



UZWATER

Water Sharing, Water Law and Water Diplomacy

Compiled by

Gunilla Björklund
Swedish Aral Sea Society

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Chapter 1

The main challenges of transboundary water resources, and Integrated Water Resources Management (IWRM)

The world's water systems, not only groundwater aquifers, lakes and rivers, but also the marine ones, both coastal and large marine ecosystems and oceans, support the development both social, economic and what is linked to livelihood system of ecosystems including the human. Many of the systems are shared by two or more nations. Or different types of (economic) interests such as the need of water for energy, agriculture or human sustenance are competing over a water system; it may be a national or a transboundary resource. Transboundary resources are interlinked by environmental, political, economic and security interdependencies. But also national resources may have a need for an integrated approach when it comes to management.

But the water systems are not static. They are of course depending on climate changes as well as changes in other of the earth systems. The human claim for water for different purposes is impacting the water quantity as well as quality. Water shortages, quality deterioration and flood and drought impacts are therefor among the problems which require greater attention and action. Integrated Water Resources Management (IWRM) is a process which can assist countries in their dealing with their sharing of water in a cost-effective and sustainable way.

Integrated Water Resources Management, IWRM, is a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. (GWP definition)

To be able to apply that process it is necessary to clearly identify some basic aspects, such as: *the natural system integration* – to understand the freshwater and coastal zone management integration, the integration of land and water management, the integration of surface water and groundwater management, integration of quantity and quality resources management, the integration of upstream and downstream water-related interest etc.

the human system integration – to make possible to apply cross-sectoral integration in national policy development, to understand and identify macro-economic effects of water developments, to identify the basic principles for integrated policy-making linked to water management, to understand influencing economic sector decisions, and the integration of all stakeholders in the planning and decision process.

Building on those basic aspects it is important to identify the general framework for IWRM, the *enabling environment* – existing national policies, legislation and regulations.

Further, the *institutional roles and functions* needs to be identified as well as ensuring their functions and operations.

The operational part of the IWRM, the application of *management instruments and tools* then, needs to be an important and integrated part of the process. It cannot be seen as a separate process although the establishing of the enabling environment is mainly seen as a first important step that has to be in place to be able to build a functional IWRM system.

The general framework for the IWRM process is, thus, identified by the three cornerstones *Ecological sustainability*, *Economic efficiency* and *Social equity* as described in the figure 4 in the GWP TAC Background Papers NO.4, 2000 (compulsory literature. That does not mean that applications for certain regions will be totally balanced between the three cornerstones but should be identified within the framework triangle.

The compulsory text as identified under this theme describes and develops the IWRM processes more in detail.

Compulsory literature from:

Global Water Partnership, Technical Advisory Committee, Background Paper 4: “*Integrated Water Resources Management*, (2000)

[http://www.gwp.org/Global/ToolBox/Publications/Background%20papers/04%20Integrated%20Water%20Resources%20Management%20\(2000\)%20English.pdf](http://www.gwp.org/Global/ToolBox/Publications/Background%20papers/04%20Integrated%20Water%20Resources%20Management%20(2000)%20English.pdf) English version

[http://www.gwp.org/Global/ToolBox/Publications/Background%20papers/04%20Integrated%20Water%20Resources%20Management%20\(2000\)%20Russian.pdf](http://www.gwp.org/Global/ToolBox/Publications/Background%20papers/04%20Integrated%20Water%20Resources%20Management%20(2000)%20Russian.pdf) Russian version

Integrated Water Resources Management

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1. INTRODUCTION



Challenges require IWRM; Challenges faced by more and more countries in their struggle for economic and social development are increasingly related to water. Water shortages, quality deterioration and flood impacts are among the problems which require greater attention and action. Integrated Water Resources Management (IWRM) is a process which can assist countries in their endeavour to deal with water issues in a cost-effective and sustainable way. The concept of IWRM has attracted particular attention following the international conferences on water and environmental issues in Dublin and Rio de Janeiro held during 1992; *however* IWRM has neither been unambiguously defined nor has the question of how it is to be implemented been fully addressed. What has to be integrated and how is it best done? Can the agreed broad principles for IWRM be operationalized in practice – and, if so, how?

Common understanding of IWRM; Global Water Partnership (GWP) has committed itself to strive to facilitate the sustainable management of water resources by fostering information exchange and helping to match needs for solutions to water problems with available tools, assistance and resources. In order to be able to work together towards a common objective, there is a clear need for a common understanding among those involved of what is meant by IWRM. Hence, the purpose of this paper is to clarify internally within GWP, and among our partners, how the GWP Technical Advisory Committee (TAC) interprets the IWRM concept and process. In so doing, TAC is building on the principles to which all governments have agreed at the Dublin and Rio conferences and which have subsequently been elaborated in the UN Commission on Sustainable Development process and other fora.

No universal blueprint; Whereas certain basic principles underlying IWRM may be commonly applicable, independent of context and stage of economic or social development, there is no universal blueprint as to how such principles can be put into practice. The nature, character and intensity of water problems, human resources, institutional

capacities, the relative strengths and characteristics of the public and private sectors, the cultural setting, natural conditions and many other factors differ greatly between countries and regions. Practical implementation of approaches derived from common principles must reflect such variations in local conditions and thus will necessarily take a variety of forms.

Target group; The intended audiences for this paper are professionals and decision-makers, who are already acquainted with water resources management. Therefore, the paper assumes some familiarity with fundamental concepts and issues within water resources management. There is no intention to provide a textbook or an all-comprehensive document but rather a focused statement giving the “corporate view” of GWP TAC and placing an emphasis on those issues most fundamental to IWRM implementation.

Content; The paper has been divided into two main parts. The first part puts forward a strong case for applying IWRM globally and defines the IWRM concept and process. The second part provides additional advice and guidance on how IWRM could be implemented in different conditions. Readers with limited time may decide to concentrate on the first part and use the second part for reference when needed. The paper is structured in such a way that an executive summary is not required. However, as a separate publication providing a short and popular summary the folder “*IWRM at a glance*” is available.

2. The overall problem

Resources under pressure; The world's freshwater resources are under increasing pressure. Growth in population, increased economic activity and improved standards of living lead to increased competition for and conflicts over the limited freshwater resource. A combination of social inequity, economic marginalization and lack of poverty alleviation programmes also force people living in extreme poverty to overexploit soil and forestry resources, which often results in negative impacts on water resources. Lack of pollution control measures further degrades water resources.

Populations under water stress; The world population has increased by a factor of about three during the 20th century whereas water withdrawals have increased by a factor of about seven. It is estimated that currently one third of the world's population live in countries that experience medium to high water stress. This ratio is expected to grow to two thirds by 2025.

The impact of pollution; Pollution of water is inherently connected with human activities. In addition to serving the basic requirement of biotic life and industrial processes, water also acts as a sink and transport mechanism for domestic, agricultural and industrial waste causing pollution. Deteriorating water quality caused by pollution influences water usability downstream, threatens human health and the functioning of aquatic ecosystems so reducing effective availability and increasing competition for water of adequate quality.

Water governance crisis; The above problems are aggravated by shortcomings in the management of water. Sectoral approaches to water resources management have dominated and are still prevailing; this leads to the fragmented and uncoordinated development and management of the resource. Moreover, water management is usually left to top-down institutions, the legitimacy and effectiveness of which have increasingly been questioned. Thus, the overall problem is caused both by inefficient governance and increased competition for the finite resource.

3. The main challenges

Securing water for people; Although most countries give first priority to satisfaction of basic human needs for water, one fifth of the world's population is without access to safe drinking water and half of the population is without access to adequate sanitation. These service deficiencies primarily affect the poorest segments of the population in developing countries. In these countries, water supply and sanitation for urban and rural areas represents one of the most serious challenges in the years ahead.

Securing water for food production; Population projections indicate that over the next 25 years food will be required for another 2-3 billion people. Water is increasingly seen as a key constraint on food production, on a par with, if not more crucial than, land scarcity. Irrigated agriculture is already responsible for more than 70% of all water withdrawals (more than 90% of all consumptive use of water). Even with an estimated need for an additional 15-20% of irrigation water over the next 25 years - which is probably on the low side - serious conflicts are likely to arise between water for irrigated agriculture and water for other human and ecosystem uses. Difficulties will be exacerbated if individual water-short countries strive for food self-sufficiency rather than achieving food security through trade; by importing food countries can in effect import water from more generously endowed areas (the concept of "virtual water").

Developing other job creating activities; All human activities need water and produce waste, but some of them need more water or produce more waste per job than others. This consideration has to be taken into account in economic development strategies, especially in regions with scarce water resources.

Protecting vital ecosystems; Terrestrial ecosystems in the upstream areas of a basin are important for rainwater infiltration, groundwater recharge and river flow regimes. Aquatic ecosystems produce a range of economic benefits, including such products as timber, fuelwood and medicinal plants, and they also provide wildlife habitats and spawning

grounds. The ecosystems depend on water flows, seasonality and watertable fluctuations and have water quality as a fundamental determinant. Land and water resources management must ensure that vital ecosystems are maintained and that adverse effects on other natural resources are considered and where possible ameliorated when development and management decisions are made.

Dealing with variability of water in time and space; Almost all the freshwater available for human use originates from precipitation, which varies immensely over time and space. Most tropical and sub-tropical regions of the world are characterized by huge seasonal and annual variations in rainfall, often compounded by erratic short-term variations. Such variability manifoldly increases the demand for infrastructure development and the need to manage water demand and supply. The challenge in managing variability is clearly greatest in the poorest countries with the least financial and human resources to cope with the problem. The effects of global climate change may add further to this challenge.

Managing risks; Variations in water flows and groundwater recharge, whether of climatic origin or due to land mismanagement, can add to drought and flood events, which can have catastrophic effects in terms of large scale loss of human life and damage to economic, social and environmental systems. Water pollution creates another set of risks, affecting human health, economic development and ecosystem functions. Economic risks are also important in water resources management and development due to the often large-scale and long-term character of the investments required. Political instability and change represents yet another important risk factor for IWRM. To date, relatively little attention has been paid to the systematic assessment of risk mitigation costs and benefits across the water use sectors and to the consequent evaluation of various risk trade-off options.

Creating popular awareness and understanding; Public awareness is needed in order to mobilize effective support for sustainable water management and induce the changes in behaviour and action required to achieve this. Additionally, public awareness and subsequent pressure for action may be vital in fostering the political will to act. The

The challenge ahead for water resources management

To strike a balance between the use of the resources as a basis for the livelihood of the world's increasing population and the protection and conservation of the resource to sustain its functions and characteristics.

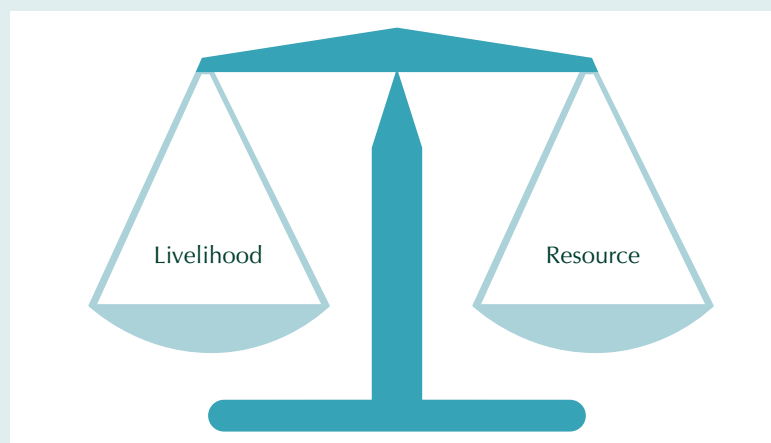


Fig. 1: The challenge of water resources management

historical development of the environmental “green” movement is an example of how public opinion and pressure has translated into political commitment and action. Time is ripe for a “blue” movement.

Forging the political will to act; In a world of scarce resources – financial as well as natural – political attention and commitment are vital to ensure good decision-making and the necessary investments in the development and management of water resources. Bringing water resources issues to the top of the political agenda is fundamental to the long-term success of sustainable water resources management.

Ensuring collaboration across sectors and boundaries; The traditional sectoral and fragmented approach to water resources management has often led to governing bodies representing conflicting interests. Policy objectives have been set without consideration of the implications for other water users and without consultation across sectoral and institutional boundaries. As a result available financial and

physical resources (including water) have not been employed to maximize total social welfare. There is a need to find appropriate ways to co-ordinate policy-making, planning and implementation in an integrated manner across sectoral, institutional and professional boundaries and to take into account the even more complex co-ordination issues arising over the management of international watercourses.

4. IWRM principles

Dublin principles as a guide; General principles, approaches and guidelines relevant to IWRM are numerous and each have their areas of appropriate application. The Dublin principles are a particularly useful set of such principles. They have been carefully formulated through an international consultative process culminating in the International Conference on Water and the Environment in Dublin, 1992. They aim to promote changes in those concepts and practices which are considered fundamental to improved water resources management. These principles are not static; there is a clear need to update and add specificity to the principles in the light of experience with their interpretation and practical implementation.

Principles have universal support; The Dublin principles significantly contributed to the Agenda 21 recommendations (Chapter 18 on freshwater resources) adopted at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, 1992. Since then, these principles (referred to as the Dublin-Rio principles) have found universal support amongst the international community as the guiding principles underpinning IWRM. More recently they have been restated and elaborated at major international water conferences in Harare and Paris, 1998, and by the UN Commission on Sustainable Commission (CSD) at its “Rio +5” follow-up meeting in 1998.

The four Dublin principles; The Dublin principles are:

- I Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.

- II Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.
- III Women play a central part in the provision, management and safeguarding of water.
- IV Water has an economic value in all its competing uses and should be recognized as an economic good.

Principle I: Water as a finite and vulnerable resource

A holistic approach; This principle recalls the need for a holistic approach to management, recognizing all the characteristics of the hydrological cycle and its interaction with other natural resources and ecosystems. The statement also recognizes that water is required for many different purposes, functions and services; holistic management, therefore, has to involve consideration of the demands placed on the resource and the threats to it.

Resource yield has natural limits; The notion that freshwater is a finite resource arises as the hydrological cycle on average yields a fixed quantity of water per time period; this overall quantity cannot be altered significantly by human actions (desalinization of seawater is becoming feasible in some locations but still at a very limited scale). The freshwater resource may be regarded as a natural capital asset, which needs to be maintained to ensure that the desired services it provides are sustained.

Effects of human activities; Human beings can clearly affect the productivity of the water resource. They can reduce the availability and quality of water by actions, such as mining of groundwater, polluting surface- and groundwater and changing land use (afforestation, deforestation, urbanization) which alter flow regimes within surface water systems. More positive effects can, however, arise from regulation of the natural temporal and spatial variability of flows. When water is used for non-consumptive purposes and involves return flows, planned

reuse can increase effective resource flows and the total quantity of services provided. It also has to be recognized that the value or welfare derived from the water resource assets will vary with the uses to which the assets are put.

Upstream-downstream user relations; The effects of human activities lead to the need for recognition of the linkages between upstream and downstream users of water. Upstream users must recognize the legitimate demands of downstream users to share the available water resources and sustain usability. Excessive consumptive use or pollution of water by upstream users may deprive the downstream users of their legitimate use of the shared resource. This clearly implies that dialogue or conflict resolution mechanisms are needed in order to reconcile the needs of upstream and downstream users.

A holistic institutional approach; Holistic management not only involves the management of natural systems; it also necessitates co-ordination between the range of human activities which create the demands for water, determine land uses and generate water-borne waste products. Creating a water sensitive political economy requires co-ordinated policy-making at all levels (from national ministries to local government or community-based institutions). There is also a need for mechanisms which ensure that economic sector decision-makers take water costs and sustainability into account when making production and consumption choices. The development of an institutional framework capable of integrating human systems – economic, social and political – represents a considerable challenge.

Principle II: Participatory approach

Real participation; Water is a subject in which everyone is a stakeholder. Real participation only takes place when stakeholders are part of the decision-making process. This can occur directly when local communities come together to make water supply, management and use choices. Participation also occurs if democratically elected or otherwise accountable agencies or spokespersons can represent stakeholder groups. Additionally, there are circumstances in which participation in

decision-making can take place through market processes; if appropriate pricing systems are in place, local governments, community organizations or irrigation districts could signal their demands for bulk water services. The type of participation will depend upon the spatial scale relevant to particular water management and investment decisions and upon the nature of the political economy in which such decisions take place.

Participation is more than consultation; Participation requires that stakeholders at all levels of the social structure have an impact on decisions at different levels of water management. Consultative mechanisms, ranging from questionnaires to stakeholder meetings, will not allow real participation if they are merely employed to legitimize decisions already made, to defuse political opposition or to delay the implementation of measures which could adversely impinge upon a powerful interest group.

Achieving consensus; A participatory approach is the only means for achieving long-lasting consensus and common agreement. However, for this to occur, stakeholders and officials from water management agencies have to recognize that the sustainability of the resource is a common problem and that all parties are going to have to sacrifice some desires for the common good. Participation is about taking responsibility, recognizing the effect of sectoral actions on other water users and aquatic ecosystems and accepting the need for change to improve the efficiency of water use and allow the sustainable development of the resource. Participation will not always achieve consensus, arbitration processes or other conflict resolution mechanisms will also need to be put in place.

Creating participatory mechanisms and capacity; Governments at national, regional and local levels have the responsibility for making participation possible. This involves the creation of mechanisms for stakeholder consultation at all spatial scales; such as national, basin or aquifer, catchment and community levels. However, while the creation of consultative mechanisms is necessary, it will by itself not lead to real participation. Governments also have to help create participatory capacity, particularly amongst women and other marginalized social

BOX 1

Creating participatory mechanisms

The state of Guanajuato, Mexico has created a Groundwater Technical Committee (Comité Técnico de Aguas Subterráneas-Cotas) to open an arena in which different water users and governmental officials gather to seek for solutions to the problems of water misuse and distribution. It is also a forum through which water users and authorities have direct channels of communication from top to bottom and vice-versa. This has enabled the possibility of implementing several regulatory decisions by consensus.

groups. This may not only involve awareness raising, confidence building and education, but also the provision of the economic resources needed to facilitate participation and the establishment of good and transparent sources of information. It has to be recognized that simply creating participatory opportunities will do nothing for currently disadvantaged groups unless their capacity to participate is enhanced.

The lowest appropriate level; Participation is an instrument that can be used to pursue an appropriate balance between a top-down and a bottom-up approach to IWRM. For some decisions the appropriate decision unit is the household or the farm; participation depends on the provision of mechanisms and information to allow individuals and communities to make water sensitive choices. At the other end of the spatial scale the management of international river basins will require some form of cross-national co-ordinating committees and mechanisms for conflict resolution.

Principle III: The important role of women

Involvement of women in decision-making; Women's participation as decision-makers is interwoven with gender hierarchies and roles within different cultures leading to the existence of communities that ignore or impede women's participation in water management. Although "gender issues" have been reflected in all statements on IWRM since the Dublin and Rio conferences, there is still a long way to go before

rhetoric is replaced by operational mechanisms and actions to ensure an equitable participation of women in IWRM. Therefore special efforts must be made to ensure women's participation at all organizational levels.

Women as water users; It is widely acknowledged that women play a key role in the collection and safeguarding of water for domestic and – in many cases – agricultural use, but that they have a much less influential role than men in management, problem analysis and in the decision-making process related to water resources. The fact that social and cultural circumstances vary between societies suggests that the need exists to explore different mechanisms for increasing women's access to decision-making and widening the spectrum of activities through which women can participate in IWRM.

IWRM requires gender awareness; In developing the full and effective participation of women at all levels of decision-making, consideration has to be given to the way different societies assign particular social, economic and cultural roles to men and women. There is a need to ensure that the water sector as a whole is gender aware, a process which should begin by the implementation of training programmes for water professionals and community or grass root mobilizers.

Principle IV: Water as an economic good

Water has a value as an economic good; Many past failures in water resources management are attributable to the fact that water has been – and is still – viewed as a free good, or at least that the full value of water has not been recognized. In a situation of competition for scarce water resources such a notion may lead to water being allocated to low-value uses and provides no incentives to treat water as a limited asset. In order to extract the maximum benefits from the available water resources there is a need to change perceptions about water values and to recognize the opportunity costs involved in current allocative patterns.

Value and charges are two different things; Concern has been voiced

over the social consequences of “the economic good” concept: How would this affect poor people’s access to water? (While the Dublin principles refer to water as an economic good, water is referred to as an economic *and social* good in Chapter 18 of Agenda 21). To avoid confusion over this concept there is a need to distinguish clearly between *valuing* and *charging* for water. The *value* of water in alternative uses is important for the rational allocation of water as a scarce resource (using the “opportunity cost” concept), whether by regulatory or economic means. *Charging* for water is applying an economic instrument to affect behaviour towards conservation and efficient water usage, to provide incentives for demand management, ensure cost recovery and to signal consumers’ willingness to pay for additional investments in water services.

Useful water value concepts; The following concepts of water value have been found useful within IWRM. The full value of water consists of its use value – or economic value – and the intrinsic value. The economic value which depends on the user and the way it is used, include: value to (direct) users of water, net benefits from water that is lost through evapotranspiration or other sinks (e.g. return flows), and the contribution of water towards the attainment of social objectives.

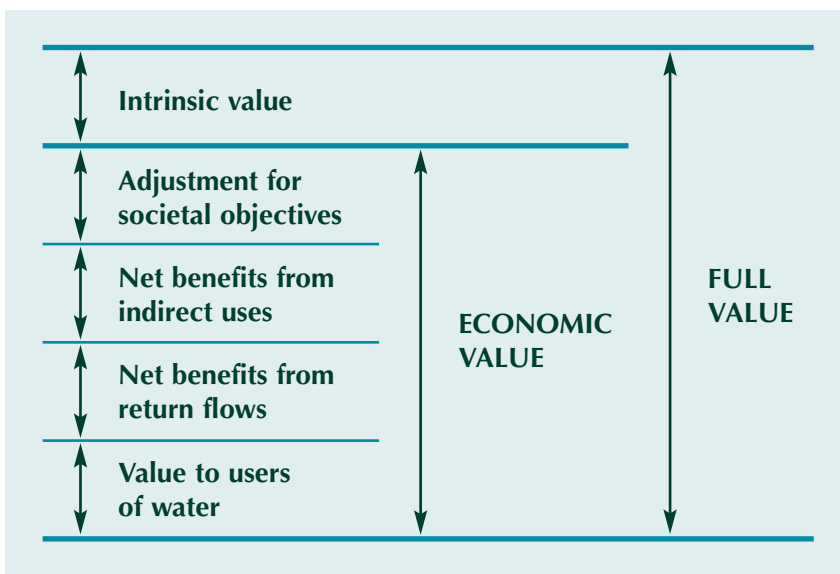
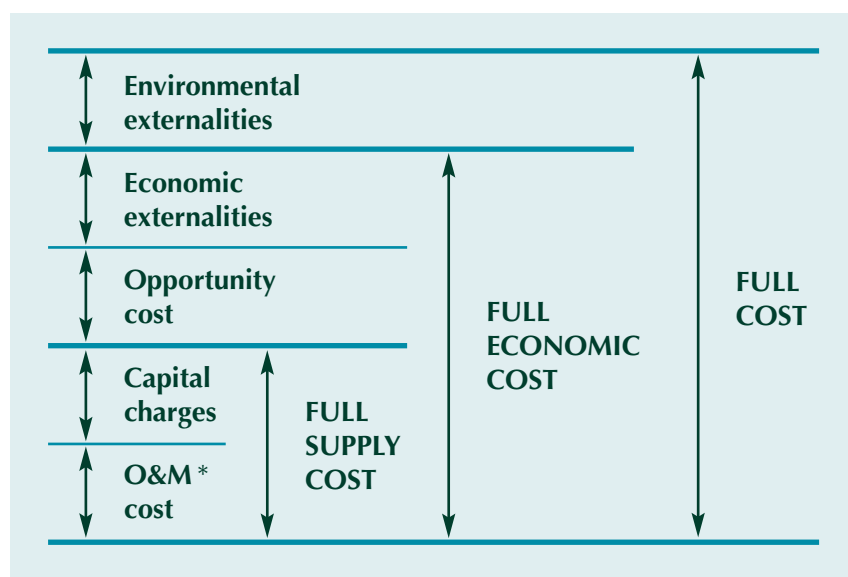


Fig. 2a: General principles for valuing water

The intrinsic value includes non-use values such as bequest or existence values (see Fig. 2a).

Useful water cost concepts; The full cost of providing water includes the full economic cost and the environmental externalities associated with public health and ecosystem maintenance. The full economic cost consists of: the full supply cost due to resource management, operating and maintenance expenditures and capital charges, the opportunity costs from alternative water uses, and the economic externalities arising from changes in economic activities of indirectly affected sectors (see Fig. 2b).



* O&M = Operation and Maintenance

Fig. 2b: General principles for costing water

The goal of full cost recovery; The recovery of full cost should be the goal for all water uses unless there are compelling reasons for not doing so. While, in principle, the full cost needs to be estimated and made known for purposes of rational allocation and management decisions, it need not necessarily be charged to the users. The cost, however, will have to be borne by someone. Estimation of full cost may be very difficult. In situations involving conflict over water

attempts should be made to at least estimate the full economic cost as the basis for allocation.

Managing demand through economic instruments; Treating water as an economic good may help balance the supply and demand of water, thereby sustaining the flow of goods and services from this important natural asset. When water becomes increasingly scarce, continuing the traditional policy of extending supply is no longer a feasible option. There is a clear need for operational economic concepts and instruments that can contribute to management by limiting the demand for water. Importantly, if charges for water goods and services reflect the full cost involved, managers will be in a better position to judge when the demand for different water products justifies the expenditure of scarce capital resources to expand supply.

Financial self-sufficiency versus water as a social good; In order for water resources management agencies and water utilities to be effective there is a need to ensure that they have adequate resources to be financially independent of general revenues. Thus, as a minimum, full supply costs should generally be recovered in order to ensure sustainability of investments. But high supply costs and social concerns may require direct subsidies to specific disadvantaged groups. While subsidies “across the board” generally distort water markets and should be discouraged, direct subsidies for targeted groups may be relevant, but they need to be *transparent*. There are, however, several institutional prerequisites for the successful implementation of targeted subsidies; these include adequate taxation or general revenue collection systems, mechanisms to identify the target groups and the capacity to monitor and follow up on fund utilization. Transparent financial linkages among different organizations and between users and management agencies are fundamental to successful implementation of water policies. The principle “subsidize the good, tax the bad” has considerable merit when exercised in a transparent manner, although it has to be recognized that all subsidies have to be paid for by someone. In general, subsidies paid for from taxation will be less distorting than systems which rely on cross-subsidies between different groups of consumers; however, it is acknowledged that in many administrations cross-subsidies are easier to implement.

5. Definition of IWRM

IWRM practices depend on context; At the operational level the challenge is to translate the agreed principles into concrete action. The response to this is often referred to as *Integrated Water Resources Management (IWRM)*, with the “M” referring to both “development and management”. However, the concept of IWRM is widely debated and an unambiguous definition of IWRM does not currently exist. Hence, the regional and national institutions must develop their own IWRM practices using the collaborative framework emerging globally and regionally. To guide further work a number of elements, which have been highlighted in conceptual discussions within and outside GWP, are given below.

IWRM definition; For the purposes of providing a common framework the following definition of IWRM is used:

BOX 2

Definition of IWRM

IWRM is a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

“Integration” in IWRM

Integration necessary but not sufficient; According to the Webster Dictionary the need for *integration* arises when dealing with the situation of “regular interaction of interdependent groups of items forming a uniform whole”. *Integration*, then, is the “art and science” of blending the right proportions of these items into a whole. However, those involved in water resources management know that *integration per se* cannot guarantee development of optimal strategies, plans and management schemes (mixing two poor ingredients does not make a good meal).

Natural and human system interaction; The concept of *Integrated Water Resources Management* – in contrast to “traditional”, fragmented water resources management – at its most fundamental level is as concerned with the management of water demand as with its supply. Thus, integration can be considered under two basic categories:

- the natural system, with its critical importance for resource availability and quality, and
- the human system, which fundamentally determines the resource use, waste production and pollution of the resource, and which must also set the development priorities.

Integration has to occur both within and between these categories, taking into account variability in time and space. Historically, water managers have tended to see themselves in a “neutral role”, managing the natural system to provide supplies to meet externally determined needs. IWRM approaches should assist them in recognizing that their behaviour also affects water demands. Clearly, consumers can only “demand” the product supplied, but water can be supplied with very different properties, for instance in terms of quality and availability in low flow or peak demand periods. Price and tariff design will also affect water demand, as will investments in infrastructure which translates potential into effective demand.

Natural system integration

Integration of freshwater management and coastal zone management; Freshwater management and coastal zone management should be integrated, reflecting the “continuum” of freshwater and coastal waters. Freshwater systems are important determinants of conditions in the coastal zone and hence freshwater managers should consider the requirements of the coastal zone when managing water resources. This is a special case of the upstream-downstream issue, which is receiving increased attention in all countries, notably through the recent UN declaration on land-based sources of pollution, which has led to the Global Programme of Action – GPA and the Global International Waters Assessment – GIWA.

Integration of land and water management; An integrated approach to the management of land and water takes as its departure the hydrological cycle transporting water between the compartments air, soil, vegetation, surface and groundwater sources. As a result, land use developments and vegetation cover (including crop selection) influence the physical distribution and quality of water and must be considered in the overall planning and management of the water resources. Another aspect is the fact that water is a key determinant of the character and health of all ecosystems (terrestrial as well as aquatic), and their water quantity and quality requirements therefore have to be taken into account in the overall allocation of available water resources. The promotion of catchment and river basin management is an acknowledgement that these are logical planning units for IWRM from a natural system perspective. Catchment and basin level management is not only important as a means of integrating land use and water issues, but is also critical in managing the relationships between quantity and quality and between upstream and downstream water interests.

“Green water” and “blue water”; A conceptual distinction can be made between water that is used directly for biomass production and “lost” in evapotranspiration (“green water”) and water flowing in rivers and aquifers (“blue water”). Terrestrial ecosystems are “green water” dependent, whereas aquatic ecosystems are “blue water” dependent.

Most water management, including the literature on IWRM, tends to focus on the “blue water”, thus neglecting rain and soil water management. Management of “green water” flows holds significant potential for water savings (crop per evaporated drop in rainfed and irrigated agriculture), increasing water use efficiency and the protection of vital ecosystems.

Integration of surface water and groundwater management; The hydrological cycle also calls for integration between surface and groundwater management. The drop of water retained at the surface of a catchment may appear alternately as surface- and groundwater on its way downstream through the catchment. Large proportions of the world’s population depend on groundwater for water supply. The widespread use of agro-chemicals and pollution from other non-point sources already pose significant threats to groundwater quality and force managers to consider the linkages between surface- and groundwater. Groundwater pollution is frequently, for all practical purposes, irreversible over a human timescale given present technologies and the remedy costs involved.

Integration of quantity and quality in water resources management; Water resources management entails the development of appropriate quantities of water with an adequate quality. Water quality management is thus an essential component of IWRM. The deterioration of water quality reduces the usability of the resource for downstream stakeholders. Clearly, institutions capable of integrating the quantity and quality aspects have to be promoted to influence the way human systems operate in generating, abating and disposing of waste products.

Integration of upstream and downstream water-related interests; An integrated approach to water resources management entails identification of conflicts of interest between upstream and downstream stakeholders. The consumptive “losses” upstream will reduce river flows. The pollution loads discharged upstream will degrade river water quality. Land use changes upstream may alter groundwater recharge and river flow seasonality. Flood control measures upstream may threaten flood-dependent livelihoods downstream. Such conflicts

of interest must be considered in IWRM with full acknowledgement of the range of physical and social linkages that exist in complex systems. Recognition of downstream vulnerability to upstream activities is imperative. Once again management involves both natural and human systems.

Human system integration

Mainstreaming of water resources; When it comes to analysing human activities or service systems, virtually all aspects of integration involve an understanding of the natural system, its capacity, vulnerability and limits. Such integration is inevitably a complex task and perfect integration is unrealistic. It involves:

- attempting to ensure that governmental policies, financial priorities and planning (physical, economic and social) take account of the implications for water resources development, water related risks and water use;
- influencing private sector decision-makers to make technological, production and consumption choices based on the real value of water and the need to sustain the natural resource assets over time; and
- providing fora and mechanisms to ensure that all stakeholders can participate in water resource allocation decisions, conflict resolution and trade-off choices.

Integrative measures are needed at all levels from the individual household to international product markets.

Cross-sectoral integration in national policy development; The IWRM approach implies that water-related developments within all economic and social sectors should be taken into account in the overall management of the water resources. Thus, water resources policy must be integrated with national economic policy, as well as with national sectoral policies. Conversely, economic and social policies need to take account of the water resource implications, for instance, national

energy and food policies may have a profound impact on water resources – and vice versa. Hence, developments must be evaluated for possible impacts on – or requirements for – the water resource, and such evaluations should be considered when designing and prioritizing development projects. The development and management of water resources has an impact on the economy and society through various pathways, such as migration, settlement growth, and changes in the composition of industries. Consequently, the water resources management system must include cross-sectoral information exchange and co-ordination procedures, as well as techniques for the evaluation of individual projects with respect to their implications for the water resources in particular and society in general.

Macro-economic effects of water developments; In situations where large amounts of capital are mobilized for water sector investments the macro-economic impacts are often quite large and deleterious to overall economic development. The increased demand for goods and services in the non-water sectors caused by the capital inflows raises their prices and thus leads to inflation. This has often induced long-term macro-economic effects that are far from desirable.

Basic principles for integrated policy-making; Cross-sectoral and “integrated” policy-making is extremely hard to achieve in practice but there are basic principles, such as:

- economic planners must carefully assess the inflation, balance of payments, and macro-economic growth impacts before embarking on any large-scale capital investment program in the water sector;
- land use policy-makers must be informed about the water consequences downstream and the *external* costs and benefits imposed on the natural water system (e.g. deforestation or urbanization of catchments could alter water flow regimes and exacerbate risks such as floods). This does not mean that these external costs should not be incurred but that the relevant policy-makers weigh these costs against the expected benefits arising from their policy or plan;

- policies which act to increase the demand for water, including its use to remove waste products, should be developed with knowledge of the full incremental costs involved (Fig. 2b);
- policies which effectively allocate water between various uses should take into account the relative values in use, measured in economic and social terms;
- policy-makers need to be aware of the trade-offs between short-term benefits and long-term costs and of situations where the application of the precautionary principle can reduce total costs over time;
- policy-makers should be aware that subsidiarity in water resources management is essential so that different tasks are undertaken at the lowest appropriate level.

Influencing economic sector decisions; The decisions of economic sector actors (from trans-national or large state-owned companies to individual farmers or households) will in most countries have significant impact on water demands, water-related risks and the availability and quality of the resource. These decisions will not be water sensitive unless clear and consistent information is available on the full costs of their actions; importantly, incentives to take account of the external costs of their decisions have to be given. Education and shifts in cultural attitudes can play an important role. Consistency of message is, however, crucial; it is, for example, clearly counterproductive to publicize water conservation or pollution control benefits while providing free water or wastewater discharge. Likewise, information on water-related risks is pointless unless the means to reduce those risks are actually available at affordable costs.

Integration of all stakeholders in the planning and decision process; The involvement of the concerned stakeholders in the management and planning of water resources is universally recognized as a key element in obtaining a balanced and sustainable utilization of water. But in many cases stakeholders represent conflicting interests and their objectives concerning water resources management may substantially differ. To deal with such situations the IWRM should develop operational tools for conflict management and resolution as well as for the evaluation of trade-offs between different objectives, plans and

actions. An important issue here is the need to identify and designate water resources management functions according to their lowest appropriate level of implementation; at each implementation level the relevant stakeholders need to be identified and mobilized.

Integrating water and wastewater management; Water is a renewable and reusable resource. Where use is non-consumptive and returned after use, mechanisms are needed to ensure that wastewater flows are a useful addition to resource flows or water supply. Without co-ordinated management waste flows often simply reduce effective supplies by impairing water quality and increasing future costs of water supply. Incentives for reuse can be provided to individual users but to be effective reuse opportunities have to be designed into the political, economic, social and administrative systems.

The cross-sectoral integration between water use sub-sectors, and the role of IWRM in their linkage, is illustrated in the “GWP comb” below:

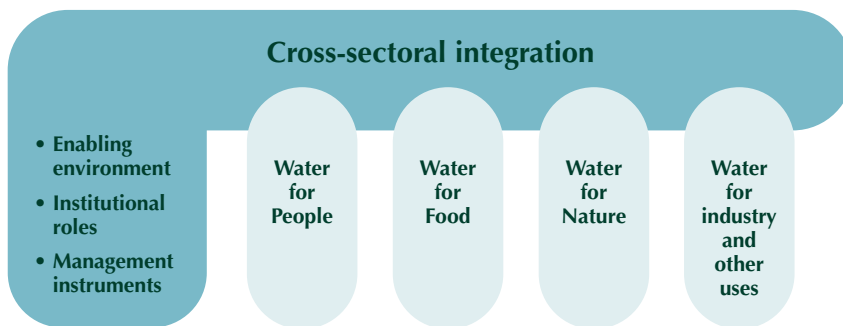


Fig. 3: IWRM and its relations to sub-sectors

Overriding criteria; In pursuing IWRM there is a need to recognize some overriding criteria that take account of social, economic and natural conditions:

- *Economic efficiency in water use:* Because of the increasing scarcity of water and financial resources, the finite and vulnerable nature of water as a resource, and the increasing demands upon it, water must be used with maximum possible efficiency;
- *Equity:* The basic right for *all* people to have access to water of adequate quantity and quality for the sustenance of human well-being must be universally recognized;
- *Environmental and ecological sustainability:* The present use of the resource should be managed in a way that does not undermine the life-support system thereby compromising use by future generations of the same resource.

Important elements; The IWRM framework and approach recognize that complementary elements of an effective water resources management system must be developed and strengthened concurrently. These complementary elements include (see Fig. 4):

- *the enabling environment* – the general framework of national policies, legislation and regulations and information for water resources management stakeholders;
- *the institutional roles* and functions of the various administrative levels and stakeholders; and
- *the management instruments*, including operational instruments for effective regulation, monitoring and enforcement that enable the decision-makers to make informed choices between alternative actions. These choices need to be based on agreed policies, available resources, environmental impacts and the social and economic consequences.

These three basic elements are described in the following Part II.

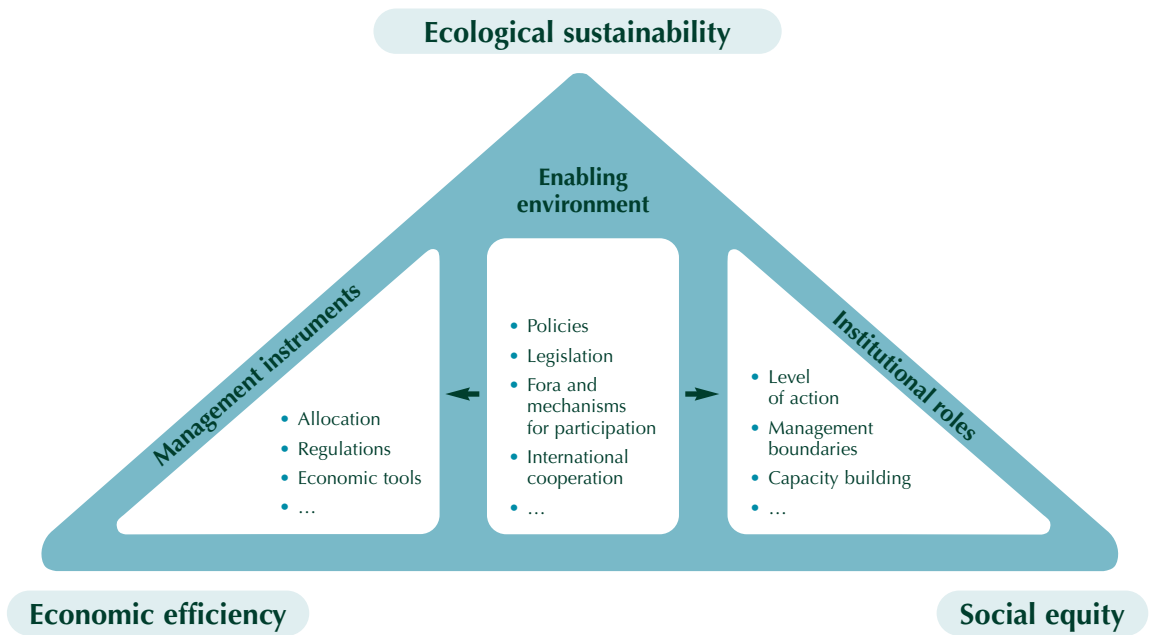


Fig. 4: General framework for IWRM

6. The enabling environment

Enabling environment; A proper enabling environment is essential to both ensure the rights and assets of all stakeholders (individuals as well as public and private sector organizations and companies), and also to protect public assets such as intrinsic environmental values. The enabling environment is basically national, provincial or local policies and the legislation that constitutes the “rules of the game” and enable all stakeholders to play their respective roles in the development and management of water resources; and the fora and mechanisms, including information and capacity building, created to establish these “rules of the game” and to facilitate and exercise stakeholder participation.

From top to bottom; In order to achieve efficient, equitable and sustainable water management within the IWRM approach, a major institutional change will be needed. Both top-down and bottom-up participation of all stakeholders will have to be promoted – from the level of the nation down to the level of a village or a municipality or from the level of a catchment or watershed up to the level of a river basin. The principle of subsidiarity, which drives down action to the lowest appropriate level, will need to be observed.

From companies to communities; Apart from government agencies, private companies, community based organizations which have full participation of women and disadvantaged groups, NGOs and other sections of civil society should be involved. All these organizations and agencies have an important role to play in enhancing access to water, in bringing about a balance between conservation and development, and making water an economic and social good.

The role of government

Government as an enabler; The participatory approach involves raising awareness of the importance of IWRM among policy-makers and the general public. The enabling role of government implies that

prescriptive, central approaches to developments within the water sector should be replaced by the creation of a framework within which participatory, demand-driven sustainable development can take place. If governments adopt a facilitating and arbitrating role, the burdens on the state can be alleviated and the performance of public functions enhanced. governments need to create the conditions under which all the actors having a stake in a particular issue can become involved and can negotiate amongst themselves to achieve acceptable solutions to water problems. However, participation does not mean that governments can abdicate their responsibilities.

Government as regulator and controller; Policy-making, planning, water allocation, monitoring, enforcement and final conflict resolution still need to be the responsibility of government. It is now generally recognized that government – where possible – should play a decreasing role as service provider and concentrate more on being the regulator and controller of specialist service providers. Others, such as the private sector or independent parastatals, may then provide water services subject to monitoring and control by some regulatory entity. The trend away from government provision has been fuelled not only by concerns over inefficiencies, conflicting interests and the lack of management transparency but also by the increasing difficulties faced by many governments in financing the necessary investments in water resources.

Government as service provider; While all governments should make a whole-hearted attempt to transfer service provision tasks to non-governmental stakeholders, this may take many years to achieve in some countries. Moreover, given that water services contain clear public good elements (e.g. flood protection and the bulk disposal and treatment of waste products) continued public investment will be necessary. Where governments retain provision functions it is an important principle that provision agencies should not regulate themselves; separation of regulatory and implementation functions helps ensure transparency and accountability.

Improvement of public sector performance; The fact that a fifth of the world's population (in general the poorest people) is without access

to safe drinking water and half of the population is without access to adequate sanitation, has been regarded as an indictment of public service provision and has pushed many governments and cities to resort to the private sector. Private sector participation should not, however, be assumed to be a panacea that can immediately solve capacity and investment problems. Perhaps its greatest impact will be to stimulate accountability and competition and, therefore, better performance by public utilities. Although there is a trend towards privatization and governments have a key role to play in facilitating greater private sector participation, the fact remains that public utilities will, for the foreseeable future, serve the vast majority of users. Hence, it is critical that greater attention be paid to improving public sector performance. Improvement of utility efficiency, be it public or private, has to be accompanied by government decisions to address key problems such as water pricing, overstaffing, the needs of the urban poor, and to provide the legal and institutional framework for successful operations.

Government role under private sector involvement; By private sector, we mean here both the corporate sector and the community based organizations. Contemporary thinking has it that private sector involvement in providing water services, notably in the water and sanitation sub-sector, will contribute to reducing government's role and burden in water management. This is not necessarily so: the tasks will change as the operational functions are transferred to private actors, but public entities need to have the capacity and capability to monitor and regulate service delivery to ensure adequate provision at reasonable prices. In short, private sector involvement typically requires *more* government regulation, not less. Moreover, involvement of poor communities will need catalytic financial support from government and other external sources.

Government and water markets; All markets require the support of governments to provide the legal, social and economic environment in which trade and competition can flourish. In principle, available water resources can be traded in a market place to allow the water to be employed in the highest value uses. Although theoretically more efficient, water markets can only function given appropriate institu-

tional arrangements. Mechanisms will also be needed to ensure that trading does not impose external costs on other water users (including the environment), or allow powerful interest groups to monopolize supplies and exclude disadvantaged groups from access to essential services. When governments choose to give a greater role to market mechanisms, both in the allocation of raw water and in the supply of services to end users, it is essential that legal and regulatory systems are in place to cope with market failures.

Water legislation

Legislation is part of a framework for action; Legislation provides the basis for government intervention and action and establishes the context and framework for action by non-governmental entities; hence it is an important element within the enabling environment. Specific water laws have been enacted in a considerable number of countries, but some still lack a water resources law *per se*. Although references to water resources may be found in the national legislation, these are often dispersed in a multitude of sectorally oriented laws and may be contradictory or inconsistent on some aspects of water resource usage.

Legislation and the political will to enforce it; The more scarce water or capital is, and the more conflicts arise over water, the more important it is to have in place a coherent and comprehensive water law. It requires considerable time to establish coherent and comprehensive water legislation from a fragmented and outdated legislative patchwork. Such a comprehensive revision process should not, however, serve to hold back sound initiatives which address pressing short-term issues. In many cases the biggest problem is not lack of adequate legislation but lack of the political will, resources and means to enforce the existing legislation.

BOX 3

An IWRM case from Tamil Nadu, India

Although it is too early to review its success, several components of IWRM are being used in the Vaigai basin of Tamil Nadu in South India, including:

- participation of stakeholders ranging from government agencies to washerwomen;
- a decision support system to quantify implications and trade-offs of alternative water allocation and policy decisions; and
- political and administrative support from the government and other agencies.

Problems in the Vaigai river basin, a very water-short basin, include:

- conflicts between stakeholders because of multiple uses of water;
- involvement of multiple institutions in various, often overlapping, aspects of basin planning and management;
- upstream/downstream conflicts; and
- cross-sectoral conflicts resulting from rapidly increasing urbanization even as traditional water demands remain.

The future poses major challenges for allocation of water and the development of a co-operative framework to make decisions based on full stakeholder participation. This is not possible without holistic river basin management. A stakeholder group has been set up by the Government of Tamil Nadu to evaluate various water allocation options.

In order to analyse alternative future scenarios, areas with significant trade-offs and impact changes in policies, agricultural cropping patterns, a Decision Support System called THANNI ("water" in Tamil Language) has been developed. THANNI includes an information system and an optimization model to maximize the benefits from water use subject to a variety of hydrological, economic, legal and policy constraints. The interface has also been converted into local Tamil language for greater communication capability. The system provides decision-makers a tool for policy and scenario analysis and stakeholders a focal point for discussions. Next steps include stakeholder groups further developing THANNI to provide a new interactive paradigm for co-ordinated and co-operative decision-making.

Requirements of legislation; Water legislation should:

- be based on a stated national water resources policy that cuts across sectoral and stakeholder divisions, addresses water as a resource and stresses the societal priority for basic human needs and ecosystem protection;
- secure water (use) rights to allow private and community investment and participation in water management;
- regulate monopolized access to raw water and water services, and prevent harm to third parties;
- present a balanced approach between resource development for economic purposes and the protection of water quality, ecosystems and other public welfare benefits;
- ensure that developmental decisions are based on sound economic, environmental, and social assessment;
- ensure the possibility of employing modern participatory and economic tools where, when and to the extent needed.

Legislation, regulations and by-laws; Amendment of water legislation is usually a tedious and time-consuming process, and therefore legislation should be kept at a sufficiently general level, establishing the rights and obligations of all stakeholders in water management, the powers and functions of regulatory bodies and the penalties for infractions of the law. Detailed guidelines and provisions for enforcement and implementation should be incorporated in the more dynamic parts of the legislative system, for example the framework of regulations and by-laws that may be amended in a continuous process as circumstances change.

The cross-sectoral and upstream-downstream dialogue

Allocation following dialogue; A critically important element of IWRM is the integration of various sectoral views and interests in the decision-making process, with due attention given to upstream-downstream relationships. The idea is to incorporate consultation and to seek consensus with all relevant line ministries at all tiers of government, as well as with other stakeholders located in different parts of a river basin. Only in this way is it possible to plan water allocation

across the entire basin and to avoid misallocation of water resources to one particular sector when higher value uses and users are denied services. Putting on one table, and transparent to all sectors and stakeholders, the combined demands placed upon water (quantity and quality) will help determine what is feasible in order to achieve sustainable water resources management.

Co-ordination at the highest level – implementation by line

agencies; In order to ensure the co-ordination of water management efforts across water-related sectors and throughout the entire basin, formal mechanisms and means of co-operation and information exchange need to be established. Such co-ordinating mechanisms should be created at the highest policy level. The implementation of policies should then be left to those line agencies and private corporate and community institutions which would be best able to realize the full advantage of independent decision-making and economies of scale. To ensure efficiency of integration there is a need to establish proper financial linkages between the relevant institutions. This would provide incentives for cross-sectoral action.

Financing structures and investment allocations for water resources infrastructure

The different investments needed; When looking at the investments needed for water resources infrastructure, one has to distinguish between the different actors who bear the responsibility for ensuring (but not necessarily providing) each type of investment:

- Investments to reduce the spatial and temporal imbalances in water availability, to protect people from extreme flood and drought events and to provide public goods are the responsibility of public authorities, be they national or sub-national;
- Investments designed to deliver water to a large number of users (households, industry, energy producers or irrigators) and remove waste or surplus water are the responsibility of local or regional governments, special irrigation institutions or water authorities of various types; and

- Investments that enable each user, on their own property, to solve their own water problems falls within the realm of personal responsibility.

Private financing assumes investment security; It is the responsibility of government to ensure and facilitate the overall investments needed to develop and maintain an adequate water infrastructure. Given the growing pressure in many countries for public sector reforms (often synonymous with cuts in the size and budget of the public sector), and the increasing competition for scarce development assistance resources, this challenge becomes increasingly difficult for developing country governments to meet. These problems favour the increased involvement of private sector financing but such financing will only take place if legislation provides for investment security.

Conditions for private sector involvement; The private sector has a role to play in many countries in improving the technical and managerial capacity of utilities and providing essential investment capital. However, investment by private companies will only take place if the rates of return earned on capital are commensurate with the perceived risks involved. In this respect there is a need to separate commercial and political risk and particular attention has to be given to financial and economic risk assessment. Although to attract investment protection from some forms of risk will be needed (e.g. asset expropriation or undue political intervention in management), this does not mean that all risks and incentives for efficient operations should be removed. To do so would not only leave the public sector or water users to shoulder the brunt of investment risks but also the efficiency advantages of private sector operations would be lost. When settling water service delivery contracts, authorities should study very carefully the question of risk sharing with contractors, and especially the issues of interest and exchange rates, financial conditions, and unlimited compulsory purchases of outputs. Financing is best attracted by ensuring long-term sustainability, i.e. by facilitating recovery of costs through reasonable pricing and independent regulation. Traditionally, the heaviest involvement of private companies has been in the water and sanitation sub-sector and has ranged from service contracts (single function contract to perform a specific service for a fee) to full divestiture (full transfer of

assets through sale, and private sector responsible for all capital investment, maintenance, operations and revenue collection). Community based organizations also make investments to develop and manage water supply systems when they are legally empowered to do so, their water rights are clearly delineated, efforts are made by NGO's, social workers or government agencies to develop effective community institutions and there is catalytic financial assistance available from the government or other external sources.

Conditions for private sector performance; While private sector enterprises may be more sensitive to productivity gains and to customer satisfaction, because their earnings and survival in business depend essentially on these factors, there are no guarantees that privatization will actually yield the desired performance improvements. Simply converting a public sector monopoly into a private one provides no competitive incentives for the utility to operate efficiently, make appropriate investments or respond to consumer demands. Likewise, privatization *per se* may do little to improve sector performance if governments are unwilling or unable to tackle such underlying problems as financing the provision of public and merit goods, curbing over-manning, restricting over-intrusive political intervention and allowing for flexibility in water pricing. The conditions under which the private sector will operate need to be clearly spelled out in tender documents, in the contract and in the regulatory procedures. Among these is a clear agreement on the quality of services to be provided, on the pricing policies, especially the subsidies or cross-subsidies for the poor, and on the range of decisions which have to be taken at the public authority level, and those that lie with the private company alone.

Charging the full cost of water; In principle, charging the full cost for water assures the long-term viability of the water supply service and effectively constrains water demand thereby ensuring sustainability of the resource. These sustainability considerations require that over time and wherever feasible both the direct and indirect beneficiaries of water use should face prices that reflect the full cost of water. In cases where broader social concerns constrain the application of full cost pricing, it may be appropriate over the short term to base prices on full

economic cost recovery or at the very minimum on full supply costs. Implied or explicit subsidies need to be identified, targeted and implemented in a transparent manner.

Sources of public investment; There are important characteristics of water that warrant a role for public investment in water-related infrastructure. For instance, control of floods and waterborne diseases are public goods, which cannot easily be charged for on the basis of individual benefit and use. In addition, the large size and extremely long time horizons of some investments, combined with the inherent risk of political interference, may reduce the incentives for private investment. To ensure adequate financing of the water sector, actions need to be taken to improve donor-recipient dialogue over financial resource mobilization and its allocation to water resource development. The international community and governments (donors and recipients alike) should be urged to maintain and increase their assistance to the water resources sector, targeted to solving specific problems. Value can be added by improving communication and co-operation between financiers (public, private, national, bilateral and international), by introducing enabling measures to mobilize the largely untapped community financing resources and by the provision of credit mechanisms which foster self-reliance efforts by individuals.

Co-operation within international river basins

Vulnerability of downstream riparians; Roughly half of all land in the world lies within river basins covering parts of the territory of two or more countries. Downstream riparians are especially vulnerable since the origin of the water on which they depend is not within their national territory. This issue has created and still creates substantial political tensions and conflicts at the regional level around the world.

Sovereignty requires special conflict resolution mechanisms; The issue is similar in nature to the classical upstream-downstream issue often encountered at the national or local level but exacerbated here by the mixture of national sovereignty. The conflict resolution or priority-setting mechanisms implemented at national or local level do not

automatically translate into validity at the international level because of the well established overriding international principle of national sovereignty.

Constraints on and potential for sharing transboundary waters;

The enabling environment equivalent to national or local legislation is international agreement on the principles for managing and sharing transboundary waters. Although there are substantive principles in international water law such as equitable utilization and prohibition of significant harm, there are formal constraints on their application because countries are not obliged to resort to any third party unless they agree on a specific conflict resolution procedure. The Helsinki Rules, the International Law Commission and the UN Convention on the Use and Protection of Non-navigational Waters are international instruments designed to facilitate collaboration. At the regional level Protocols have been developed, as for example the Protocol on Shared Watercourse Systems in the Southern Africa Development Community (SADC) Region. At the river basin level (including shared lakes and groundwater aquifers) a large number of commissions and agreements have been established. Common to most of these agreements is the large gap between rhetoric and action, not only at the political level in terms of willingness to cooperate, but also at the practical level of establishing the proper data and information base and the analytical tools needed for meaningful collaboration.

The need for negotiated agreements for water use; While there are extreme positions in the law of international watercourses, such as absolute sovereignty and absolute territorial integrity, international courts have favoured the concept of community of interests among riparian countries. Riparian States should co-operate on transboundary water resources, searching for negotiated agreements respecting all riparian countries' interests and based on equitable and reasonable use of water. The international community and water-related organizations could act as catalysts and brokers for reaching such negotiated agreements. Such agreements are often part of more global agreements where it may be easier to reach a satisfactory balance between the interests of the parties.

BOX 4

International co-operation

Ten countries share the Nile basin. Building on earlier cooperative efforts, nine of these countries have agreed to form a regional partnership known as the Nile Basin Initiative (NBI). Launched in February 1999, the NBI seeks to harness the tremendous potential of the Nile through sustainable development and management of its waters for mutual benefits.

The shared vision of the NBI is "to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin water resources."

The NBI is governed by a council of ministers responsible for water affairs in the Nile Basin countries. The council is supported by a Nile Technical Advisory Committee and it maintains a secretariat in Entebbe, Uganda.

Joint committees as a mechanism for management; Often, a useful step towards the joint management of shared waters is the setting up of a joint committee or commission with the objective of sorting out and agreeing on facts about the present status and use of the shared water resources.

7. The institutional roles

Flawed demarcation as a constraint on IWRM; When discussing the roles and functions of organizations at different levels, it is important to stress that there can be no blueprints valid for all cases. This is an area where stage of development, financial and human resources, traditional norms and other specific circumstances will play an important part in determining what is most appropriate in a given context. Nevertheless, institutional development is critical to the formulation and implementation of IWRM policies and programmes. Flawed demarcation of responsibilities between actors, inadequate co-ordination mechanisms, jurisdictional gaps or overlaps, and the

failure to match responsibilities, authority and capacities for action are all major sources of difficulty with implementing IWRM. The agencies involved in water resources management have to be considered in their various geographic settings, taking into account the political structure of the country, the unity of the resource in a basin or aquifer and the existence and capacities of community organizations. Institutional development is not simply about the creation of formally constituted organizations (e.g. service agencies, authorities or consultative committees). It also involves consideration of a whole range of formal rules and regulations, customs and practices, ideas and information, and interest or community group networks, which together provide the institutional framework or context within which water management actors and other decision-makers operate.

The importance of effective co-ordination mechanisms; A key issue is the creation of effective co-ordination mechanisms between different agencies. It should not be assumed that *integration* in the sense of organizational consolidation automatically leads to co-operation and co-ordination which in turn leads to the improved effectiveness of water resources management. Fragmented and shared responsibilities are a reality and are always likely to exist. There are many examples where agencies or responsibilities have been merged without significant performance improvements; conversely, there are several examples where the existence of effective co-ordination mechanisms has allowed problems to be handled well despite the need to involve several agencies. It is clear that the simple act of putting all water functions within one agency will not necessarily remove conflicts of interest; decisions about priorities are then made within the agency with the danger of loss of transparency.

Roles and functions of organizations at different levels

National level bodies; In many cases the establishment of an “Apex” body at the national level may be desirable for the accomplishment of IWRM. It should at least be responsible for developing policies and strategies, and for co-ordination and national planning regarding water resources. Preferably, it should be independent of major users of water

and should report to government at a high level. National organizations may also have an information gathering and dissemination role and under some conditions may act to regulate and monitor the performance of lower tier organizations.

Bottom-up and top-down strategies; In developing policy-making, implementation mechanisms, consultative, co-ordinating and regulatory bodies, attention has to be paid to the appropriate scale at which they operate. A key tenet of IWRM is that traditional top-down approaches to management have to be supplemented by, and indeed partly replaced by, bottom-up strategies to ensure that the water sector is demand-driven and can deliver welfare gains to the whole range of end users. For bottom-up strategies to be effective new institutions are likely to be needed. In many situations it will be essential to create community based organizations, which can actively participate in the development and management of water supply systems. In other situations democratically elected and representative consultative committees and market mechanisms may be the appropriate means by which users can convey their demands for water goods and services to providers. Bottom-up strategies do not mean that the complete devolution of decision-making to the local or community level is desirable or feasible; an appropriate balance has to be struck between community-level organizations and governmental bodies.

State/provincial/regional level management; In many countries water is managed at the State/provincial/regional level rather than at the national level. Being normally closer to both the resource and service users, this level of government would typically need to consider such issues as the allocation of water and wastewater discharge permits, charging for water, enforcement of standard or permit conditions, monitoring and assessment of water resources, adjudication of conflicts and broad landuse planning issues. Some countries have grouped municipalities, industries and other water users into special-purpose organizations in order to implement water management measures. Sub-national level organizations may also have regulatory functions to ensure that local level service providers are fulfilling their duties effectively.

BOX 5

River basin management in France

A law in December 1964 divided the whole territory of France among six Water Agencies, their spatial limits following hydrological divisions. Each Agency is organized as follows:

- the staff prepares the program, and implements it after approval (**the conscience**);
- a committee of about 60 representatives of all stakeholders involved approves the program, the fees, the grants and loans (**the forum**).

Each Agency has the following duties:

- establish five years' water management investment programs;
- collect fees for each m³ of water abstracted from the natural water resource and for each ton of waste discharged into the natural water resource;
- issue grants or low-interest loans to all actors (cities, industries, etc.) who contribute to the implementation of the five-year program. Expenses and revenues have to be in balance over this five-year program (**the budget**).

River basin/aquifer/catchment management structures; Water flows according to natural characteristics and does not respect administrative boundaries – therefore the question arises: should water be managed and management structures defined according to existing administrative boundaries or according to natural boundaries, usually taken to be river basins? From a pure water resource point of view there might be much logic in adopting a river basin approach, or at least considering the river basin as the logical planning unit. However, in accordance with the principle of demand-driven development, a river basin organization should only be established in response to a perceived and expressed demand, typically expressed by multiple users. Existing administrative divisions and regulatory conditions might discourage the management of water according to river basin boundaries. It should also be noted that river basin agencies cannot in themselves ensure the sustainable development of the resource. They will need to be supported by a range of institutions that help determine the demands placed on the resource by economic, social and political change.

Elements for the success of a basin organization; Depending on the actual conditions and priorities, river basin (or lake basin or aquifer) organizations may range from being executive bodies with mandates for the allocation of water rights and fee collection to purely advisory bodies advising existing administrative and executive bodies. As an example, the French experience with this system suggests that three elements are essential for the success of an active organization:

- *A conscience*, embodied in the staff and responsible for the collection and assessment of water resources information in the basin, facilitation of co-ordination and negotiation between stakeholders, preparation of plans and proposals for investment and collection of fees for water use and wastewater discharge.
- *A forum* for all stakeholders to discuss and make actual decisions on water resources issues, acting as a kind of a “water parliament” for the river basin. Its responsibility is to supervise the “conscience”, to discuss, modify and approve its proposals. The forum should also approve the budget of the river basin organization. Central government should participate in the forum and the national parliament be informed of the river basin organization activities, in order to ensure the necessary links with national policies.
- *A budget* to sustain the organization, and to finance the necessary operations and investments in water-related infrastructure. The budget might be based on charges for water use and wastewater disposal. The river basin organization may encourage sustainable water use by allocating loans and grants to cities, industries or individuals willing to invest in facilities that contribute to the overall goals of IWRM in the basin. Hence, there is a direct link between what is charged for water and what is invested in water.

An international role for basin organizations; River basin organizations may also provide a useful mechanism for management of international water resources. There are numerous examples of such bodies, with varying objectives and functions from around the world, which

suggests that they may contribute to the peaceful, equitable and negotiated management of shared waters. The mere existence of such bodies, providing a forum for the articulation of views and negotiation, encourages states to discuss and solve their mutual problems before disagreements escalate to a crisis level.

The role of local government; In a number of countries the provision of water supply and sanitation services is devolved to local governments. While this should help ensure that service delivery is more attuned to consumer priorities, and that providers are more accountable for their actions, several important issues are raised by devolution:

- To achieve efficiency it is important to distance the provider from short-term political interference;
- The finances of the provider need to be clearly differentiated from the general accounts of the local government unit;
- To minimize the danger of capture, performance monitoring, benchmarking and some aspects of regulation may be more appropriately entrusted to a higher tier of government or some independent agency;
- Institutions are needed to ensure that local providers cannot ignore the effects of their actions on downstream water users or other stakeholders in the catchment;
- Provision of co-ordination mechanisms may be necessary if the boundaries of local governments fail to cover all customers or if more than one local authority exists in an area;
- Small municipalities may need to consolidate their water service facilities and/or activities in order to fully realize economies of scale and scope; and
- It is important that local government recognizes that land use planning, economic development and social policies can all have a profound effect on water demand and the production of water-borne waste.

Civil society and community participation; These groups should be encouraged to participate in operational water resources management. For instance, irrigation schemes may be transferred, with appropriate

regulations, from the government to farmer associations, and community based organizations may be made responsible for the operation and maintenance of local water supply systems. In this way, there is a better chance of establishing a sense of ownership, which is often a precondition for improved and more sustainable management of assets and resources. As mentioned earlier there is also considerable scope for public-private partnerships and private operators, including communities and NGOs, to play a role in water resources management. The exact role played by each of these actors needs to be assessed in the light of local economic, social and political circumstances.

Institutional capacity building

Capacity building for problem solution; Institutional capacity building is a means of enhancing performance. In the context of IWRM, capacity building is the sum of efforts to nurture, enhance and utilize the skills and capabilities of people and institutions at all levels – locally, nationally, regionally and internationally – so that they can make better progress towards a broader goal. At the basic conceptual level, building capacity involves empowering and equipping people and organizations with appropriate tools and sustainable resources to solve their problems, rather than attempting to fix such problems directly. When capacity building is successful, the result is more effective individuals and institutions that are better able to provide products and services on a sustainable basis.

Training accompanied by incentives; Human resources development through training, education and provision of information is a key dimension of capacity building. Training is not, however, enough. If new skills or ideas are actually to be used, institutions and individuals need incentives to change practices and approaches; such incentives will need to be consistent with the broader goals of the institutions concerned. Improved human resources are a key factor in bringing about institutional capacity building. The ability of an institution to adapt to changing demands depends to a large extent upon its ability to adapt its human potential – the knowledge, perspectives and skills of its staff.

Conditions for fulfilment of institutional mandates; Equally important for an institution's capacity to fulfil its mandate is the proper devolution of institutional responsibilities, functions and jurisdictions. This is likely to involve solving problems of jurisdictional overlaps and competition between institutions, in addition to the creation of proper and sustainable financing mechanisms.

8. Management instruments

The importance of a “tool box”; The management instruments for IWRM are the tools and methods that enable and help decision-makers to make rational and informed choices between alternative actions. These choices should be based on agreed policies, available resources, environmental impacts and the social and economic consequences. A wide range of quantitative and qualitative methods is being offered by systems analysis, operations research and management theory. These methods, combined with a knowledge of economics, hydrology, hydraulics, environmental sciences, sociology and other disciplines pertinent to the problem in question, are used for defining and evaluating alternative water management plans and implementation schemes. The art of IWRM is about knowing the available elements of the “tool box” and selecting, adjusting and applying the mix of tools appropriate to the given circumstances.

Water resources assessment: availability and demand

The importance of water resources assessments; Management of water resources requires an understanding of the nature and scope of the problem to be managed. How are all relevant water resources problems identified? How can we make sure that we acquire useful information which enables us to identify and assess existing and potential future water resources problems and solutions? Carrying out water resources assessments is a useful way of acquiring such information as a basis for management.

The need for a water resources knowledge base; In many countries available information about the water resources situation is scarce, fragmented, outdated or otherwise unsuitable for management purposes. Without adequate access to scientific information concerning the hydrological cycle and the associated ecosystems it is not possible to evaluate the resource or to balance its availability and quality against demands. Hence, the development of a water resources knowledge base is a precondition for effective water management. It takes stock of the resource and establishes the natural limits for management.

Objective of water resources assessments; The concept of water resources assessments is here interpreted to imply a holistic view of the water resources situation and its interaction with societal use in a country or region. The assessment should address the occurrence in space and time of both surface- and groundwater quantities and associated qualities, and give a tentative assessment of the water requirements for the assumed development. In this respect there is a distinct need for comparative measures of water use efficiency and intensity in use (i.e. product per drop). At the initial stage the assessment would preferably be based – to the largest extent possible – on existing data and knowledge in order to avoid any unnecessary delay in the process of implementing management improvements. The objective of the assessment is not to solve the problems but to identify and list the problems and identify priority areas within which more detailed investigations may be carried out.

Demand as a function of user behaviour and preferences; It is important to stress that the water knowledge base must include data on the variables which influence demand; only with such data can a flexible and realistic approach to assessing water demands be taken. If not considered in a context of water scarcity and competition, sectoral planners may be overly optimistic about possible development and associated water requirements. Effective demand management may influence demand figures significantly. The use of scenario building for water demand projections may be advantageous and serve to identify possible ranges for various categories of future water demands. In addition, assessing effective demand by analysing the behaviour of

users as they react to water scarce situations provides key information that is vital to determining appropriate pricing policies.

The importance of monitoring and gauging systems; The assessment of water resources availability and quality, and their possible long-term changes through consumptive water use, climate or land use change, are highly dependent on reliable data from monitoring and gauging systems; this indicates the need for resources to be allocated for the investment, operation and maintenance of this aspect of water infrastructure. This is sometimes neglected in favour of allocation of financial resources to the construction of more tangible assets such as water supply systems or dams. However, considering the potential economic implications of, for example, deciding to build a hydropower plant based on unreliable river flow data, it turns out that money spent on the collection of water resources data may entail considerable savings in investment costs.

Environmental Impact Assessments (EIA); EIA plays a central role in acquiring information on the social and environmental implications – including water resources implications – of development programmes and projects, identifying the measures necessary to protect the resource and related ecosystems and then ensuring that such measures are implemented. The IWRM approach implies that sectoral developments are evaluated for possible impacts on the water resource and that such evaluations are considered when designing as well as giving priority to development projects. EIAs are concerned not only with impacts on the natural environment but also with effects on the social environment. Hence, the EIA touches the heart of the need for cross-sectoral integration involving project developers, water managers, decision-makers and the public, and provides a mechanism or tool to achieve this.

Risk assessment tools; Risks associated with IWRM come in different shapes – usually related to extreme climatic events, public health and environmental damage (in addition to business related risks). It is never possible to eliminate risk. Well-established techniques are available to undertake hazard (frequency and magnitude of events) and

risk assessments. However, such assessments, which rely heavily on science, technology and economics, neglect the question of what levels and types of risks are acceptable within civil society. This is a perceptual cultural issue that can only be addressed within a participatory approach to IWRM.

Risk management; Risk mitigation is never costless and, in real world circumstances of capital and human capacity constraints, trade-offs will inevitably have to be made not only over the levels of risk which people may have to accept but also over the types of hazards which can be tackled in particular countries and at different points in time. Essentially, risk management is about achieving an appropriate balance between the benefits of risk taking and the losses incurred, and about preparing the means by which people and property can be safeguarded when adverse conditions arise.

The precautionary principle; From an environmental point of view the precautionary principle in risk management may be warranted in some instances. One key lesson, for example, is that actions to avoid potentially irreversible environmental damage should not be postponed on the ground that scientific research has not fully proved and quantified a causal link between cause and potential damage. The principle here is that a precautionary approach may reduce costs by preventing the damage rather than having to remedy the damage after the event, but not that all possible risks should be avoided.

Communication and information systems

Communication for enhancement of stakeholder involvement; The principle of stakeholder participation in water resources management requires a serious effort of awareness raising among politicians, decision-makers in the water sector, professionals, interest groups and the public at large. In any attempt to attract attention and support for water management from these groups, success will depend upon the mechanisms of communication and the quality and relevance of available information. Communication and information systems should address the question of opportunity cost and trade-offs between

alternative water uses and projects on the one hand, and other social investments on the other.

Information needs for stakeholder involvement; In order to encourage stakeholder participation in water resources management, and in order for the participatory process to be effective, the availability of timely and relevant information to all concerned is an essential precondition. Therefore, adequate official surveys and inventories of water sources and supplies, up-to-date registers and records of water uses and dischargers, water rights, and the beneficiaries of such rights, with their respective water allocations, should be made available to the public. In addition the results of benchmarkings and performance evaluations of service providers should be made publicly available as this contributes to the competitive and transparent provision of water services.

Stakeholder communication strategies; Concrete strategies for communication with all actors and stakeholders need to be devised. In the area of EIA there have been attempts to institutionalize public participation through, for instance, public information sessions, expert panel hearings, citizen juries and similar methods. The “water sector” might take advantage of the experiences gained in this area. However, the most appropriate method in each case needs to take account of local social, political, cultural and other factors.

Openness and transparency; Some countries have little experience of conducting water resources management in an open and transparent manner with full public access to information. Decision-making has often been left to professionals and scientific experts, thus excluding other stakeholders from the process. A continuation of this approach will be counterproductive to assuring broad participation and private sector investment in water management.

International exchange of information; Especially when dealing with international water courses, openness and sharing of information are key to the achievement of IWRM since all involved riparian countries have “natural monopolies” in data collection and dissemination within their national territories.

Water allocation and conflict resolution

Issues in allocation; To allocate water efficiently and effectively to competing users, the following issues have to be addressed:

- When markets do not fully capture the total value of water other mechanisms have to be used to allocate water to the highest value uses and users;
- Market mechanisms (trading systems and/or full cost pricing through valuation) could be improved in conjunction with the formulation of appropriate regulatory systems; and
- Conflict resolution mechanisms may be used to facilitate water sharing among competing users such as upstream and downstream stakeholders

Allocation by market-based instruments; Normal goods and services that are exchanged through perfectly functioning markets get allocated to their highest valued use. In the water case, because of the intrinsic attributes of the resource and because of the way it has been managed historically, not all water values (including social and environmental values) are or indeed can be reflected in market prices. Thus, full cost pricing tools through valuation and enhanced water trading are needed to complement and correct the faulty market valuation processes.

Using valuation to resolve conflicts; The process of determining the value of water to various stakeholders could enhance their participation in decision-making and contribute to resolving conflict. These tools would not only ensure that existing water supplies are allocated in a sustainable fashion to the highest-value uses but would also enable water managers to determine when the users are willing to pay the costs of investing in additional water-dependent services.

Resolution of upstream-downstream conflicts; Conflicts among upstream users and downstream users within a country tend to be pervasive and usually result in undue delays in the implementation of water resources development projects. Currently, such conflicts may be resolved through political negotiations or the involvement of the judiciary. However, experience shows that the involved parties often

use such negotiations to postpone agreements on water sharing. It is important to note that resolving upstream-downstream conflicts requires acceptable estimates of water resource availability over time, taking into account return flows and the effects of catchment development on evaporation losses and run-off. One way to resolve such conflicts is to involve water users and other stakeholders who will be affected by the water resources development project. As a safeguard for parties negatively affected by the status quo, governments should also always have a default compulsory jurisdiction function for conflict adjudication. Unless governments have such powers the parties benefiting from the status quo have no incentives to enter negotiations or accept mediation to solve the allocative conflicts from which they derive a benefit.

Conflict management techniques; A wide range of conflict management techniques, involving both consensus building or conflict prevention and conflict resolution, is available to assist stakeholders in their negotiations. Decision-makers could integrate this expertise and experience more widely in the water sector. Empirical research is required to evaluate and learn from the experience so far gained (e.g. in USA, Australia) in attempts to resolve conflicts between upstream and downstream users and between different sectoral interests.

Valuation by conflict resolution methods; The fact that not all services provided by water and water-related ecosystems can be valued in an objective and quantitative manner, independent of the value systems of those involved, also links valuation directly to conflict resolution techniques. In the presence of a market, the agreed price is an indicator of the value of the good or service and serves to prevent conflicts. In the absence of a market, values can be approximated through explicit valuation techniques that transform attributes into their monetary units, or they can be determined implicitly through conflict resolution methods (i.e. every agreement reached also implies an agreed value of the goods and services provided in the uses considered in the conflict).

Valuation research on environmental benefits; There is a special need to develop further methodologies for valuing the benefits of

ecological services provided by nature. Although some attempts have been made to put values on direct environmental and ecological services such as fishing, grazing and forestry, the main problems appear to be in assigning economic values to non-market benefits, such as biodiversity and intrinsic value. One key problem is how to include the value of the environment in providing water services, including the sustainable provision of the water resource itself. The value of catchment protection to downstream users and the value of groundwater recharge areas have not been adequately incorporated in planning methodologies. In practical terms, as with many aspects of environmental planning, the first requirement is to broaden the scope of valuation exercises, through linking the expertise of economists to the analyses of hydrologists and ecologists. Valuation of ecosystem costs and benefits has not been on the practical water management agenda so far; multidisciplinary research is needed for this.

Regulatory instruments

Three groups of regulatory instruments; A multitude of regulatory instruments is at the disposal of water authorities in setting up appropriate management structures and procedures. These fall into three main groups: direct controls, economic instruments, and encouraged self-regulation. In most situations authorities will need to employ a mix of instruments to ensure effective and low-cost regulation.

Direct controls

Executive regulations; There is a need for management instructions and rules interpreting and detailing water legislation. If sustained by enabling laws, containing both basic substantive principles and authorization for delegation of authority and issuance of regulations, the usefulness of executive regulations lies in the fact that they – contrary to laws – can be made and amended at short notice, quickly responding to changing environmental, economic or social circumstances. Typically, executive regulations are needed for abstraction of water and discharge of wastewater and may order users – or certain

categories of users – to obtain permits for abstraction or discharge of water. The regulations would describe the procedures to be followed in applying for permits and the criteria for granting permits. As a general rule it should be ensured that only executive regulations which are enforceable be implemented. If the existing enforcement capacity is deemed insufficient, regulations should be simplified or abandoned.

Water right systems; While in most countries water is considered a national asset under public ownership, there are some countries which implicitly treat water as an unlimited resource, where it is de facto a “common resource” without clearly defined property rights. In other countries water rights are linked to land tenure, with inadequacies and conflicts occurring because of the non-stationary nature of water and inter-connections within the hydrological cycle (who owns the water flowing in the river, and how can the necessary multiple use of water be accounted for?). Stable and secure water rights should be pursued because they are an important incentive for private investment. In granting water rights it is, however, equally important to prevent the waste of water, monopolization, harm to third parties and environmental degradation. Thus, water rights are rights to use certain amounts of water rather than the right to the ownership of the resource itself. Many systems also include provisions for penalizing the non-use of allocated resources.

Standards and guidelines; These instruments have been widely applied to:

- control the quantity of water withdrawn by users from the natural water system within set time periods;
- control the discharge of waste products into water courses (controls can be placed on the quantity, quality, timing and location of discharges);
- require specific technologies to be employed (technology standards) to either reduce water use or waste loads; and
- specify product standards, both for water provided for specific users and for goods which are potentially polluting (e.g. water efficiency standards).

Standards and other direct regulations have been heavily criticized as being inflexible, costly to implement, prone to imperfect implementation and evasion and for failing to allow users the freedom to employ a range of techniques to conserve water or reduce waste disposal. These defects have been one reason why the use of economic instruments have been increasingly advocated.

Land use planning controls; Some water authorities have long employed land use controls to protect their supply sources; for example, land uses may be regulated in upstream recharge areas and around reservoirs to prevent pollution, siltation and changed run-off regimes. However, their ability to do this will clearly depend upon their functional and spatial jurisdiction. Likewise, some water authorities have been regarded as legitimate consultees when development decisions (industrial sites, housing developments, etc.) are made in order that water supply and pollution issues are taken account of in the planning process. In the context of IWRM the management of land use is as important as managing the water resource itself since it will affect flows, patterns of demand and pollution loads. Moreover, effective land use planning can also help promote water recycling and planned reuse.

Position of consumptive and non-consumptive users within the basin; When water is taken from a river in order to irrigate land, practically no water comes back immediately to the river and most of it is either evaporated, or infiltrated into the soil and is lost to other uses for a substantial period of time. In contrast, when water is employed for domestic or industrial purposes, a significant proportion returns to the river very quickly and can be reused by others subject, of course, to appropriate treatment. “Consumptive” water use raises questions about the exact location of each user along a river, suggesting that the possibilities for sequential use of water be considered when locating water-dependent activities. However, it should be noted that ‘non-consumptive’ users, who return waste flows to the river system, can ‘consume’ resource value if the untreated wastes cannot be reused and if they destroy valued ecosystems.

Utility regulation (both private and public owned); Water supply and sanitation is a monopoly industry providing essential services. Government needs to regulate the industry and has to strike a balance between providing actors with the incentives to invest and operate efficiently, and ensuring that the interests of society at large are protected. Because of aspects such as the monopoly of water as a product, capital intensity and sunk costs for infrastructure, unregulated competition on a free market is not an option for the water sector. Some of the major regulatory tasks involve defining and dealing with risks, setting up appropriate contractual operating arrangements, defining performance indicators, monitoring compliance and performing transparent benchmarking assessments.

Economic instruments

Efficiency of economic tools; The use of economic instruments is on the increase but has far from reached its full potential. Until now most governments have relied primarily on direct regulation in water resources management. However, economic tools may offer several advantages, such as providing incentives to change behaviour, raising revenue to help finance necessary investments, establishing user priorities and achieving management objectives at the least possible overall cost to society. Prerequisites for successful application of most economic instruments are appropriate standards, effective administrative, monitoring and enforcement capacities, institutional co-ordination, and economic stability. Designing appropriate economic instruments requires simultaneous consideration of efficiency, environmental sustainability, equity, and other social concerns, as well as the complementary institutional and regulatory framework. Some notable examples of economic instruments include water prices, tariffs and subsidies, incentives, fees and fee structures, water markets, and taxes.

Water prices, tariffs and subsidies; According to the principle of managing water as an economic and social good, the recovery of full costs should be the goal for all water uses, unless compelling reasons indicate otherwise. Yet, this principle entails inherent difficulties: How can principles of equitable access to water used for basic human needs

BOX 6

Focal subsidies – Chilean experience

Chile has been able to implement a well-working system of focal subsidies in the water and sanitation sector. The success of the system depends on the concerted effort and institutional capabilities of the national government, the municipalities and the water companies.

Other countries in Latin America have attempted to replicate the very successful Chilean experience. However, the funds available did not match the needs of the users, neither did the institutional capability of governments match the monitoring requirements of system implementation and enforcement. For this reason some countries, such as Argentina, have resorted to traditional cross-subsidies, despite the obvious drawbacks of the system.

The lesson is that before suggesting either focal or cross-subsidies, countries and financing institutions should ensure not only financial and economic viability, but also that institutional structures do allow efficacious implementation.

be taken into account at the same time? At a minimum, full supply costs should be recovered in order to ensure sustainability of investment and the viability of service providers. However, in many situations, even the achievement of this objective may require direct subsidies for years to come. Poverty alleviation policies might be incompatible with abrupt implementation of full supply cost recovery in, for instance, some surface irrigation systems. In the provision of municipal and rural water supply there are well-established practices of cross-subsidization from better-off water users to the poor. The use of cross-subsidies does not necessarily compromise the financial sustainability of utilities but they distort prices and patterns of demand. For management purposes such subsidies should be made in a transparent manner and, where possible, direct subsidies are the preferred option to reduce distortions in the system. Under normal circumstances industries should meet at least the full economic cost of the supplied water.

Tariffs as incentives; In the domestic sector the scope for reducing water consumption may be relatively small because of the need to provide enough water to meet basic health and hygiene requirements.

Nevertheless, reductions are possible and overall, tariff or fee setting that sends the right price signals to water users is an important element of much-needed demand management. In irrigation, pricing may be used to encourage a shift from water-intensive crops to other crops.

Fee structures; Water tariffs provide little incentives for the sustainable use of water if charged at a flat rate independent of the amount used. In such cases, setting the right fee structure, imposing progressively higher unit cost prices on high-volume users, may induce the more judicious use of the resource, although the level of demand reduction will depend upon the nature of the high-volume users. Such a structure also contributes to the financial sustainability of water authorities and to covering the cost of administering water resources management.

BOX 7

Tariffs and fees

There is scattered but compelling evidence that improved policies can have major impacts and at least 20-30% of water used by households and industries can be saved by applying appropriate policy instruments. Experience shows that higher water prices and pollution charges result in a "win-win" situation of water conservation and reduced water pollution. Two examples are reported below:

In Bogor, Indonesia, as a result of a tariff increase of 200-300% for different consumer groups in 1990, a household with a monthly consumption of more than 30m³ had to pay \$0.42 for a cubic meter of water (exceeding consumption of 20m³) instead of \$0.15. This produced significant reductions - around 30% - in water use for the affected groups.

In Sao Paulo, Brazil, in 1980, three industrial plants were requested to pay effluent charges to the central effluent treatment facility. The companies decided to economize production through changes in processes, substitution of inputs, use of more efficient equipment, and use of mechanical washing instead of manual washing. In the pharmaceutical industry, the volume of effluent (and of water consumption) per unit of output in 1982 was 49% less than in 1980. In the food processing industry, effluent and water consumption were lower by 42% per unit of output compared with 1980. The steps taken to achieve these reductions were changes in washing processes and effluent recycling, and modifications in cleaning processes. In the dairy industry, the effluents and water use were lowered by 62% through improvements in the washing process and expansion of the on-site treatment plant.

Fees for wastewater discharges; In accordance with the ‘polluter-pays-principle’, effluent fees may be levied on waste water discharges; these should be set to reflect both the cost of environmental externalities and those associated with treating polluted wastewater or the recipient waters. The fees can be related to both the quantity and quality of individual discharges and then adjusted carefully to create optimum incentives for polluters to introduce improved treatment technology, reuse water and minimize the pollution of water resources. This tool needs to be combined with regulatory measures to control and monitor the contaminants discharged and is especially suited for industrial polluters. A judicious mix of progressive water tariffs and pollution charges will provide adequate incentives for water conservation, recycling and reuse within industries.

Water markets; Under the right circumstances water markets can improve the efficiency of water resources allocation and help ensure that water is used for higher-value purposes. This, however, requires an appropriate regulatory and institutional framework in order to account for market imperfections and other external effects, as described in the section “The role of government”.

Taxes; Product charges or taxes on environmentally damaging products may be a powerful tool in affecting behaviour and are especially suitable where the users have alternative production or waste disposal choices which are less environmentally harmful. This tool could be applied for both products involving high water consumption and products which contribute to water pollution. For non-point pollution problems, especially those related to the use of agrochemicals, this option has proved to be the most useful tool, since direct discharge control or treatment options are not feasible here. Hence, the reduction of pollution is achieved through decreased use of agrochemicals as a response to higher product prices. However, any adverse effects on food production or higher prices for fertilizers and pesticides would have to be considered.

BOX 8

Water markets

Water markets are widely utilized in the American West. Available water supplies and water rights are quantified and recorded. Water rights are granted under conditions of effective and beneficial use. Transfers are supervised and monitored by regulatory institutions. These markets have been active.

Other countries have implemented water markets without requirements of effective and beneficial use. Government supervision is minimal. These markets have not been active.

The lesson learnt is that markets that operate under close government regulation, under the principles of effective and beneficial use, and prevention of harm to third parties and the environment, have promoted efficient and equitable water reallocations.

Encouraged self-regulation

Guidelines and information; Controlling information can be a low-intervention mode of regulation. Two common versions exist: mandatory disclosure of performance data or labelling of products and controls over false or misleading information. Transparency of information can not only provide water service providers with incentives to improve their performance (e.g. benchmarking league tables) but also allows civil society and governmental bodies to judge and push for performance improvements. In recent years the high costs of command and control regulation has encouraged the development of "self-regulatory" mechanisms, supported by appropriate procedures for performance monitoring. For example, professional organizations may produce best practice guidelines or governments may introduce "quality" hallmarking schemes; such schemes are now quite common in the environmental and product safety areas and may be a useful addition to the water sector tool box.


Technology

Technological advances towards sustainability; In evaluating the range of available management tools, the role of and scope for technological advances should still be carefully considered as a factor that may help achieve sustainable water resources management. There is scope for substantial progress both in technology refinement within the water sector itself and in those other productive sectors which critically affect the supply of and demand for water services. Traditional technologies like rainwater harvesting can also play a key role.

Research and development in technology; Technological innovation and adaptation are key components of many efforts within the water sector. At the conceptual level models and forecasting systems are being improved, particularly as a result of advances in computer technology, to allow better predictions of temporal and spatial variations in the quantity and quality of available water resources. This may help to reduce uncertainties and risks in the use and management of the resources. Water saving technologies in irrigation (e.g. drip irrigation), improved and cost-effective methods for the treatment and reuse of wastewater in industries and domestic systems, aquifer recharge technologies, human waste disposal systems that require no or extremely small quantities of water, and cheap but effective water purification systems for villages are other examples of promising innovations which can promote the sustainability of future water resources. However, achieving such technological advances requires both appropriate incentives and the willingness of more wealthy countries, particularly the more wealthy industrialized nations, to invest in research with a long-term return.

Technology assessment; What could be labelled as “auxiliary” technological achievements may also be usefully considered in water management. These are technologies that are developed for purposes other than water saving and water management but may have considerable effects on the water sector. Examples include genetically modified crops resistant to pesticides and with lower water needs, optimization of crop selection to better match climatic conditions, and reductions in the costs of producing energy, which could allow the

wider application of desalinization as a cost effective method for fresh-water provision. Water managers must keep abreast of developments and be willing to experiment and co-operate with other sectors.

Technology choices; In addition to the above-mentioned promising prospects, a word of caution is warranted on the issue of technology. Many projects in the water sector have failed due to the uncritical application in developing countries of technologies that have worked in industrialized nations but in totally different physical, social and economic settings. It has to be realized that technological choices must take account of specific conditions prevailing at the location of use. This means that the most advanced and modern technology is not necessarily the optimal choice in all cases. If the system cannot be sustained because of lack of spare parts, skilled manpower or economic resources for operation, it is not the most appropriate solution. Moreover, high-cost technologies can prevent community and household involvement in water management. 

List of abbreviations

BAT	Best Available Technology
GPA	Global Programme of Action
CSD	Commission of Sustainable Development
EIA	Environmental Impact Assessment
GWP	Global Water Partnership
GIWA	Global International Waters Assessment
IWRM	Integrated Water Resources Management
NGO	Non-Governmental Organization
O&M	Operation and Maintenance
SADC	Southern Africa Development Community
TAC	Technical Advisory Committee
UNCED	United Nations Conference on Environment and Development

Chapter 2

The development of international water law

An important water related question is how and why conflict over international waters arise. In principle that is where conflicting interests occur and the available water resources are inadequate to meet the needs of all users. To provide for meaningful solutions to conflict over water, whether between diverging interests within a country or between independent and sovereign nation states there need to be an identifiable body of legal rules, both within most countries and such that govern international relations over water.

There is a range of means and mechanisms to states offered by the existing body of rules developed by international law. These means and mechanisms are important for dispute avoidance and dispute settlements. The diplomatic means offered by international law include negotiations, consultation, good offices, mediation, fact-finding, inquiry, conciliation and the use of joint bodies and institutions. Among the legal means to resolve international disputes are arbitration and adjudication. (explanations can be found in the compulsory literature). Conflicts or disagreements over water are settled through negotiations, applying rules developed by international law and with an agreement as the final outcome. Central to the specific rules that have evolved in the area of international water law are norms as contained in the important legal instrument dealing with international waters, the 1997 International Watercourse Convention.

International treaties and international custom are the principle sources of law. In principle, among the most important aspects that regulates by the international law are dealt with under the rules of state responsibility. Here, where one state has denied another state its equitable and reasonable utilization of a transboundary water course, the former will be liable to remedy the wrongful conduct (have to compensate for this denial),

Among the “sources” of international laws are different kinds of treaties – conventions, agreements, protocols, charters, accords etc. – which are legally binding on the state parties who have expressed their consent to be bound by it. This can be done by ratification, which is building on an in-country decision process, and thus a more binding context. A treaty may be *bilateral* (two state parties) or *multilateral*.

International water law is mainly known as international watercourse law or law of water resources and has been developed out of international customary law and its principles to use the transboundary water resources in an *equitable and reasonable* manner, and to *avoid causing significant harm* to other riparian state. A first effort to state this principles on paper were done in 1911 but the first systematic “code of conduct”, the ILA Helsinki Rules, were established 1966. The first important treaty for Central Asia was the 1992 Central Asian Water Agreement. The only global treaty is the 1997 UN Convention of the Non-Navigational Uses of International Watercourses.

The compulsory text as identified below describes somewhat more in detail what international water law is, how it has been developed and how it works. The text further discusses the transformation conflicts into agreement: Means and Mechanisms. The report by Vinograd-Wouters-Jones gives the background information and definition of international water law and should be the compulsory text.

Wolf and others describes different examples of by application of international water law it is possible to achieve effective Transboundary Water Resources Management, and there the articles by McCaffrey deals with the prospects and pitfalls in developing the 1997 UN Watercourse Convention.

Compulsory literature from:

Sergei Vinograd, Patricia Wouters and Patricia Jones: Transforming Potential Conflict into Cooperation Potential: The role of International Water Law. UNESCO-IHP, 2003

<http://unesdoc.unesco.org/images/0013/001332/133258e.pdf>

Aaron Wolf, ed.: Sharing Water, Sharing Benefits: working towards effective Transboundary Water Resources Management : A Graduate Professional Skills-Building Workbook, UNESCO-IHP, 2010

<http://unesdoc.unesco.org/images/0018/001893/189394e.pdf>



TRANSFORMING POTENTIAL CONFLICT INTO COOPERATION POTENTIAL:

The Role of International Water Law

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LIST OF ABBREVIATIONS

BWT	Canadian–US Boundary Waters Treaty
COP	Conference of the parties
CTS	Consolidated Treaty Series
ICJ	International Court of Justice
IDI	L’Institut de Droit International
IJC	International Joint Commission (Canada–USA)
ILA	International Law Association
ILC	United Nations International Law Commission
ILM	International Legal Materials
ILR	International Law Reports
IWC	International Watercourses
LNTS	League of Nations Treaty Series
MOP	Meeting of the parties
NRJ	Natural Resources Journal
PCA	Permanent Court of Arbitration
PCCP	Potential Conflict–Cooperation Potential
PCIJ	Permanent Court of International Justice
RIAA	United Nations Reports of International Arbitral Awards
SADC	Southern African Development Community
UN	United Nations
UN GA	United Nations General Assembly
UNTS	United Nations Treaty Series
UN ECE	United Nations Economic Commission for Europe

THE ROLE OF INTERNATIONAL WATER LAW

International river basins cover more than half of the land's surface. With close to 300 major watercourses shared by two or more states and an ever-increasing demand on the world's diminishing water resources, there may be some justification in the assertion by certain commentators that "water wars" are imminent. The UN forecasts that more than half of the world's population will suffer direct consequences of water scarcity if the current development patterns continue. The situation is particularly critical in developing countries, leading the world's governments to commit themselves to "halve by 2015, the proportion of people without access to safe drinking water and basic sanitation," and also to "develop integrated water resources management and water efficiency plans by 2005" (UN Summit on Development, Johannesburg, 2002). Commendable as these plans may be, what solutions will states find in their competition over shared water resources? This is particularly crucial for states that depend on water supplies that cross their national borders.

This study discusses the relevance and role of international water law in the promotion of cooperation over shared transboundary watercourses. With its focus on actual case studies and through examination of contemporary state practice and detailed analysis of the 1997 UN Watercourses Convention, this work aims to provide water resource experts from all disciplines with an overview of the rules of international law that govern interstate relations over water.

PART ONE: INTRODUCTION

1. INTRODUCTION

International river basins cover more than half of the land's surface. With nearly 300 major watercourses shared by two or more states and ever-increasing demand on the world's diminishing water resources, there may be some justification in the assertion by certain commentators that "water wars" are imminent in the near future. The UN forecasts that more than half of the world's population will suffer the direct consequences of water scarcity if current development patterns continue (UNEP, 2002). The situation is particularly critical in developing countries, which has provoked collective action on the part of national governments, leading them to commit to "halve by 2015, the proportion of people without access to safe drinking water and basic sanitation," and also to "develop integrated water resources management and water efficiency plans by 2005" (UN, 2002). Commendable as these plans may be, what solutions will states find in their competition over shared water resources? This is especially critical for states that depend on water supplies that cross their national borders.

This study discusses the relevance and role of international water law in the promotion of cooperation over shared transboundary watercourses. It is aimed at water resource professionals and seeks to make more accessible the rules and mechanisms of international law that govern interstate relations over water.

2. THE CONCEPTUAL APPROACH: THE "PCCP CYCLE"

In line with the central theme of the UNESCO WWAP project, this legal report focuses on the *PCCP cycle*: how *potential conflicts* over water are transformed into *cooperation potential*. From a legal perspective, the PCCP cycle has four identifiable phases, which are connected and reiterative:

- *Phase I*. The legal context (the rules of international law that apply to the conflict and its resolution).
- *Phase II*. From conflict to cooperation (the means used to transform the conflict into a cooperative arrangement).
- *Phase III*. The agreement (the new legal framework).
- *Phase IV*. Implementation (how the agreement is implemented and how changing circumstances and potential new conflicts are being dealt with).

Each of these phases is examined through the perspective of international water law, with a particular emphasis on actual state practice. Part One of this report lays the foundation for this work and concludes with an analysis of the Lake Lanoux dispute as a model case study for the PCCP cycle. Part Two provides an overview of the fundamental principles and rules of international law, in general, and those related to international freshwaters, in particular. This sets the stage for understanding Phase I (the legal context) of the PCCP cycle. Part Three identifies the principal causes of water disputes and reviews mechanisms used by states to resolve them, demonstrating how states employ available means of dispute resolution in order to transform conflict into cooperation: Phase II (Transforming Conflict into Cooperation). Part Four looks at the key elements of a "good" watercourse agreement, one for example that promotes dispute avoidance and provides a flexible regime for managing shared transboundary water resources. Finally, part Five provides a summary of

lessons learned, and offers a checklist of best practices for states to use in their management of international water resources.

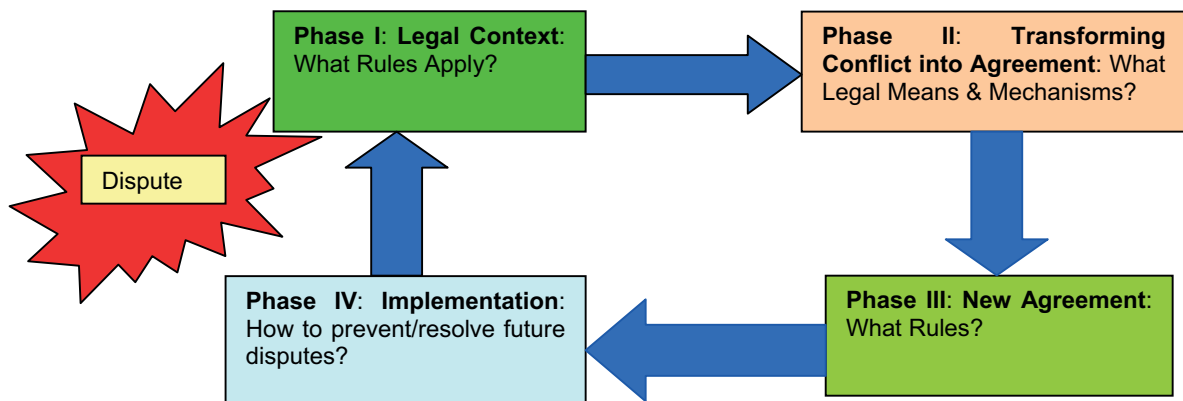


Figure 1. The PCCP cycle: legal approach

How and why do “conflicts” over international waters arise? The most common scenario is where a new or increased use by one or more states results in the available water resources being inadequate to meet the needs of all users in a quantitative or qualitative sense. This leads to a conflict of uses, which may develop into an international dispute. Conflicts over water may also result from national political and economic policies, such as an attempt to achieve food security, or may be part of a broader political conflict. Disputes over water may vary greatly in terms of their legal context, their spatial or temporal dimensions, number of states involved, and so forth. Given such a range of possibilities for water-related disputes between independent and sovereign nation states, how can international law provide meaningful solutions? Fortunately, there does exist an identifiable body of legal rules that govern international relations over water, and these will be examined in this report.

The body of rules developed by international law offers a range of means and mechanisms to states for dispute avoidance and dispute settlement. Central to the specific rules that have evolved in the area of international water law are those norms contained in the most important universal legal instrument dealing with international waters: the 1997 UN Convention on the Non-Navigational Uses of International Watercourses (1997 IWC Convention). This document will be referred to throughout this study as the principal and only universal treaty in this area of international relations.

International law offers a range of diplomatic means (negotiations, consultation, good offices, mediation, fact-finding, inquiry, conciliation, the use of joint bodies and institutions) and legal means (arbitration and adjudication) to resolve international disputes. Generally, water conflicts are settled through negotiations with an agreement as the final outcome. In fact, most transboundary water resources are subject to a treaty regime of some form, with several hundred international agreements governing the use of most of the world’s shared waters (FAO Index UN FAO, Systematic Index of International Water Resources Treaties, Declarations, Acts and Cases by Basin, Vol. II, Legislative Study No. 34 (1984)).

The agreement may be watercourse-specific (e.g. the 1961 Columbia River Treaty), a boundary agreement (e.g. the 1909 Canada–United States Boundary Waters Treaty), an umbrella agreement regulating all regional waters (e.g. the 1992 Helsinki Convention on Transboundary Watercourses), or an instrument for dispute

resolution of the “friendly relations between neighboring states.” In each of these documents, international lawyers will be most interested in the following key issues:

- the material terms of the agreement (rights and duties)
- the duration of the agreement (term)
- performance of a treaty by its parties (implementation)
- flexibility and adaptability of the treaty regime (how, or if, the agreement may be modified in the event of changed or unforeseen circumstances).

In some cases the legal rules for each of these elements may be ascertained from rules that are external to the treaty in question. Of particular relevance to the PCCP cycle is how disputes are resolved within the legal regimes that govern the particular transboundary waters under consideration. The PCCP process is cyclical: while an agreement (treaty) may form the basis for the initial watercourse regime, issues of implementation related to that agreement – such as changed circumstances – may lead to a conflict. Thus conflict can arise out of cooperative arrangements. However, conflict can also be avoided or resolved through cooperation, for example through the mechanisms provided for in the agreement or by those means available in general international water law. These legal rules and processes can provide the means with which to transform the conflict into cooperation, which will most often be formalized through a new or revised agreement. The PCCP cycle seen through this legal perspective is illustrated in Figure 2.

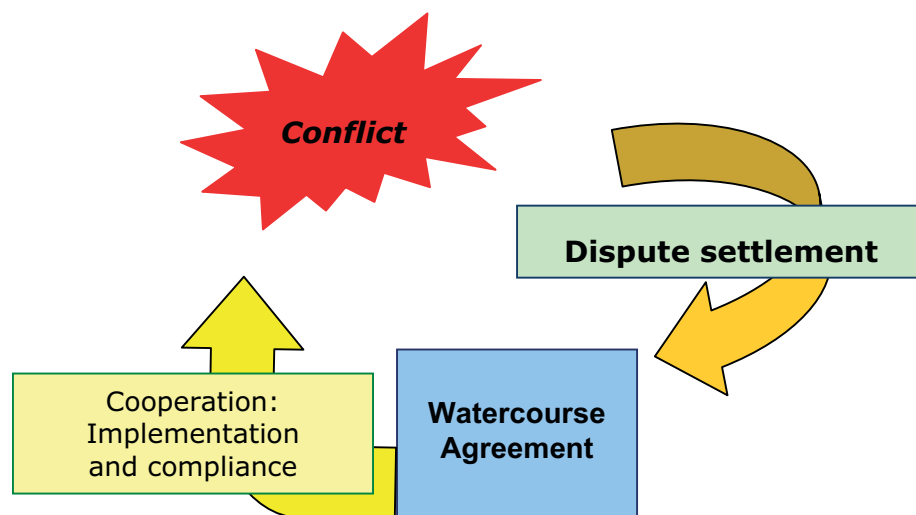


Figure 2. Transforming conflict into cooperation: legal mechanisms and processes

3. THE PCCP CYCLE IN PRACTICE: THE LAKE LANOUX CASE

The dispute between France and Spain over Lake Lanoux provides a model example of how the PCCP cycle works in practice.

3.1. Phase I: The Legal Context

The Lake Lanoux dispute arose from the French Government’s decision to permit Électricité de France to develop a hydroelectric project that diverted water from Lake Lanoux into the Ariège river. Lake Lanoux, approximately 2,200 meters above sea level in the southern Pyrenees in French territory, drains into the Font-Vivres stream, one of the headwaters of the Carol river, also in France. The Carol flows 25 kilometers

until it reaches and crosses the Spanish–French border and becomes a tributary of the Segre. The Carol waters were traditionally used for irrigation, particularly in Spain. The Ariège river, on the other hand, is a tributary of the Gargone, which flows to the Atlantic entirely through French territory. Spain opposed the French project, which initially provided for no return of water to the Carol river and offered only monetary compensation by France. The French offer to modify the project by returning to the Carol the same amount of water that it extracted for the reservoir, was also rejected by Spain.

The boundary waters delimitation treaties have governed the Lake Lanoux regime for 150 years, although French–Spanish agreements concerning utilization of boundary waters date back to 1750. The 1866 Treaty of Bayonne and Additional Act, the primary agreements, contained provisions regarding the “control and enjoyment of waters of common use between the two countries.” The Additional Act contained the following important provisions:

- It recognized the sovereignty and national jurisdiction of each party over “all standing or flowing waters” within their respective territories.
- It recognized existing uses “necessary to satisfy *actual need*.”
- Each party had a right to develop the transboundary water resources, provided that compensation was paid, *unless* harm was caused. Each party was permitted to authorize works of public utility provided that it paid compensation.
- Remaining waters were allocated proportionally on the basis of irrigable lands not already served.
- Prior notification had to be given to the competent local authorities when a planned measure “might change the course or volume” of water resources, “so that if they might threaten the rights of riparian owners of the adjoining sovereignty a claim may be lodged . . . and thus the interests on both sides will be safeguarded” (Art. 12).
- An international commission of engineers was created with a right to ascertain and allocate waters necessary for present uses, to remove abuses, and, to identify available waters and area of irrigable land in each party’s territory.
- The commission was to propose measures and “precautions” needed to implement regulations and to “avoid, as far as possible, all strife among the respective riparian owners” (Art. 18).

Another important bilateral instrument between Spain and France – the Treaty of Friendship, Conciliation and Judicial or Arbitral Settlement – provided for disputes of any kind to be resolved by conciliation, arbitration, or before the Permanent Court of International Justice (PCIJ). Before a dispute could be submitted for settlement by arbitration or adjudication, it had to be presented to a permanent international commission or a permanent conciliation commission. The commission had to evaluate the questions involved in the dispute, collect information, endeavor to bring the parties to agreement, and report within six months of the submittal, unless the parties otherwise agreed. If the conciliation failed, the parties could agree to submit the dispute to arbitration or to the PCIJ/ICJ.

3.2. Phase II: From Conflict to Cooperation

In 1917, long before the dispute arose, the French and Spanish governments had exchanged diplomatic correspondence about the French use of the waters of Lake Lanoux. However, final agreement to convene a special international commission to deal with the water-related issues was not reached before the Second World War. Negotiations on the matter recommenced in 1949 at the meeting of the International Commission of the Pyrenees, which had been created by France and Spain in 1875.

Following negotiations, France and Spain agreed to convene a special Mixed Commission of Engineers. In 1950, when France granted Électricité de France a concession to divert the waters of Lake Lanoux, Spain proposed that a special commission review the scheme. The Mixed Commission of Engineers met in August 1955 but without any result. The issue was raised in the International Commission for the Pyrenees in November 1955, where France presented the work plan for the scheme along with guarantees for Spanish riparians. No agreement was reached and the International Commission accepted the French proposal to establish a special mixed commission with the task of drawing up a joint proposal for the use of the Lake's waters; this first met in December 1955. The French proposal included: technical guarantees for ensuring that the quantity of water supplied to the Carol equaled the amount that would have been naturally available in the system; the setting up of a mixed commission to control the works; Spanish on-site inspection; and a guarantee of an annual minimum of 20 million cubic meters of water irrespective of whether the amount is naturally available. After Spain rejected this proposal, the parties agreed to a meeting of the Special Mixed Commission in March 1956. Spain presented a counter-proposal that did not require diversion of the Carol. No agreement was reached and the Special Mixed Commission terminated its work and reported to the two governments. At the March 1956 meeting of the International Commission of the Pyrenees, France notified Spain that it would resume the project, and commenced construction on the works. On November 19 1956, the parties entered into a special agreement – a *compromis* – whereby they agreed to submit their dispute to arbitration.

The issue at heart of the arbitration was whether the implementation of the French project without a prior agreement with Spain violated the Treaty of Bayonne and the Additional Act. Spain argued that the proposed project was unlawful because, in particular, by altering natural conditions it would affect the entire system of waters of the basin and would destroy the "community" established by the Additional Act in favor of a unilateral control by one party. Spain also insisted that the Act of Bayonne required the prior agreement of the two governments before any development proceeded. France, in turn, argued that the treaties did not bar development, but rather established rules for modification as the need arose, that the prior consent of one state is not required by any of the agreements, and that the scheme safeguarded the rights and interests of Spain and did not compromise its independence. France also maintained that the scheme affected only 25 percent of the waters of the Carol – those that flow from Lake Lanoux – and that this same amount would be returned under the proposed development scheme, meaning that neither the flow nor the course would be changed in Spain.

The Arbitral Tribunal, in its decision of November 16 1957, ruled in favor of France, finding that the proposed project did not breach the applicable Treaties or any rule of international law, and determined that the scheme was not subject to the prior consent of Spain. In comments unrelated to the central legal issues of the case (*obiter dicta*) the Tribunal reasoned that:

The conflicting interests aroused by the industrial use of international rivers must be reconciled by mutual concessions embodied in a comprehensive agreement. States have a duty to seek to enter into such agreements. The "interests" safeguarded in the Treaties between France and Spain included interests beyond specific legal rights. A state wishing to do that which will affect an international watercourse cannot decide whether another state's interests will be affected; the other state is the sole judge of that and has the right to information on the proposals. Consultations and negotiations between the two states must be genuine, must comply with the rules of good faith and must not be mere formalities. The rules of reason and good

faith are applicable to procedural rights and duties relative to the sharing of the use of international rivers; and the subjecting by one state of such rivers to a form of development which causes the withdrawal of some supplies from its basin, are not irreconcilable with the interests of the another state.

On the question of prior consent, the Tribunal noted that for a restriction on state sovereignty to be limited to such an extent that exercising jurisdiction was possible only upon agreement with another state is found only rarely in international relations and must be proved by clear and convincing evidence. Requiring prior consent to all planned measures would enshrine a right of veto, which is not permitted in international law. International practice "prefers to resort to less extreme solutions by confining itself to obliging the states to seek, by preliminary negotiations, terms for an agreement, without subordinating the exercise of their competencies to the conclusion of such an agreement." The Tribunal found no evidence in the treaty law, international practice, custom, or general principles of law that "states may utilize the hydraulic power of international watercourses only on condition of a prior agreement." The obligation to give notice does not include the obligation to obtain agreement. In the Tribunal's view, France had met its international obligations because the project provided for the full restoration of the waters in the channel of the Carol and guaranteed an annual minimum flow that might even exceed the natural flow and could alter the timing of the restoration of the waters to better meet Spanish agricultural needs. In essence, the French proposal left Spanish riparians better off.

3.3. Phase III: The New Agreement

The Tribunal's decision paved way to a new bilateral treaty, the Agreement Relating to Lake Lanoux, which was signed in 1958 and incorporated relevant provisions of the 1866 Treaty of Bayonne, the French proposal to the Mixed Commission of December 2 1955, and the 1957 arbitral decision. The Electricité de France was obliged to provide a minimum of 20 million cubic meters of water annually to the Carol river channel above the Spanish border.

A six-member commission was established to ensure that the scheme was implemented in accordance with the Agreement. The Commission was charged with overseeing the construction and operation of the project. In the event that Électricité de France was unable to deliver the amount of water agreed, France had to take all necessary measures to address the situation, including making reparation. The agreement refers disputes to the existing mechanisms under the Spain–France Treaty of Friendship.

3.4. Phase IV: Implementation

The international commission established by the 1958 Agreement has met annually since its inception. The agreement was amended in 1970. The new regime has been successful, allowing downstream agriculture to benefit and permitting resolution of a water quality problem. The test of any treaty is its ability to deal with changes to the regime: what response to changed circumstances, unforeseen problems, conflicts of use? These issues will be addressed in more detail in Part Four of this study.

4. LESSONS LEARNED AND ISSUES FOR CONSIDERATION

The Lake Lanoux case provides practical insight into how the rules and mechanisms of international law are employed when dispute over transboundary waters arises. The first step involves assessing the legal context. Are there rules that govern the

interstate relations? If so, what is the normative content of these rules? In the Lake Lanoux case there were a series of treaties that governed both the lawfulness of proposed new uses on the watercourse and the resolution of disputes. The treaty regime also provided for the creation of institutional bodies to deal with the dispute as it evolved. When the diplomatic means of resolving the dispute were unsuccessful, the parties sought settlement through binding arbitration. This led to a conclusion of the dispute and the foundation for a new international agreement, which was finalized in a treaty. That legal arrangement has proven to be a successful vehicle with which to manage the watercourse up to the present date.

The Lake Lanoux case highlighted the *substantive* and *procedural* obligations of the two riparian states in their development of an international river. It demonstrates also a range of diplomatic and legal mechanisms that the two states employed in order to achieve a mutually acceptable solution. However, each watercourse dispute is different and the way in which this particular dispute was resolved is but one example. It must be considered in its context. In the Lake Lanoux dispute, the PCCP cycle was facilitated by:

- the legal framework in place (series of treaties)
- the relatively good neighborly relations between the parties
- the creation of joint commissions to address the problems
- agreement to submit the matter to arbitration
- the fact that the project in question was determined not to cause any significant adverse impact on the quantity or quality of water flowing into Spain.

Unfortunately, these enabling factors may not be present in other water conflicts between watercourse states. Quite often relations between the parties to water disputes are tense or openly hostile, the legal basis for regulating transboundary waters may be either lacking or insufficient, and a planned or existing use of a shared water resource may cause serious adverse impacts in another state, depriving it of its "equitable and reasonable use." In such a case international law, including various mechanisms for conflict resolution, is traditionally appealed to by states to facilitate seeking and securing a mutually acceptable solution. International law, while admittedly not a panacea for all water conflicts, provides a set of rules, instruments, and mechanisms capable of transforming conflicts into cooperation. What these legal instruments and mechanisms are, and how they might be utilized will be discussed in the following parts.

PART TWO: THE ROLE OF INTERNATIONAL WATER LAW IN DISPUTE PREVENTION AND RESOLUTION

1. INTERNATIONAL LAW: WHAT IT IS AND HOW IT WORKS

International law is sometimes defined as a system of principles and rules of general application governing the conduct and relations of states. Over the last fifty years, international law has evolved to include international organizations and certain legal persons as “subjects” within its scope. What distinguishes international law from domestic law is that the former is both created and enforced by states (at the international level) primarily in order to regulate state–state relations in various areas, while the domain of national law concerns matters that occur within a state’s borders and are left to the sovereignty of that particular state. International law operates as a separate system of law, with its own distinct rules and mechanisms.

The consequences for a state that violates a rule of international law are dealt with under the rules of *state responsibility*. There are two criteria to be met to qualify a state’s conduct as wrongful. First, it must be an action or omission attributable to the state (i.e. committed by the state apparatus: organs, officials, etc.). Second, this conduct must constitute a breach of a rule of international law. Thus, the alleged violation must be determined to be: (i) committed by a state, and, (ii) break an identifiable rule of international law. The remedies available to the state(s) whose rights have been violated include, *inter alia*, an order for cessation of the wrongful conduct, guarantees by the state in breach of non-repetition of the wrongful acts, satisfaction (apology, exemplary damages), restitution, and compensation. Thus, where one state has denied another state its *equitable and reasonable utilization* of a transboundary watercourse, the former will be liable to remedy the wrongful conduct.

An important objective of international law is to ensure the peaceful relations of states and to prevent and resolve interstate conflicts and controversies. The pacific settlement of disputes has been enshrined in the United Nations Charter as one of the main goals of the United Nations, which was created following the Second World War. The principal UN organs – the General Assembly, the Security Council, and the International Court of Justice (ICJ) in particular – are each entrusted with various dispute avoidance/ settlement duties and functions, powers that they use regularly to “maintain the peace.”

2. SOURCES OF INTERNATIONAL LAW

International law incorporates the rules that have emerged and developed as a result of many centuries of interstate relations and practice. The rules that legally bind states may be found in international treaties, international customary law, and, general principles of law: the so-called “sources” of international law. International treaties and international custom are the primary sources of law. The decisions of international courts and arbitral tribunals, and legal doctrine (the teachings of the “most highly qualified publicists” of various nations) are also used to determine the applicable rules of law, as “*subsidiary*” sources.

Until relatively recently the rules of customary – or unwritten – law was the most prevalent source of international law and played a central role in defining the lawfulness of a state’s international activity. International custom is a legal rule that has evolved from the practice of states, usually in the absence of formal agreements (although agreements may contain rules of customary law). To become a binding rule of customary law, there must be a demonstrable general, and widespread practice,

which shows that states consider this rule as the one that governs their activities in a particular area. The evidence of customary law (state practice) can be found in the form of agreements, statutes and decrees, diplomatic correspondence, statements of states' representatives in international organizations and conferences, and so forth.

Many rules of international law (e.g., freedom of the high seas, diplomatic immunities and privileges) have their roots in international custom. They may exist as both treaty norms (for those states that participate in a specific international agreement containing these rules) and customary rules (for those states that do not). As will be seen, the basic principles of international water law – including, *inter alia*, the principle of *equitable and reasonable utilization* – initially emerged and developed as rules of customary law. However, international custom by its very nature is imprecise and thus open to conflicting interpretations. Additionally, customary law may not be able to address the increasingly sophisticated and complex issues that now face states. Thus, over the last half-century there has been a prominent move to “codify” (write down) and “progressively develop” the rules of customary international law. As a result, today, international treaties have replaced customary law as the most important source of international legal rights and obligations. Given their particular significance, especially in the area of water law, treaties will be discussed in some detail in this part of the study.

In the rare instances where rules of customary law or treaty law are lacking or inadequate, the source of international law may be *general principles* of law, used to determine respective rights and obligations of states. These are derived from the domestic practice of the majority of legal systems around the world and generally include rules that are accepted by all, such as the prohibition of slavery, the principle of good faith, the rules relating to estoppel and proportionality, to name a few. The general principles of law are identified through inference, analogy, and inductive reasoning from existing international or domestic (national) law.

As a subsidiary source of international law, international judicial decisions and the writings of jurists may contribute to the determination of the existence of the legal rules and their content. Although judges and lawyers do not create law *per se*, their analysis of state practice can offer evidence of customary law. In international law, the decisions of international courts and tribunals are binding only for the parties in the particular dispute and only in respect of that particular case. Unlike the common law tradition of legal “precedents,” international tribunals are not obliged to follow previous decisions of any other tribunal or court. However, practice demonstrates that these earlier decisions are almost always taken into consideration where similar cases are decided.

Non-legally binding instruments (often referred to as “soft law”) – such as declarations, resolutions, and recommendations adopted by the UN General Assembly and various international organizations and conferences – also contribute to the formation of international law, but indirectly. Even if not binding by their legal nature, resolutions and recommendations may have a “normative” (e.g. law-making) value. On the one hand, these acts can often serve as evidence of customary international

The “sources” of international law

Statute of the International Court of Justice

Article 38 (1). “The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply:

- a) international conventions, whether general or particular, establishing rules expressly recognised by contesting states;
- b) international custom, as evidence of a general practice accepted as law;
- c) the general principles of law recognised by civilised nations;
- d) . . . judicial decisions and the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law.”

law, reflecting the views of states supporting them. On the other hand, such acts, by introducing certain rules of states' behavior, may act as a catalyst for the creation of emerging rules of customary or treaty law.

3. LAW OF TREATIES

Treaties have now replaced customary law as the primary source of international law. International treaties are considered to have many advantages over customary law. They provide a more clear manifestation of the legal undertakings made by states; their norms are more precise and easily accessible. They are able also to deal with questions of a highly technical nature (such as freshwater quality and quantity standards, norms of water abstraction, permissible levels of discharges and emissions, and so on).

Although a treaty may be known by different names – convention, agreement, protocol, charter, accord, and statute among others – its legal nature is always the same: these instruments are binding on the state parties and establish their respective rights and obligations, together with the “rules of the game” that govern their relations. As a general rule, a treaty applies only to those states that have expressed their consent to be bound by it. Depending on the number of parties involved treaties may be *bilateral* (two state parties), *multilateral* (more than two state parties) with limited participation (open for signature by a restricted number of countries), and universal (open for participation by all states).

Multilateral treaties, which are often called international conventions, are normally adopted by specially convened international conferences, usually under the auspices of the United Nations General Assembly or of specialized UN agencies. Among the most important are conventions that “codify” customary international law in particular fields of interstate relations or activities: the law of the sea, diplomatic and consular relations, and the law of the non-navigational uses of international watercourses, to name but a few.

The *1969 Vienna Convention on the Law of Treaties* codified and progressively developed the international law relating to treaties, namely the customary and other rules governing conclusion, implementation, interpretation, and termination of international agreements. Treaties are concluded, or become legally binding, only after a series of specific actions by the states that are party to them. The actions are designed to signify clearly the consent or agreement of states to be bound by their legal undertakings. The act of giving consent can be demonstrated by signing and, in the case of important treaties, through their subsequent ratification by states. In modern practice the ratification process is important and usually necessary since the constitutional law of most countries requires an elected representative body to formally approve the agreement before it becomes legally binding. States may also “accept” or “accede” to a treaty. Evidence of the approval (ratification, acceptance, accession) is contained in the formal communication of the state to the official depositary that administers the treaty. The date of signature and the date of the deposit of the “instrument of ratification” are legally significant. They signify the moment when the state's legal obligation is effective, provided that the treaty has entered into force.

The principle *pacta sunt servanda* – found both in customary law and the UN Charter – is a fundamental rule of international law that requires states to abide by the agreements they make. International agreements are binding and must be performed in good faith.

All disputes concerning the implementation, interpretation, or breach of an agreement must be resolved peacefully through a range of dispute settlement mechanisms available to states, both diplomatic (negotiation, mediation, fact-finding

and inquiry, conciliation, etc.) and legal (adjudication and arbitration), each of which will be analyzed in Part Three of this study.

4. INTERNATIONAL WATER LAW

International water law (also known as international watercourse law, international law of water resources) is a term used to identify those legal rules that regulate the use of water resources shared by two or more countries. The primary role of international water law is to determine a state's entitlement to the benefits of the watercourse (substantive rules) and to establish certain requirements for states' behavior while developing the resource (procedural rules).

The development of international water law is inseparable from the development of international law in general. Such fundamental principles and basic concepts as the sovereign equality of states, non-interference in matters of exclusive national jurisdiction, responsibility for the breach of state's international obligations, and peaceful settlement of international disputes equally apply in the area governed by international water law.

At the same time, this relatively independent branch of international law has developed its own principles and norms specifically tailored to regulate states' conduct in a rather distinct field: the utilization of transboundary water resources. The basic rules are: the right to use waters of the transboundary watercourse located in the territory of the state ("equitable and reasonable utilization"), and a correlative duty to ensure similar rights are enjoyed by co-basin states.

The law governing international watercourses has evolved through both custom (practice of states) and international treaties, and has been influenced by other "sources" of law: general principles of law, judicial decisions, and resolutions and recommendations of international organizations. The range of sources for international water law is too great to be comprehensively covered in this study, and thus, only the most important will be dealt with here.

5. CUSTOMARY RULES OF INTERNATIONAL WATER LAW

International customary law is the primary source of two fundamental obligations on states in terms of transboundary water resources: to use them in an "*equitable and reasonable*" manner, and to *avoid causing significant harm* to other riparian states. There have been several attempts to put these and other customary rules "on paper." The first such effort was made as early as 1911 by the Institute of International Law (IDI), an authoritative professional organization of international lawyers, in its Declaration of Madrid. Entitled "International Regulation regarding the Use of International Watercourses for Purposes other than Navigation," the Declaration proposed certain rules to be observed by riparian states while using a common watercourse. Fifty years later the IDI returned to the question of the non-navigational uses of international watercourses and adopted two resolutions: "On the Use of International Non-Maritime Waters" (Salzburg, September 11 1961) and "On the Pollution of Rivers and Lakes and International Law" (Athens, September 12 1979). The main emphasis of all three documents was on the equality of the riparian states' rights to utilize transboundary waters, subject to certain limitations imposed by international law.

A more sustained and detailed attempt to develop in a systematic way "a code of conduct" concerning transboundary water resources was made by the International Law Association (ILA), a professional non-governmental organization created in 1873 for the purpose of "study, elucidation and advancement of international law." In 1966, the ILA adopted the Helsinki Rules on the Uses of the Waters of International Rivers, a

comprehensive set of rules that codified and progressively developed the law governing utilization of the waters of international drainage basins. The ILA Helsinki Rules could be considered as a "statement of the existing rules of international law" at the time they were adopted. The most important among these was the cornerstone principle, according to which each international river basin state was entitled to an equitable and reasonable share in the uses of the waters of an international drainage basin (Article IV).

ILA Helsinki Rules

Article IV: "Each basin State is entitled, within its territory, to a *reasonable and equitable share in the beneficial use of the water of an international drainage basin.*"

Since 1966, the ILA has adopted a number of resolutions that provide supplementary rules dealing with specific issues of transboundary water resources: flood control, international groundwaters, and regulation of flow, pollution, administration, and so forth, most of which are contained in their Campione Consolidation (ILA, 1999). Although the ILA resolutions are not legally binding they are widely acknowledged by many states and numerous international water resource experts to be an authoritative statement of the international law governing transboundary water resources.

6. JUDICIAL DECISIONS

International judicial decisions played a particularly important role in the evolution and clarification of the customary rules of international water law. On a number of occasions international tribunals were asked to settle disputes over transboundary waters between riparian countries. The most important judicial decisions by the World Court include:

RIVER ODER

In the 1920s the Permanent Court of International Justice (PCIJ), a predecessor of the International Court of Justice (ICJ), was called upon to resolve a dispute concerning navigational rights on the tributaries of the River Oder, which had been "internationalized" for the purpose of navigation after the First World War under the Treaty of Versailles. Although the Court was not asked to deal with the non-navigational uses, it introduced in its decision a relatively new notion – the *community of interest of riparian states* – which since has influenced the evolution of international water law.

RIVER MEUSE

In the 1930s, the PCIJ was again involved in resolving a water dispute, this time between the Netherlands and Belgium over the diversion of water from their transboundary Meuse river. The impact of the Court's decision on the evolution of water law was somewhat limited since it focused primarily on the questions of application and interpretation of the existing bilateral agreement, which established the regime governing diversions of water from the river. However, it is significant that the two countries agreed to submit their dispute to international adjudication.

RIVER DANUBE

The most recent, and probably the most important, dispute over water brought before the ICJ is the Gabčíkovo–Nagymaros case (also known as the Danube river case), involving Hungary and Czechoslovakia (at a later stage, Slovakia, as a successor state). The dispute arose over the implementation of the bilateral treaty concluded in 1977 with a goal of constructing a series of dams and barrages on a stretch of the

river crossing the territories of the two states, Hungary and Czechoslovakia. The project was conceived as a joint venture, with equal participation in terms of investment and sharing of future benefits, for the purposes of hydropower generation, and improving navigation and flood and ice control on the Danube river. The range of legal issues that the Court had to address was unprecedentedly broad: from the validity of international treaties, succession of states and international responsibility to environmental protection, and the law of international watercourses. In essence, the Court decided that both parties had acted unlawfully: Hungary by abandoning work on the project and unilaterally terminating the bilateral agreement, Slovakia by responding to Hungary's actions through diverting for its use and benefit between 80 and 90 percent of the waters from the part of the river that constituted the boundary between the two countries. The Court also upheld the legal validity of the 1977 treaty, which allowed the parties to adjust the project in order to address environmental concerns, and ruled that its purported termination by Hungary was ineffective. The joint operational regime of the entire project would have to be reinstalled, and the parties, unless they agreed otherwise, would have to compensate each other for the harm caused by their unlawful acts.

A number of *international arbitral decisions*, such as the Lake Lanoux case, have also contributed to the evolution of international law in this field. Others include, for example, the Helmand river delta dispute between Persia and Afghanistan over the delimitation of the boundary and the use of the river's waters, the San Juan river dispute between Costa Rica and Nicaragua, and the Zarumilla river dispute between Ecuador and Peru over the delimitation of their respective common boundaries.

National judicial decisions, although not a *source* of international law as such, can serve as models for the resolution of international disputes or be used to identify applicable general principles of law. This is especially true when considering decisions of the supreme courts that were called on to settle water controversies between different constituent units (states, *länder*) in federal states. The US Supreme Court, in particular, has greatly influenced the articulation of some of the fundamental rules of water law. The Court unequivocally endorsed the approach to water allocation based on the equality of rights of upper and lower riparian states: the former are not entitled to claim exclusive rights to use water only because it originates within their territory while the latter have no entitlement to undiminished stream flows. In resolving interstate conflicts over water sharing, the Supreme Court developed and applied the doctrine of "equitable apportionment," which eventually evolved into the international legal principle of "equitable and reasonable utilization."

7. TREATIES

International treaties are the primary instruments of cooperation in the field of water resource utilization as well as the most important source of international water law. More than 3,600 international agreements, bilateral and multilateral, that deal with water-related issues are known. The first general treaty dealing with international watercourses – the 1923 Geneva Convention relating to the Development of Hydraulic Power affecting more than one state – failed to achieve its objectives. It was ratified by only ten countries, none of whom had common borders.

However, there are a large number of multilateral – regional and basin-wide – agreements, the most significant being the 1997 *UN Convention on the Law of the Non-Navigational Uses of International Watercourses* (1997 UN IWC Convention). Among the other important water treaties are:

- The 1969 Treaty on the River Plata (23 April 1969).

- The 1992 UN Economic Commission for Europe Convention on the Protection and Use of Transboundary Watercourses and International Lakes, concluded in Helsinki (1992 UN ECE Helsinki Convention).
- The 1992 Agreement on Cooperation in the Area of Joint Management, Utilization and Protection of Interstate Water Resources [in Central Asia] (1992 Central Asian Water Agreement).
- The 1994 Convention on Cooperation for the Protection and Sustainable Use of the Danube River (1994 Danube Convention).
- The 1995 Agreement on Cooperation for the Sustainable Development of the Mekong River Basin (1995 Mekong Agreement).
- The 1998 Convention on the Protection of the Rhine (1998 Rhine Convention).
- The 1995 Protocol on Shared Watercourse Systems in the Southern African Development Community (1995 SADC Protocol), to be superseded by the 2000 Revised Protocol on the Shared Watercourses in the Southern African Development Community (2000 SADC Revised Protocol).

Multilateral agreements usually establish a general legal and institutional basis for cooperation for either a particular region (Europe, Southern Africa, Central Asia), a river basin (Danube, Rhine), or a part of one (Mekong). They may have a form of a “framework” treaty (1992 Helsinki Convention), sometimes supplemented by additional instruments (such as the 1999 London Protocol on Water and Health to the 1992 Helsinki Convention). Or they may contain both general commitments and more specific rules and standards.

Examples of *bilateral* water-related treaties are numerous. Among the earliest was the 1909 Boundary Waters Treaty concluded between the United States and Canada (Great Britain), which created an International Joint Commission: one of the most successful models of bilateral cooperation. Many bilateral treaties, the primary purpose of which is to delineate international boundaries, also deal with the waters that are crossed by or constitute an international boundary (one example is the 1973 agreement between Czechoslovakia and the USSR on the regime of state frontiers and cooperation in frontier questions). Some bilateral agreements may also have a framework character, establishing certain general legal rights and obligations, and creating institutional mechanisms of cooperation for all transboundary waters (for example, the 1956 treaty between Hungary and Austria concerning the regulation of water economy questions in the frontier region, or the most recent agreement of May 24 2002 between Russia and Belarus on cooperation in the field of protection and rational use of transboundary water bodies). Finally, bilateral agreements are often concluded to regulate different activities on specific watercourses (such as the series of agreements between France and Switzerland concerning Lake Lemman) or to implement certain joint projects (such as the 1977 treaty between Hungary and Czechoslovakia concerning construction of a system of locks on the Danube).

Thus, water treaties may be bilateral or multilateral; they may have a framework character governing all transboundary waters, or deal with a specific IWC or part of it; they may regulate a particular use, be project specific or be concerned with watercourse protection and pollution control.

8. THE 1997 UN INTERNATIONAL WATERCOURSES CONVENTION

Given the multitude and the variety of international agreements dealing with water resources, it may be surprising that the only global treaty in this area, the 1997 UN Convention on the Non-Navigational Uses of International Watercourses (1997 IWC Convention), was adopted fairly recently. The initial attempt to draft a treaty of

universal application to international freshwaters dates back to 1970, when the UN General Assembly asked its International Law Commission (ILC) to prepare a set of rules governing the non-navigational uses of IWC. The Commission, which consists of thirty-four international lawyers serving in their individual capacity and representing the major legal systems of the world, is a special UN organ entrusted with the codification and progressive development of international law. In 1994, the ILC adopted Draft Articles on the law of the non-navigational uses of international watercourses, following close to thirty years of work on the topic. This project went forward to the UN General Assembly and its Sixth (Legal) Committee, which provided the forum for negotiating and eventually adopting the 1997 IWC Convention.

That the effort to codify the international law of water resources was a challenging task is evidenced by the time it has taken to come to agreement and by the differences in legal positions that had to be reconciled. Until the very last deliberations of the UN Working Group of the Whole in April 1997, it was uncertain whether or not states could reach agreement and adopt a universal convention. Seemingly irreconcilable views that had divided upstream and downstream countries in the past on the nature and extent of a state's right to use transboundary water resources resurfaced during the debate. The three central issues that dominated the UN debate included: a) the status of existing treaties and the effect of the convention on future agreements; b) the relationship between the "no harm" rule and the principle of "equitable and reasonable utilization," including environmental considerations; and, c) the provisions on dispute settlement.

Notwithstanding the serious disagreements that for some time threatened the negotiations, the text was finally agreed on by the majority of state representatives in the Sixth Committee and adopted by the UN General Assembly on May 21 1997. In favor were 104 states, with three against (Burundi, China, and Turkey), and twenty-six abstaining. To date, twelve countries have ratified the 1997 IWC Convention, and eight additional states have signed but not yet ratified it. To enter into force it needs to be ratified or approved by thirty-five states. Regardless of when and whether the Convention enters into force, it is clear that it will play a very important role in all relations involving watercourse states.

So as to better understand the significance of the 1997 IWC Convention and its potential role in preventing and resolving water conflicts, it may be worthwhile to give a snapshot of the conventional provisions with some in-depth discussion of the most important rules.

1997 IWC Convention: controversial issues

- the effect of the Convention on existing and future agreements
- the relationship between "equitable and reasonable utilisation" and the "no harm" rule
- dispute settlement.

1997 IWC Convention

Ratified by: Finland, Hungary, Iraq, Jordan, Lebanon, Namibia, Netherlands, Norway, Qatar, South Africa, Sweden, and the Syrian Arab Republic.

Signed by: Cote d'Ivoire, Germany, Luxembourg, Paraguay, Portugal, Tunisia, Venezuela, and Yemen.
(September 2002)

8.1. Scope

The 1997 IWC Convention applies to uses of IWC for purposes other than navigation, and to measures of protection, preservation, and management related to those uses. "Preservation" includes conservation, but does not extend to living resources unless these are affected by other uses. Navigation is covered only to the extent that it affects other uses or is affected by them. The term "international watercourse" is

UN IWC Convention

Article 2. Use of Terms: "Watercourse" means a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus."

defined as a system of surface and connected groundwaters located in more than one state. The 1997 IWC Convention does not govern the use of "confined" transboundary groundwater (also called "confined aquifers"): groundwater that is not related to an IWC. Although the International Law Commission had appended a draft resolution to the

1994 Draft Articles that formed the working document for the 1997 IWC Convention, the UN Working Group of the Whole did not accept this proposal. Thus, the international law that governs shared groundwater is uncertain. This is a serious shortcoming of the Convention, since a large portion of the world's freshwater is contained in shared aquifers. However, states were not prepared to accept that the rules that governed shared surface water should apply also to shared confined aquifers. (See Annex II: "Scope Defined in International Agreements.")

8.2. Substantive Rules

This term normally defines those customary or treaty rules that deal with the creation, definition, and regulation of rights and duties. The issue of "entitlement" is the fundamental issue. Entitlement is a legal right to use the waters of a shared watercourse located in the territory of a watercourse state. It deals with the question "*who* has a right to use *what* water." Ideally, a transboundary watercourse agreement should identify the entitlement of a state and apportion the beneficial uses of the resource among the watercourse states. In the absence of such an agreement, customary international law provides that each riparian or watercourse state has the right to an equitable and reasonable use of a trans-

boundary watercourse located in its territory. Transboundary watercourse agreements may refer to the customary rule "equitable and reasonable utilization," or may provide for a quantified allocation such as a right to a specific amount of water (as was done under the 1996 Farakka Barrage Treaty between India and Bangladesh), or allocate rights to use waters of specific parts of an IWC system (1960 Indus Waters Treaty).

Equitable and reasonable utilization is considered to be a statement of customary international law evolved from the practice of sharing IWCs, taken in part from the jurisprudence of federal states. This rule encompasses both a watercourse state's right to a share of the beneficial uses and benefits of an IWC, and the correlative obligation not to deprive other watercourse states of their right to an equitable utilization. It implies attaining an *optimal utilization*, securing the maximum possible benefits for all watercourse states and achieving the greatest possible satisfaction of all their needs, while minimizing the detriment to, or unmet needs of, each. "Equitable" utilization does not necessarily mean an equal portion of the resource or equal share of uses and benefits. The application of equitable and reasonable

1997 IWC Convention

Article 5. Equitable and reasonable utilization and Participation:

"Watercourse states shall in their respective territories utilize an international watercourse in an equitable and reasonable manner. In particular, an international watercourse shall be used and developed by watercourse states with a view to attaining optimal and sustainable utilization thereof and benefits therefrom taking into account the interests of the watercourse states concerned, consistent with adequate protection of the watercourse."

Legal entitlement:

Who has a right to use *what* water?

1997 IWC Convention

Article 6. Factors relevant to equitable and reasonable utilization

"The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is a reasonable and equitable use, *all relevant factors are to be considered together and a conclusion reached on the basis of the whole.*"

utilization in a particular watercourse will not prohibit a use that causes damage unless it exceeds the limits of the using state's equitable share of the watercourse. An expert opinion is instructive of the difficulties encountered in applying the rule: "it could be argued that the rule is more a guideline – possibly due to a complex area in which engineers and economists play so large a role." (Lipper, 1967).

The primary substantive rules of the 1997 IWC Convention are found in Part II: General Principles. They include the governing rule of "equitable and reasonable

utilization" (Article 5), and the obligation to take all measures necessary not to cause significant harm (Article 7). How states are to determine what is equitable and reasonable is explained in Article 6, which provides a non-exhaustive list of factors to be considered in the determination of an "equitable and reasonable use" (ILC Report, 1994). These factors cover two broad categories: (i) scientific (hydrographic, hydrological, climatic, ecological, factors of a natural character; effects of use on other watercourse states, existing and potential uses, conservation measures, and availability of alternatives), and (ii) economic (social and economic needs, population dependent on watercourse). An indication of how these factors are to be utilized is found in Article 6(3), which directs that "the weight to be given each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is an equitable and reasonable use, all relevant factors are to be considered together and a conclusion reached on the basis of the whole." Interestingly, this provision was added during the final stages of the multilateral negotiation in New York and comes directly from the ILC's Helsinki Rules. For more detail on the ILC's approach to this provision, see its Commentary to the provision contained in its 1994 Draft, which, although of no legal force, is an important tool for understanding the meaning of the provision. Similarly, the work of the ILC, including the reports of the Special Rapporteurs, offers important insights into the rule and demonstrates some of the controversies over the evolution of the rule.

The challenges with applying equitable and reasonable utilization in practice will be examined more closely in Part Four of this study. As a practical first step, however, the ILC suggests that a watercourse state should first attempt to determine its legal entitlement to the beneficial uses of an IWC in its territory:

This process of assessment is to be performed, in the first instance at least, by each watercourse state, in order to assure compliance with the rule of equitable and reasonable utilization laid down in Article 5. . . . This provision means that, in order to assure that their conduct is in conformity with the obligations of equitable utilization contained in Article 5, watercourse states must take into account, in an ongoing manner, all factors that are relevant to ensuring that the equal and correlative rights of other watercourse states are respected."

(ILC Report, 1994, p. 100.)

The primary rule of "equitable and reasonable use" requires consideration of "all relevant factors" as they may arise in the context of new or increased uses. Thus, factors such as vital human needs, in-stream flow requirements, pollution harm, sustainable development requirements and so forth, are all part of the calculus. The Convention imposes on the states parties an obligation to "protect and preserve the

1997 IWC Convention

Article 20. Protection and preservation of ecosystems

"Watercourse states shall, individually and, where appropriate, jointly, protect and preserve the ecosystems of international watercourses."

ecosystems" (Article 20) of international watercourses and to "prevent, reduce and control the pollution of an international watercourse that may cause significant harm to other watercourse states or to their environment, including harm to human health or safety, to the use of the waters for any beneficial purpose or to the living resources of the watercourse" (Article 21). The operationalization of the principle of equitable and

reasonable utilization in each particular case requires that these environmental factors be considered – the extent to which such elements will be controlling will depend on the circumstances of each particular case. (See Annex III: Relevant Factors Matrix.)

8.3. Procedural Rules

The duty to cooperate embodied in the 1997 IWC Convention serves as a bridge between its substantive and procedural rules. To properly realize the rule of equitable and reasonable utilization, certain mechanisms of cooperation are necessary, including the prior notification of planned measures, the exchange of information, consultations, and in certain instances negotiations.

What rules must watercourse states follow when they plan new works on international waters? In Part III "Planned Measures," the Convention sets forth a number of procedural rules to be followed by states when they seek to undertake new works. In the first instance, states must on a regular basis exchange readily available data and information on the condition of the watercourse, in particular that of a hydrological, meteorological, hydrogeological, and ecological nature and related to the water quality, as well as related forecasts (Article 9(1)). In the event of a planned measure, states are required to "exchange information and consult each other and, if necessary, negotiate on the possible effects of planned measures on the condition of an international watercourse" (Article 11).

For planned measures involving works that could significantly affect other states, the procedural requirements are more stringent. Part III contains detailed procedures aimed at determining whether or not a proposed measure should go forward. The

1997 IWC Convention

Article 8. General obligation to cooperate:

"Watercourse states *shall cooperate* on the basis of sovereign equality territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of an international watercourse."

1997 IWC Convention

Article 12. Notification concerning planned measures with possible adverse effects

Before a watercourse state implements or permits the implementation of planned measures which may have a significant adverse effect [on other watercourse states], it shall provide those states with timely notification thereof. Such notification shall be accompanied by available technical data and information, including the results of any environmental impact assessment, in order to enable the notified states to evaluate the possible effects of the planned measures.

notified watercourse state has a fixed period within which to reply, informing of its opinion with respect to the proposed measure. Where no response is received, and the notifying state is confident that its planned measure complies with the rule of equitable and reasonable utilization, it can proceed. Where the notified state objects to the planned measure, consultations are required, with a view to seeking a solution that is equitable and reasonable. However, no state has a veto right over the development activities of another watercourse state. Neither can planned measures be

implemented without meeting notification and, if necessary, consultation requirements established by the procedural rules.

8.4. Institutional Mechanisms

Under the UN IWC Convention, states are encouraged to create institutional mechanisms, but not obligated to do so. This is consistent with the aims of a framework agreement, although states were divided on how explicit this provision should be. In international practice, states appear willing to embrace a range of institutional mechanisms, from the Meeting of the Parties (MOP, in the 1992 Helsinki Convention), to the establishment of joint commissions (IJC in the 1909 Canada–United States Boundary Waters Treaty), to the establishment of specialized dispute settlement tribunals (e.g. the Tribunal set up in the 1995 SADC regime). These are discussed in more detail in Part Four of this study. Suffice it to emphasize at this point the very important role of institutional mechanisms in the PCCP cycle, as evidenced in the majority of state practice involving transboundary waters.

1997 IWC Convention Article 24. Management

“Watercourse states shall, at the request of any of them, enter into consultations concerning the management of an international watercourse, which may include the establishment of a joint management mechanism.”

8.5. Dispute Settlement

Despite significant controversy over whether or not it was appropriate for a framework convention to contain dispute settlement provisions, Article 33 – the compromise formula eventually adopted – offers a range of dispute resolution mechanisms. States are free to select the means through which to settle their differences, including negotiation, good offices, mediation, conciliation, joint watercourse institutions, and so forth. However, if these attempts fail, any state to the dispute can unilaterally invoke the compulsory fact-finding procedure provided for under Article 33.

In its final form, Article 33 reflects a certain compromise between the two views. Nonetheless a number of states found it necessary to clarify their positions regarding the provision during the UN plenary session that adopted the Resolution. Some states, notably China, India, Israel, and Rwanda did not support Article 33 because in their view it went too far in establishing mandatory dispute settlement. China and India

1997 IWC Convention

Article 33. Settlement of Disputes

1. In the event of a dispute between two or more Parties concerning the interpretation or application of the present Convention, the Parties concerned shall, in the absence of an applicable agreement between them, seek a settlement of the dispute by peaceful means in accordance with the following provisions.
2. If the Parties concerned cannot reach agreement by negotiation requested by one of them, they may jointly seek the good offices of, or request mediation or conciliation by, a third party, or make use, as appropriate, of any joint watercourse institutions that may have been established by them or agree to submit the dispute to arbitration or to the International Court of Justice.
3. . . . If after six months from the time of the request for negotiations . . . the Parties concerned have not been able to settle their dispute through negotiation or any other means . . . the dispute shall be submitted, at the request of any of the parties to the dispute, to *impartial fact-finding*. . . .
4. A Fact-finding Commission shall be established, composed of one member nominated by each party concerned and in addition a member not having the nationality of any of the parties concerned chosen by the nominated members who shall serve as Chairman.

voted against the Resolution primarily owing to their dissatisfaction with its dispute settlement provisions. Turkey took the position that it was unsuitable for a framework instrument to contain any provisions relating to dispute resolution. On the other hand, some states, such as Pakistan, Switzerland, and Syria, were unhappy with Article 33 because in their view it was not strong enough. The extent of disagreement of states demonstrates the importance they attribute to the process associated with water-related disputes.

The so-called “fact-finding” mechanism resembles conciliation, since the Fact-finding Commission’s task includes providing “*such recommendation as it deems appropriate for an equitable solution of the dispute.*” The major difference between fact-finding and the other means of dispute settlement under the convention is that the fact-finding procedure can be invoked by any of the parties, while recourse to mediation, conciliation, arbitration, or adjudication requires the consent of all the parties concerned.

Arbitration and adjudication are also optional and need the agreement of all parties to the dispute. An annex to the convention sets out the procedure for arbitration, which generally follows an established pattern. The panel is composed of three members, two nominated by the parties and a chair selected by the nominated arbitrators. Where there is more than one “party in the same interest,” the parties nominate an arbitrator jointly. Applicable law is the convention and “international law.” The panel may recommend “essential interim measures of protection.” Proceedings are confidential, and the parties share the costs equally. The tribunal has a right to consent to intervention by parties with a legal interest in the dispute. The panel must give its decision, stating the reasons, and any dissenting opinions, within five months of being fully constituted, or within a maximum of ten months. The decision is final and binding unless the parties agreed in advance to an appeal procedure.

Despite the fact that the convention’s fact-finding mechanism has not yet been tested, it appears well suited to the particularities of water-related disputes, as demonstrated by the substantial domestic practice in the United States and India, which each have a long history of resolving interstate controversies over water (Sherk, 2000).

1997 IWC Convention

Article 33. Settlement of Disputes

8. The Commission shall adopt its report by a majority vote, unless it is a single-member Commission, and shall submit that report to the parties concerned, setting forth its findings and the reasons therefor and *such recommendation as it deems appropriate for an equitable solution of the dispute*, which the Parties concerned shall consider in good faith.

9. SUMMARY

This part has presented a general overview of international water law. International water law is a part of international law and along with its general principles provides more specific rules, which have their origins in both international custom and treaty law. The most important international water-related treaty is the 1997 UN International Watercourses Convention. Its main elements were examined under the headings of “scope,” “substantive rules,” “procedural rules,” “institutional mechanisms” and “dispute settlement,” as the background for the more detailed analysis of state practice that follows in Parts Three and Four. Part Three examines how water conflicts are transformed into cooperative frameworks, with an emphasis on actual case studies. Part Four sets forth the issues related to the design and implementation of watercourse agreements, as a catalyst for conflict prevention and instruments of cooperation.

PART THREE: TRANSFORMING CONFLICT INTO AGREEMENT: MEANS AND MECHANISMS

1. WATER CONFLICTS: AN OVERVIEW

In order to ensure a better understanding of the dynamics and legal intricacies of the PCCP cycle, this part of the study will first address the concept of "conflict" in international law. The primary focus here will be on the issue of "water conflicts," their principal causes and exigencies. The discussion will provide an insight into how various diplomatic and legal techniques of conflict resolution have been used in the past, and will thus inform the process of determination and selection of the optimal conflict resolution mechanisms to be employed in possible future arrangements.

Despite the fact that the only recorded war with water as its principal cause happened some 4,500 years ago, disputes over international waters are both common and current. The most recent examples include the increasing tension over shared water resources between Pakistan and India, and between Israel and Lebanon. The dispute between Pakistan and India regarding Jammu and Kashmir has been aggravated by the controversy over the Indian Baghliar hydroelectric project on the Chenab river, one of the rivers of the Indus Basin. Pakistan wants the matter to be referred to the "neutral expert" provided for in the Indus Waters Treaty. Some Indian legislators argued in favor of abrogating this treaty altogether.

Israel has been threatening military action against Lebanon over the latter's use of the Wazzani, a tributary to the Jordan river. Israel strongly opposes Lebanon's pumping of an additional 4 million cubic meters, for a total of about 10 million cubic meters per year, to supply drinking water to its border villages. It is noteworthy that in both cases the parties to the dispute invoke the rules of international law in support of their respective positions.

Singapore and Malaysia for years now have been locked in dispute over the two water agreements concluded at the time of separation: the 1961 Tebrau and Scudai Water Agreement, and the 1962 Johor River Water Agreement, which allow Singapore to draw up to 330 million gallons a day (mgd). Both countries have been embroiled in a controversy concerning the price Malaysia receives from Singapore for raw water and pays for treated water. In August 2002, Niger and Benin agreed to bring to the International Court of Justice (ICJ) their territorial dispute involving a boundary river.

Disputes over water may have various causes. Usually, problems arise where there is insufficient water to meet existing or new needs. A "conflict-of-uses" situation often arises where the quantity or quality of the water is such that competing demands of watercourse states clash with each other.

The most typical scenarios of "conflict-of-uses" are described below.

1.1. Conflict Between Existing Uses

Different scenarios may lead to such a conflict. The most typical is when an aggregate demand on water by different users and uses of a shared watercourse exceeds the total volume of available water. In some extreme cases this can result in a situation where not only are some users, usually downstream, prevented from enjoying their fair share of the beneficial uses but also the water resource itself (a river or an aquifer) is threatened by over-exploitation. In the Aral Sea basin, the removal of water for irrigation from its two main rivers – Amu-Darya and Syr-Darya – reduced the annual water inflow into the Sea from approximately 69 km³ in the 1960s to about 5 km³ in the late 1980s. Unsurprisingly, the population in the low reaches of the two rivers in Uzbekistan and Kazakhstan, as well as the Sea itself, suffered the most.

A conflict between existing uses may arise from a significant seasonal demand variance. This is the main cause of ongoing controversy in the Syr-Darya river basin between Kyrgyzstan, an upstream country, and its two downstream neighbors, Uzbekistan and Kazakhstan. The current system of transboundary water resources management, which gives priority to irrigated agriculture downstream, was inherited from the former Soviet Union. This was possible because the centralized Soviet planning system compensated upstream countries for releasing impounded water for agriculture by providing fuel and energy supplies. Hydropower generation played a subordinate role. Since independence, this system has been replaced by an ad hoc water distribution and water/energy exchange mechanism, whereby the upstream states are to be compensated by their downstream neighbors for limitations on hydropower generation in winter to maximize the volumes of water available for irrigation in the summer. However, this mechanism (provided for under the 1998 Agreement on Use of the Water and Energy Resources of the Syr-Darya River Basin) has failed to achieve unreservedly its stated objectives. On a number of occasions Kyrgyzstan was compelled to release water in order to produce hydropower during winter seasons, thus not only reducing the amount of water available for irrigation but also causing floods in the downstream regions.

A conflict of uses often results from the discharge of pollutants, which can also be considered as one of the in principle allowable uses of a watercourse that affects other users and uses. Changes in natural conditions, such as a drought leading to a diminished flow of water, may also bring existing uses into conflict.

In this respect a question may arise as to *what uses are allowed?* Allowable uses, as defined by the UN International Law Commission, are all uses "in the broadest sense." It is generally accepted that unless states agree otherwise, *no use has an inherent priority over another*, which also applies to navigation. However, there are examples when watercourse agreements establish prioritized lists of protected uses, as was done in the 1909 Canadian-US Boundary Waters Treaty (BWT). It is noteworthy that the 1909 Treaty sets the "ordinary use for domestic and sanitary purposes" outside the treaty regime, meaning that such uses are allowed first call on the water without the consent of the International Joint Commission.

Increasingly international water law, in the first instance the 1997 IWC Convention, singles out "*vital human needs*" as a special category of uses that should be given a sort of priority over other uses. The 2000 SADC Revised Protocol refers to "domestic use," defining it as the use of water for drinking, washing, cooking, bathing, sanitation, and stock watering purposes. Priority is accorded to those uses needed to meet *vital human needs*. This can be justified on both ethical and economic grounds. First, it is recognized that such uses consume a relatively insignificant amount of water, when considered in the context of the basin overall. Second, vital human needs have to be met in order to sustain and preserve human life itself, which should give them automatic priority *vis-à-vis* other competing uses.

Water for *vital human needs* is "drinking water sufficient to sustain human life and water required for the production of food in order to prevent starvation."
(*Statement of Understanding pertaining to the text of Article 10, 1997 UN IWC Convention*)

A different kind of conflict may arise in a situation where the total sum of existing uses exceeds the bearing capacity of a watercourse: a conflict between human consumption and the environment. *Ecological* use, as a special sort of water "use," is gradually being recognized in international law as having a certain priority over other demands on water: "no river, no water." Provisions requiring the preservation of "minimum stream flows" can be found in some recently adopted international treaties (1995 Mekong Agreement, 1998 Convention on the Portuguese-Spanish River Basins). In Central Asia, along with the five basin states, the Aral Sea,

including the deltas of the inflowing rivers, has been designated as a "water user," entitled to a certain share of limited water resources of the region.

The maintenance of a minimum stream flow protects the ecological, chemical, and physical integrity of an international water resource. This is not incompatible with, and is subject to, the primary international water law rule of "equitable and reasonable utilization." The beneficial uses of in-stream flows include: maintenance of fisheries and other aquatic life; drinking water; and maintenance of estuaries and of river channel integrity. The quantity of water in a transboundary resource is causally related to other beneficial uses, if any of the above beneficial uses is affected by a diminution of the flow.

To sum up, in all cases when a conflict of uses arises, adjustments or accommodations may be required under the rule of equitable and reasonable utilization to preserve each state's right to an equitable share of the beneficial uses of the transboundary watercourse. This is usually achieved through special agreements between riparian states.

1.2. Conflict Between Existing and New Uses (Planned Measures)

This is another typical situation where existing uses are threatened either by their increase by one or more watercourse states or by new proposed activities, the so-called planned measures, defined broadly to include "new projects or programs of a major or minor nature, as well as changes in existing uses of an international watercourse." Such new activities may and often do interfere with existing uses. Again, the conflict of uses must be resolved on the basis of equity.

Existing uses do not enjoy automatic protection; international water law does not recognize the right of "prior appropriation" or any "vested" or "historic rights" with respect to transboundary water resources. Present uses by one watercourse state may even become inequitable if, in the light of changing circumstances, their continuation prevents another watercourse state (or states) from equitably sharing the benefits of the water resource utilization. An existing use is legally protected only so long as "the factors justifying its continued existence are not outweighed by factors showing desirability of its modification or termination" (ILA commentaries to the 1966 Helsinki Rules).

1.3. Conflict Over Future Uses

Should water resources for possible future needs of a co-riparian be set aside? This frequently asked question must be answered in the negative: a state may not "reserve" water for future use. Possible future uses should be distinguished from *planned measures*. The latter are certain works that will occur if permissible; the former are uncertain and not concrete proposals. In fact, a conflict may arise if a state that currently has no immediate need to utilize a transboundary water resource insists on preserving its "share" of the water for the future, where other beneficial uses are adversely affected as a result.

International practice does not accept a "reservation" of water for uncertain future needs, even if a state has a right to an equitable share of the water resource. To do so would preclude other states from beneficially using the "reserved" waters not currently required by the first state. In situations where water resources are scarce and in great demand, this could be wasteful and unjust. Thus, the mere possibility of a future claim cannot prevent the continuance of an existing use. On the other hand, the fact that a riparian state does not presently use its "share" of water resources does not prejudice its right to claim it in the future. Otherwise, the first user would be granted a vested right in all the waters it is currently using.

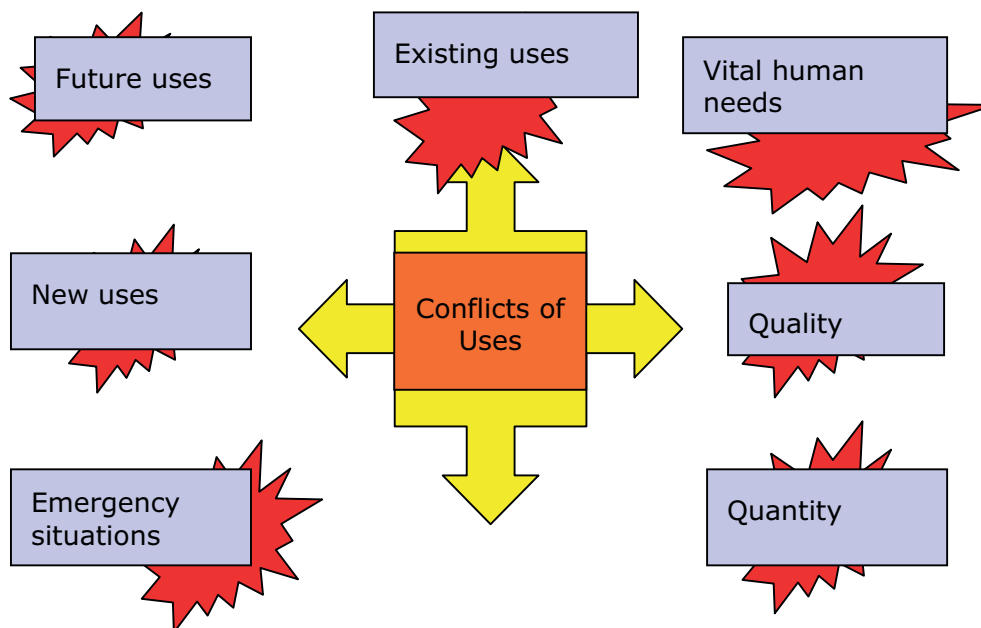


Figure 4. Water conflicts of use

1.4. Conflict as a Result of Emergency Situations

Emergency-related conflicts may arise as a result of industrial accidents or natural disasters (such as floods) if they are related to human activities. One such example is the Baia Mare gold mine tailings dam collapse in Romania, which caused the spillage of 100,000 cubic meters of cyanide containing waste into the Lapus–Tisza–Danube rivers system and affected downstream countries, first of all Hungary and Serbia. Disasters may be caused by the release of excessive amounts of water from upstream reservoirs, especially when combined with natural floods. Recently, floods have been caused downstream in the Syr-Darya river basin by significant discharges of water for hydropower production from the upstream reservoirs. States in general have a duty to cooperate in dealing with water-related emergencies. They must notify each other if there are reasons to believe that an emergency may cause harm to other riparian states. However, there is no international customary legal obligation that would require a state to prevent or mitigate natural conditions on its territory, which contribute to naturally occurring hazards, such as flooding.

2. "WATER CONFLICTS" AND "WATER DISPUTES": LEGAL DEFINITION

The PCCP project has adopted the term "conflict" as an all-embracing notion covering the entire spectrum of possible situations where the interests of states may collide: from minor differences in opinion to the other extreme of situations of tension and hostility that may threaten international peace and security. While not entirely averse to the notion of "conflict" as a generic conceptual underpinning of the discourse involving all relevant disciplines, international law traditionally uses the word "dispute" as a term of art. It should be noted, however, that these two terms are inextricably linked. Law dictionaries typically define the term "dispute" as a "conflict or controversy; a conflict of claims or rights" (e.g. Black's Law Dictionary, 4th ed., 1951).

Although this study does not purport to provide the ultimate definition of the term "water dispute," certain comments may be appropriate in order to establish a

context for further discussion. First of all, properly defining the term “dispute” is not simply a matter of semantics but may have serious legal implications. In some cases the existence of the dispute must be established prior to the activation of certain means of peaceful settlement, such as international adjudication. However, even among international lawyers there remains some disagreement over the precise meaning of this term.

International treaty practice is not consistent in its use of terms and thus is not very helpful. One international agreement refers to the “questions or matters of difference” (1909 BWT), another to “differences or disputes” (1995 Mekong Agreement), a third distinguishes between “questions,” “differences” and “disputes” (1960 Indus Waters Treaty) without defining them. The World Court’s opinion on what constitutes an international dispute may be of some help. In the PCIJ decision in the *Mavrommatis Palestine Concessions* case the term “dispute” was defined as “a disagreement on a point of law or fact, a conflict of legal views or of interest between the parties.” Yet, even this definition is far from precise and can be interpreted broadly enough to include any kind of interstate controversy. It has been argued that in order to be resolved by reference to international law the dispute must be “justiciable.” A mere conflict of interests between states, as distinct from a conflict over their respective rights, may make the dispute “non-justiciable.”

Thus, the distinction is often drawn between legal disputes (primarily involving legal issues) and any other kind of dispute. This distinction may be of importance in cases involving international judicial procedure. In certain situations an international tribunal may be unable to resolve a dispute because such a dispute is not capable of being settled by the application of principles and rules of international law, or in other words be unsuitable for adjudication. This, however, does not mean that disputes (even “non-justiciable”) cannot be resolved through other means of peaceful settlement, including involvement of a third party.

Second, it is important to recognize that not all conflicts or disputes involving water should be regarded as “water disputes.” They can hardly include controversies where water is an *instrument* of conflict rather than its *object*. It is doubtful whether intentional or inadvertent destruction of water supply facilities, dykes, or other water infrastructure during an armed conflict will make this conflict “water related.” The same can be said about territorial disputes regarding boundary rivers, so long as they do not involve questions of water utilization. Disputes over navigation are also of limited relevance, except in situations where other water uses either affect navigational uses or are affected by them.

Thus, for the purpose of this study the term “water dispute” will be limited to those conflicts involving the use of transboundary water resources, both surface and ground waters. However, it will be treated broadly enough to cover any conflict of views or of interests that takes the form of opposing claims between the states involved, “justiciable” as well as “non-justiciable” disputes, which can be resolved through all available means of dispute settlement.



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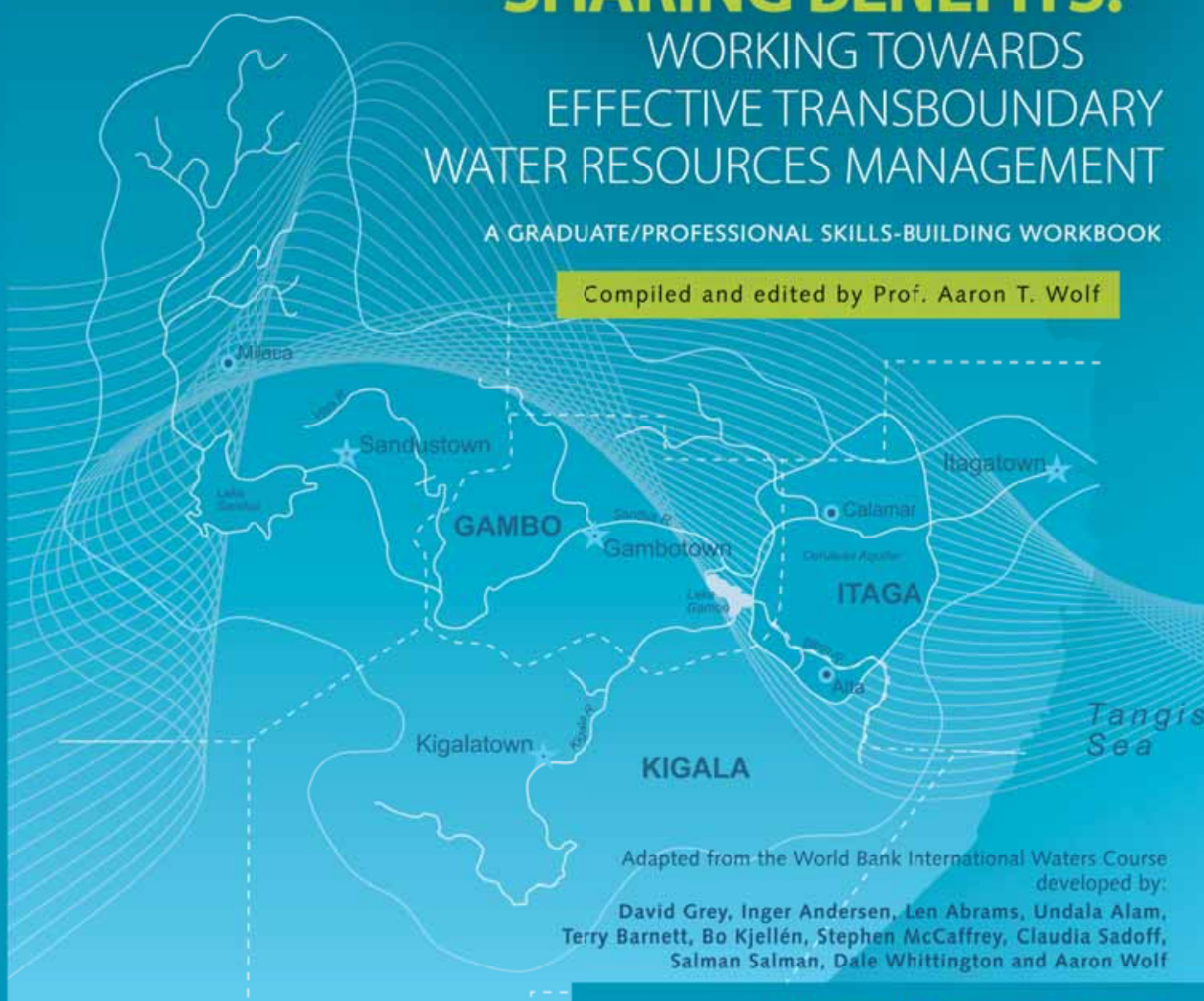
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SHARING WATER, SHARING BENEFITS:

WORKING TOWARDS EFFECTIVE TRANSBOUNDARY WATER RESOURCES MANAGEMENT

A GRADUATE/PROFESSIONAL SKILLS-BUILDING WORKBOOK

Compiled and edited by Prof. Aaron T. Wolf



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SECTION E: SUPPLEMENTAL READING FOR MODULE IV

The Law of International Watercourses: The Global Context

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Introduction

This paper provides general background information on the law of internationally shared freshwater resources. In particular, it focuses upon the law of the non-navigational uses of international watercourses. A treaty on this subject was concluded under United Nations auspices in 1997. It is entitled the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (“Convention” or “UN Convention”).²⁷ The Convention is generally regarded as reflecting the fundamental rules of customary international law applicable in the field. This proposition was reinforced by the judgment of the International Court of Justice in the *Case Concerning the Gabčíkovo-Nagymaros Project* (Hungary/Slovakia) (the “Danube Case”).²⁸

27. United Nations, 21 May 1997, annexed to U.N. Doc. A/RES/51/229, of 8 July 1997.

28. 1997 ICJ 7, judgment of 25 Sept. 1997.

Terminology

a. “Watercourse”

The term used in the UN Convention to refer to a river, stream, or lake, as well as many types of aquifers, is “watercourse”. This term is also in general use internationally. However, this expression should not be conceived of restrictively, for example, as applying only to the main stem of a stream. Instead, it refers to the entire system of waters in a drainage basin or catchment. Thus it would include tributary flows, whether consisting of surface water or groundwater.

The UN Convention defines the term “watercourse” in the following way: “Watercourse” means a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus.

Finally, while it may seem to refer only to the “course”, channel or bed in which water flows, the term “watercourse” is taken to embrace both the water and the bed, aquifer, etc., in which it is physically contained.

b. “International Watercourse”

An “international watercourse”, then, is a “watercourse” that is shared by two or more countries. The UN Convention defines this term as follows: “International watercourse” means a watercourse, parts of which are situated in different States.²⁹

It is important to bear in mind that the breadth of these definitions means that the rules of international law concerning shared freshwater apply to any and all “parts” of an international watercourse that may be located in a given country. Thus they would apply, for example, to: headwaters or tributaries in State A of a stream that flows into State B; a groundwater basin that straddles the border between States A and B and is fed by surface water in State A;³⁰ or a groundwater basin wholly located in State A that feeds a tributary of a stream flowing into State B.

c. “Riparian State”

As used in this paper, the expression “riparian state” refers to a state in whose territory a part of an international watercourse is situated. Similarly, “co-riparian state(s)” refers to a state or states sharing an international watercourse. These terms are not used in the UN Convention but are employed here from time to time for convenience.

General Rules of Law concerning the Use of International Watercourses

There are several rules of international law of a general and fundamental nature that govern the conduct of states in relation to international watercourses. The most basic of these are the following:

- The requirement that a state use an international watercourse in a way that is equitable and reasonable vis-à-vis other states sharing the watercourse.
- The requirement that riparian states take all appropriate measures to prevent the causing of significant harm to co-riparian states.
- The requirement that a riparian state provide prior and timely notification to co-riparian states concerning any new use or change in existing uses of an international watercourse, together with relevant technical information, and that it consult with the co-riparian states.

It is probable that there is also an emerging rule requiring the protection of the ecosystems of international watercourses. The following paragraphs will attempt to provide an overview of these general rules and some of their implications.

29. UN Convention, art. 2(b).

30. There is some question as to the extent to which the rules of international law described herein apply to so-called “confined transboundary groundwater” – i.e., groundwater intersected by an international boundary that does not interact in any way with surface water or other groundwater. The UN International Law Commission, which prepared the draft upon which the UN Convention is based, made this form of groundwater the subject of a separate resolution. That resolution, however, recommends that states, in their relations concerning confined transboundary groundwater, be guided by the principles governing international watercourses.

1. Equitable Utilization

There is perhaps no more fundamental rule of international law concerning the use of international watercourses than that of equitable and reasonable utilization. In its judgment in the *Danube Case* the International Court of Justice referred to the “basic right” of a state (there, Hungary) to “an equitable and reasonable sharing of the resources of an international watercourse.”³¹

This obligation requires each riparian state to ensure, in an ongoing manner, that its use is equitable and reasonable vis-à-vis other riparian states. What is equitable and reasonable in any given case may be determined only by taking into account all relevant factors and circumstances – both natural (climate, hydrography, etc.) and human-related (social and economic needs of the riparian states, effects of uses in one state on co-riparians, existing and potential uses, etc.).³²

But conditions may change over time, producing consequential changes in the weight assigned to given factors. For example, a drought would reduce the available water supply; a population increase would result in greater need for water; etc. Maintaining a regime of utilization that is equitable in relation to other riparian states is therefore necessarily a dynamic process. It requires regular communication between the countries sharing the watercourse – communication regarding data and information relating to the condition of the watercourse (flow and any regulation thereof, pollution, meteorological factors that could influence utilization, etc.) and regarding any new projects or changes in existing uses. Many countries sharing international watercourses have found that this kind of systematic communication may be effectively and efficiently accomplished through a joint management mechanism, such as a commission.

Absent such an organization or some other system allowing regular communication, it can be challenging at best to maintain a regime of utilization that is equitable vis-à-vis a state's co-riparians.

2. Equitable participation

Often a river or other form of watercourse will be used so intensively by co-riparian states that it will be necessary for them to take affirmative steps – such as construction or maintenance of works or other forms of regulation of the watercourse – to make it possible for other riparians to utilize the shared watercourse equitably. This notion is captured in the concept of “equitable participation”, a principle reflected in the UN Convention.³³ In the *Danube Case* the International Court of Justice laid stress on the importance of equitable participation in the “common utilization of shared water resources for the achievement of the several objectives mentioned in the Treaty [in question]”.³⁴

3. Prevention of Significant Harm

It is a fundamental rule of international law that one state should not cause significant harm to another. This principle has been recognized in several important decisions in international cases.³⁵ However, the application of the principle to international watercourses is highly controversial. While it is clear that one state may not intentionally cause harm to another through, e.g., flooding or deliberate releases of toxic pollution, there is dispute about whether one state's use that reduces the available supply in another state is prohibited by this norm.

The better view is that the latter situation is governed first and foremost by the principle of equitable utilization: if harm is caused through a pattern of utilization that is otherwise equitable, it should not be prohibited. Otherwise, for example, a later-developing upstream state would be prevented from developing the portion of an international watercourse in its territory to the extent that such development impaired existing uses in downstream states. This view – that in respect of apportionment the principle of equitable utilization prevails over that of harm prevention if the two come into conflict – would appear to be borne out by the UN

31. 1997 ICJ p. 54, para. 78.

32. UN Convention, art. 6.

33. See art. 5(2) of the UN Convention setting forth this concept.

34. 1997 ICJ p. 80, para. 147. The objectives referred to included hydropower production, improvement of navigation, protection from floods and protection of water quality and riverine ecosystems.

35. Chiefly the *Trail Smelter*, *Lake Lanoux* and *Corfu Channel* cases.

Convention.³⁶ Moreover, the International Court of Justice in the *Danube Case* referred only to the principle of equitable utilization when addressing the parties' respective rights to the uses and benefits of the river; the principle of prevention of harm figured only – although importantly – as a constraint on actions that would affect the environment of other states.

Regardless of its relationship to equitable utilization, the duty to prevent significant harm to other states is not absolute; it requires that a country exercise its best efforts³⁷ to prevent harm. Whether a state has complied with this obligation will thus be, in part, a function of its capability to do so. Presumably, therefore, developing countries would generally have more leeway in this regard than developed countries, by virtue of the greater capacity of the latter to prevent harm to co-riparians.

4. Rules concerning New Uses

Although it has been controversial in the past, today there is little doubt that customary international law requires a state planning a new use to provide notice thereof to other states that the use might adversely affect. This rule applies to all projects that have the potential to change the regime of the watercourse in a way that would be prejudicial to other riparian states. In its classical conception it applies to projects (including both new uses and changes in existing uses) that may have adverse factual impacts upon other states. More recently it has been recognized that adverse *legal* effects should also be covered by the rule. Thus, for example, a planned project in a downstream state might, when implemented, make it impossible for an upstream state to implement a project of its own without running the risk that its project would result in its overall utilization being considered inequitable. Because of this possibility, notification should be provided to co-riparian states of all planned projects of significance, even if they would not have the potential of causing adverse factual effects in those states.

Once notification has been provided, the state in which the project is planned has a duty to consult with the potentially affected state or states. The planning and potentially affected states are expected to arrive at an equitable resolution of any differences between them with regard to the project.

5. Rules concerning Pollution

The UN Convention provides that states sharing an international watercourse have an obligation to protect and preserve the watercourse's ecosystems. While this obligation is not tied to harm to other states, it seems unlikely that a co-riparian would assert a violation unless it had suffered some harm. More specifically, states are required to prevent, reduce and control pollution that may cause significant harm to co-riparians. Like the obligation to prevent significant harm, this duty is one of due diligence.

6. The Special Case of Shared Groundwater

The rules discussed above apply to all components of an international watercourse system, including groundwater. However, in view of the different characteristics of groundwater, the rules may apply somewhat differently. This is a developing area of the law. It is therefore not clear to what extent the rules, or their application, differ in the case of groundwater.

It does seem possible, however, to arrive at certain general conclusions. First, the obligation of equitable and reasonable utilization applies equally to surface and groundwater. Second, the obligation to prevent significant harm may be somewhat more stringent in the case of groundwater because of the greater importance of prevention where it is concerned: harm occasioned through an aquifer often takes longer to remedy than in the case of surface water. This is particularly the case with pollution, which may cause contamination of an aquifer that cannot be remedied for many years, if at all. And third, the special characteristics of groundwater make close cooperation between states sharing it particularly important. Prior notification, the sharing of data and information on a regular basis, and where possible, the establishment of joint management mechanisms take on greater significance with regard to shared groundwater.

36. See art. 7 of the UN Convention, and especially para. 2 of that article.

37. Article 7 of the UN Convention requires states to "take all appropriate measures" to prevent harm to other states.

Links with World Bank Procedures

There are three Bank documents that are relevant to the law of international watercourses:

1. Bank Operational Policies (OP 7.50): Projects on International Waterways
2. Bank Procedures (BP 7.50): Projects on International Waterways
3. Bank Good Practices (GP 7.50): Projects on International Waterways

These documents indicate Bank policy and set forth procedures to be followed in respect of projects on international watercourses. (The term “waterways” in the titles of the documents should not be interpreted restrictively to refer only to those that are navigable. See OP 7.50, para. 1.)

The documents essentially provide that:

- International water rights issues be assessed as early as possible in project identification, and that
- The Bank advise the state proposing the project that it should formally notify the other states sharing the watercourse of the proposed project, including project details, if it has not already done so. (BP 7.50, paras. 1 and 2.)
- The information provided should be sufficient to enable the other states to determine whether the proposed project has potential for causing appreciable harm through water deprivation or pollution or otherwise.
- If other states object, the Bank assesses the objection and decides whether and how to proceed. The opinion of independent experts may be sought if needed.
- These procedures are generally consistent with the law of international watercourses, as outlined elsewhere in this handout.

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The UN Convention on the Law of the Non-Navigational Uses of International Watercourses: Prospects and Pitfalls

Stephen McCaffrey*

AN OVERVIEW OF THE UN CONVENTION

The Convention on the Law of the Non-Navigational Uses of International Watercourses was adopted by the United Nations General Assembly on May 21, 1997.¹ It had been negotiated in the Sixth (Legal) Committee of the General Assembly, on the basis of draft articles adopted by the International Law Commission (ILC)² after some twenty years' work on the project.³ The Convention is a general, framework agreement that contains thirty-seven articles, which are divided into seven parts. The most important substantive and procedural provisions are contained in Part II, General Principles, Part III, Planned Measures, and Part IV, Protection, Preservation and Management. Also important is Article 33 on the Settlement of Disputes. In the following overview, I will pay particular attention to the articles that I believe may be of special significance for the Bank's work.

Perhaps the most logical starting place is the Convention's definition of the term "international watercourse." It is natural to think of this expression as being synonymous with "international river", but as used in the Convention it is much broader. The definition takes into account that most fresh water is in fact underground, and that most of this groundwater is related to, or interacts with, surface water. Thus, for example, pollution of surface water can contaminate groundwater, and vice versa, just as

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¹ The Convention is annexed to U.N.G.A. Res. 51/229, 21 May 1997, adopted by a vote of 103 for and 3 against, with 27 abstentions. See generally Attila Tanzi, *Codifying the Minimum Standards of the Law of International Watercourses: Remarks on Part One and a Half*, 21 NAT. RESOURCES J. 109 (1997); and John Crook & Stephen McCaffrey, *The United Nations Starts Work on a Watercourses Convention*, 91 AM. J. INT'L L. 374 (1997).

² *Report of the International Law Commission on the Work of its Forty-sixth Session*, U.N. GAOR, 49th Sess., Supp. No. 10, 197, U.N. Doc. A/49/10 (1994) [hereinafter *1994 ILC Report*]. See Stephen McCaffrey, *The International Law Commission Adopts Draft Articles on International Watercourses*, 89 AM. J. INT'L L. 395 (1995).

³ The ILC included the topic in its general program of work in 1971. It began study of the topic in 1974 with the establishment of a sub-committee and the appointment of the first of five special rapporteurs. See e.g., [1985] Y.B. INT'L L. COMM'N, vol. 2, pt. 2, 68 (1986).

withdrawals of groundwater can affect surface water flows. Article 2, therefore, defines “watercourse” as “a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole...” This definition calls the attention of states to the interrelationship between all parts of the system of surface and undergroundwaters that make up an international watercourse. Thus it should be clear immediately that an effect on one part of the system will generally be transmitted to other parts. Let us assume, for example, that an aquifer is intersected by the border between states A and B. Mining of the groundwater in that aquifer in country A can affect groundwater levels in state B. It may also affect surface flows in state B to the extent that the aquifer contributes to those flows. Nevertheless, the inclusion of groundwater in the Convention was cited as a reason for the abstentions of two states from the vote on the Convention.⁴

The relationship of the Convention to agreements concerning specific watercourses is dealt with in Articles 3 and 4 of the Convention, which have been covered by Professor Caflisch. Article 3 generally encourages states sharing watercourses to enter into agreements that apply and adjust the provisions of the Convention to the particular characteristics of the watercourse concerned. While existing agreements remain unaffected by the Convention, parties are called upon to “consider harmonizing” those agreements with its “basic principles.”⁵ As you can imagine, some delegations, such as Ethiopia’s, believed that harmonization should have been required. But given the vast number and variety of existing agreements, such a requirement would have been impractical. However, this does not mean that the principles reflected in the Convention will be without significance in the *interpretation* of existing agreements.

Article 3 also addresses the situation in which less than all of the states sharing a watercourse enter into an agreement concerning its use. In that case, the agreement may not adversely affect uses of other states on that watercourse without their consent. Then there is the situation in which a riparian state believes the principles of the Convention should govern the watercourse it shares with another state or states. Article 3 provides that in such a case, the states sharing the watercourse *must* enter into consultations “with a view to negotiating in good faith for the purpose of concluding a watercourse agreement.”

Article 4 deals with the rights of riparian states to participate in specific agreements that apply to an entire international watercourse and those that apply “only to a part of the watercourse or to a particular project, program or use.” If an agreement is to apply to an entire international watercourse, all states on the watercourse are entitled to participate in the negotiation of, and to become a party to the agreement. As to agreements concerning only a part of a watercourse or particular project, a riparian state whose use of the watercourse may be affected by the implementation of a prospective agreement of this kind may participate in consultations relating to the agreement, “and,

⁴ Verbatim record, 99th plenary meeting, U.N. General Assembly, 21 May 1997, U.N. Doc. A/51/PV.99, at 5 (Pakistan) and 12 (Rwanda).

⁵ Some delegations believed harmonization should have been required. See, e.g., the statement of Ethiopia in explaining its vote on the Convention, Verbatim record, *id.* at 9-10.

where appropriate, in the negotiation thereof in good faith with a view to becoming a party thereto, to the extent that its use is thereby affected.”

Part II, General Principles, is the core of the Convention. It is introduced by Article 5, “Equitable and Reasonable Utilization and Participation.” This article sets forth what many regard as the cornerstone of the law of international watercourses—namely, the principle that a state must use an international watercourse in a manner that is equitable and reasonable vis-à-vis other states sharing the watercourse. Indeed, the International Court of Justice, in its recent decision in the *Gabčíkovo-Nagymaros* case, emphasized the importance of operating the project involved in the case “in an equitable and reasonable manner.”⁶ According to Article 5, to be equitable and reasonable, the use must also be consistent with adequate *protection* of the watercourse from pollution and other forms of degradation.

But how does upstream State A, for example, know whether its use of an international watercourse is equitable and reasonable vis-à-vis downstream States B and C? The answer is, this may be a very difficult thing for State A to determine, in the absence of a joint mechanism with States B and C, or a very close working relationship with them. Article 6 of the Convention sets forth a non-exhaustive list of factors to be taken into account in making the determination, and Article 9 requires riparian states to exchange data and information concerning the condition of the watercourse on a regular basis. The Article 6 factors will doubtless be of assistance to State A in making the equitable utilization determination, as will the Article 9 data and information—indeed, it would be nearly impossible for a state to ensure its use was equitable without data and information from other riparian states. However, the principle of equitable and reasonable utilization is much better suited to implementation through very close cooperation between the states concerned, ideally through a joint commission, or by a court or other third party. After all, the doctrine had its origins in decisions of the United States Supreme Court in water disputes between U.S. states. This having been said, however, it seems clear that there is no other general principle that can take into account adequately the wide spectrum of factors that may come into play with regard to international watercourse throughout the world.

What this underlines is the importance of *cooperation* between riparian states with a view to achieving a regime of equitable and reasonable utilization and participation for an international watercourse system as a whole. Thus, Article 8 of the Convention lays down a general obligation to cooperate “in order to attain optimal utilization and adequate protection of an international watercourse.” It is interesting to note that the delegations negotiating the Convention attached such significance to cooperation *through joint mechanisms* that they added a paragraph to Article 8 calling for states to “consider the establishment of [such] mechanisms or commissions...”

⁶ Case Concerning the Gabčíkovo-Nagymaros Project (Hung./Slovk.), 1997 I.C.J. 92 (Sept. 25), 37 I.L.M. 162 (1998), para. 150, at 69, <<http://www.icj-cij.org/idoctr/ihs/ihsjudgment/ihsjudcontent.html>>.

Returning for a moment to Article 5, that provision also introduces the new concept of equitable *participation*. The basic idea behind this concept is that in order to achieve a regime of equitable and reasonable utilization, riparian states must often cooperate with each other by taking *affirmative* steps, individually or jointly, with regard to the watercourse. While this idea is, in effect, a feature of some well-developed cooperative relationships between river basin countries, it had not been reflected as such in attempts to codify the law in this field until the International Law Commission included it in Article 5. Its acceptance as a part of the Convention is welcome, because it helps to convey the message that a regime of equitable utilization of an international watercourse system, together with the protection and preservation of its ecosystems, cannot be achieved solely through individual action by each riparian state acting in isolation; again, affirmative cooperation will often be necessary. The utility of this concept is illustrated by the fact that the ICJ quoted the entire paragraph of Article 5 that sets forth the obligation of equitable participation in its judgment in the *Gabčíkovo-Nagymaros* case.⁷

I now come to the most controversial provision of the entire Convention, the obligation not to cause significant harm, which is set forth in Article 7. That article was treated as being closely linked with Articles 5 and 6 throughout the negotiations in the U.N. The three-article package was finally adopted by a vote of 38 to 4, with 22 abstentions.

At first blush it seems obvious that one state should not cause significant harm to another state, whether through its use of a watercourse or otherwise. But at least in the case of international watercourses, it is not so simple. Suppose, for example, that—as is often the case—upstream State A has not significantly developed its water resources because of its mountainous terrain. The topography of the downstream states on the watercourse, B and C, is flatter, and they have used the watercourse extensively for irrigation for centuries, if not millennia. State A now wishes to develop its water resources for hydroelectric and agricultural purposes. States B and C cry foul, on the ground that this would significantly harm their established uses. How should the positions of State A, on the one hand, and States B and C, on the other—neither of which seems unreasonable on its face—be reconciled?

This question is at the heart of the controversy over Article 7 and its relationship with Article 5 on equitable and reasonable utilization. I will take up each of these points in turn—albeit only briefly. First, as to how the so-called “no significant harm” obligation should be formulated: The International Law Commission’s first draft of the article, adopted in 1991, was the essence of simplicity. It provided: “Watercourse States shall utilize an international watercourse in such a way as not to cause appreciable harm to other watercourse States.” The Commission’s final draft, adopted in 1994, introduced considerable flexibility into the text, in two principal respects. First, it expressly made the obligation one of “due diligence”: “Watercourse States shall *exercise due diligence* to utilize an international watercourse in such a way as not to cause significant harm ...

⁷ *Id.*, para. 147. See also Chapter 7 of this Report.

[etc.].” (You will notice, incidentally, that it also changed “appreciable” to “significant.” I don’t regard this as a terribly “significant” change, however.) But the insertion of the “due diligence” modifier made it clear beyond any doubt that this was not in any way an *absolute* obligation, but rather one of due diligence, or best efforts under the circumstances.

The second way in which flexibility was introduced was by adding a lengthy paragraph 2, which converted the “no harm” obligation into what the ILC described as “*a process aimed at avoiding significant harm as far as possible while reaching an equitable result in each concrete case.*” Paragraph 2 did this by requiring that if significant harm was caused despite the exercise of due diligence, the states involved must enter into consultations concerning two things: first, the extent to which the harmful use is equitable and reasonable; and second, whether the harming state should adjust its use to eliminate or mitigate the harm, and, “where appropriate, the question of compensation.”

The ILC’s text was changed in the U.N. negotiations. Undoubtedly, scholars will spill much ink over the extent to which the changes are “significant.” I, personally, don’t think they are. In my view the deletion of “due diligence” from paragraph 1 and its replacement with “take all appropriate measures” is merely saying the same thing in different words. The real fight was over the second paragraph. The question there was whether equitable utilization should prevail over the “no-harm” obligation, or vice-versa. To illustrate, allow me to return to our hypothetical fact situation. If equitable utilization is the controlling legal principle, upstream State A may develop its water resources in an equitable and reasonable manner vis-à-vis downstream States B and C, even though that development would cause significant harm to their established uses. If, on the other hand, the obligation not to cause significant harm is dominant, State A could engage in no development, no matter how equitable and reasonable, that would cause States B and C significant harm.

To some delegations at the U.N. negotiations, the ILC’s final text—which represents an effort to strike a balance between the two principles—favored equitable utilization too heavily. They argued for a text that more clearly gave precedence to the “no-harm” principle. Other delegations took the opposite view. For them the basic rule was equitable utilization; at most, any harm to another riparian state should merely be one factor to be taken into account in determining whether the harming state’s use was equitable. You see before you the compromise formula arrived at in the U.N. negotiations. Perhaps not surprisingly, the final text is somewhat like a basket of Halloween candy: there is something in it for everyone. No matter whether you are from the equitable utilization or the no-harm school, you can claim at least partial victory. In my view, however, paragraph 2 of Article 7 of the Convention gives precedence to equitable utilization over the no-harm doctrine. The very existence of a second paragraph implicitly acknowledging that harm may be caused without engaging the harming state’s responsibility supports this conclusion. Also indicating a recognition that significant harm may have to be tolerated by a watercourse state are the numerous mitigating clauses in paragraph 2, especially the phrase “having due regard for the provisions of articles 5 and 6”—the two equitable utilization articles. Finally, the proposition that the “no-harm”

rule does not enjoy inherent preeminence is supported by Article 10 of the Convention, which provides that any conflict between uses of an international watercourse is to be resolved “with reference to articles 5 to 7...” This would presumably mean that if State A’s hydroelectric use conflicts with State B’s agricultural use, the conflict is not to be resolved solely by applying the “no-harm” rule of Article 7, but rather through reference to the “package” of articles setting forth the principles of both equitable utilization and “no-harm.”

But in actual disputes, it seems probable that the facts and circumstances of each case, rather than any *a priori* rule, will ultimately be the key determinants of the rights and obligations of the parties. Difficult cases, of which there are bound to be more in the future, will be solved by cooperation and compromise, not by rigid insistence on rules of law. This is one of the lessons of the World Court’s judgment in the *Gabčíkovo-Nagymaros case*.

Before leaving the “General Principles” part of the Convention, I should say an additional word about Article 10. Originally conceived as a provision that would clearly specify that navigational uses no longer enjoy inherent priority over non-navigational ones—if they ever did—this article now has a much richer texture. In particular, paragraph 2 provides that a conflict between different kinds of uses of an international watercourse is to be “resolved with reference to articles 5 to 7, with special regard being given to the requirements of vital human needs.” The expression “vital human needs” was discussed at some length in the U.N. negotiations. The final text maintains the ILC’s language but a “statement of understanding” accompanying the text of the Convention indicates that: “In determining ‘vital human need,’ special attention is to be paid to providing sufficient water to sustain human life, including both drinking water and water required for production of food in order to prevent starvation.” This is no doubt right. What some countries may fear is that the concept of “vital human needs” could become a loophole, enabling a state to argue that its use should prevail on this ground when in fact it was highly debatable whether vital human needs were involved at all. But since the “statement of understanding” is based on the ILC’s commentary, which would in any event be relevant to an interpretation of paragraph 2, the “statement” probably adds no new problems.

Part III of the Convention, Planned Measures, contains a set of procedures to be followed in relation to a new activity in one state that may have a significant adverse effect on other states sharing an international watercourse. The fact that the basic obligation to provide prior notification of such changes was accepted as a part of the Convention by most delegations⁸ is, in itself, important: it provides further evidence that the international community as a whole emphatically rejects the notion that a state has

⁸ Three that did not were Ethiopia, Rwanda and Turkey. Verbatim record, 99th plenary meeting, *supra* note 4, at 4-5 (Turkey), 12 (Rwanda) and 9 (Ethiopia). In explaining its negative vote on the Convention, Turkey stated that Part III introduces a “veto”. *Id.*, at 5. While it is true that the articles provide for a temporary suspensive effect upon implementation of measures by the planning state (see Articles 13 and 17), no veto is provided for in Part III.

unfettered discretion to do as it alone wishes with the portion of an international watercourse within its territory.⁹

While the Working Group made a number of drafting changes, the essence of the system envisaged in Part III is unchanged from the ILC's draft. It essentially provides that a state contemplating a new use or a change in an existing use of an international watercourse that may have a significant adverse effect on other riparian states must provide prior notification to the potentially affected states. Those states are then given six months within which to respond. If they object to the planned use, they are to enter into discussions with the notifying state "with a view to arriving at an equitable resolution of the situation." This entire process could take twelve months or longer. If the matter is not resolved to the satisfaction of any of the states concerned, the dispute settlement procedures of Article 33 would be applicable. A final important point concerning Part III is that it seems clear that, of necessity, it is premised on the assumption that the planning state will conduct an environmental impact assessment to identify, possible adverse effects on co-riparian states.¹⁰

Part IV of the Convention, entitled "Protection, Preservation and Management," contains the "environmental" provisions of the Convention. While a variety of proposals were made in the U.N. negotiations for the strengthening of these provisions, in the end only minor changes were made to the ILC's text. Article 20, Protection and Preservation of Ecosystems, is a simple but potentially quite powerful provision. It says that riparian states have an obligation to "protect and preserve the ecosystems of international watercourses." Like Article 192 of the United Nations Convention on the Law of the Sea, on which it is modeled, this obligation is not qualified. For example, it does not say that the ecosystems must be protected only if failure to do so may harm another riparian state. Since the "ecosystems" of international watercourses include land areas contiguous to them, Article 20 requires that such land areas be maintained in such a way that the watercourses they border are not harmed by, for example, excessive agricultural runoff. Doubtless this is not an absolute obligation, however. That is, it is an obligation to exercise due diligence to protect and preserve watercourse ecosystems. This standard takes into account the sensitivity of the ecosystem as well as the capability of the state involved.

Pollution of international watercourses is dealt with in Article 21, Prevention, Reduction and Control of Pollution. After defining the term "pollution," it uses the standard formula—also employed in Article 194 of the Law of the Sea Convention—that riparian states must "prevent, reduce and control" pollution of international watercourses. Unlike Article 20, however, this obligation is qualified. It is triggered *only* if the pollution "may cause significant harm to other watercourse States or to their environment..." Of

⁹ The doctrine of "absolute territorial sovereignty", which would support such unfettered discretion, has long been rejected by the state that invented it. See Stephen McCaffrey, *The Harmon Doctrine One Hundred Years Later: Buried, Not Praised*, 36 NAT. RESOURCES J. 725 (1996).

¹⁰ But cf. art. 12.

course, it is at least arguable that pollution that would harm only the environment of the state of origin would have to be controlled pursuant to Article 20.

Article 22 requires riparian states to prevent the introduction of alien or new species into international watercourses. Like Article 21, the obligation contained in Article 22 applies only where significant harm will be caused to other riparian states.

Article 23 addresses, in a very general way, the problem of marine pollution from landbased sources. Like Article 20, the obligation applies whether or not other states are injured. Article 23 actually goes beyond the problem of pollution, however. Since it requires riparian states to “protect and preserve the marine environment,” it would presumably apply also to such things as the protection of anadromous species and of coral reefs.

In a “statement of understanding” the Working Group in which the Convention was negotiated indicated that Articles 21-23 “impose a due diligence standard on watercourse States.” It is interesting that this statement does not cover Article 20. But, as I have already indicated, I believe Article 20 must also be read to reflect an obligation of due diligence.

Article 24, Management, is a provision believed by many specialists to be too modest in view of the importance of joint commissions. But the ILC did not feel it could go any further than this in a general, framework instrument. It was of the view that while international law may require riparian states to cooperate with each other, it does not go so far as to require them to form joint commissions. I believe the Commission was correct in this assessment, although in my view the article could have gone somewhat further in indicating the concrete forms that institutionalized cooperation between riparian states might take. But some states—and indeed some members of the Commission—were somewhat uncomfortable even with the article as it presently stands, let alone a more specific provision.

Regulation of watercourses, international or national, is a common phenomenon, as any hydraulic engineer will tell you. This often takes the form of fortifying banks to prevent erosion, straightening the course of a river, building up embankments, and the like. Article 25 deals with these activities, requiring riparian states to cooperate in responding to needs for regulation, and to participate in the required works on an equitable basis.

The proper construction and maintenance of dams and similar works is dealt with in Article 26, Installations. Since a faulty dam may pose great danger to downstream states, this article requires that a state in whose territory a dam is located maintain it and protect it from forces that may result in harm to other riparian states.

Part V is entitled “Harmful Conditions and Emergency Situations.” It contains one article on each of those topics. By “harmful conditions” is meant such things as water-borne diseases, ice floes, siltation and erosion. Article 27 requires riparian states to

take “all appropriate measures” to prevent or mitigate such conditions, where they may be harmful to other states sharing the watercourse. Article 28 deals with emergency situations. This term is defined broadly to include both natural phenomena such as floods, and those that are caused by humans, such as chemical spills. A state within whose territory such an emergency originates must notify other potentially affected states as well as competent international organizations. It must also take “all practicable measures ... to prevent, mitigate and eliminate harmful effects of the emergency.”

Part VI, Miscellaneous Provisions, contains Articles 29 to 33. Article 29, dealing with armed conflict, serves as a reminder that there are rules of international law that protect international watercourses and related installations, facilities and other works during hostilities.

Article 30 provides for riparian states to utilize indirect procedures to fulfill their obligations of cooperation under the Convention when there are serious obstacles to direct contacts between them, such as where they do not have diplomatic relations with each other.

Article 31 simply safeguards classified information that is “vital to ... national defense or security.”

Article 32 deals essentially with private remedies. Its intent was to ensure equal access and nondiscrimination, so that an injured or threatened party could have access to judicial or administrative procedures in the state of origin, regardless of whether that was on the other side of an international boundary. The article provoked controversy in the U.N. negotiations, including a proposal that it be deleted. Evidently not all states are yet comfortable with the idea of granting private persons from other (usually neighboring) countries nondiscriminatory access to their judicial and administrative procedures relating to transboundary harm or the threat thereof.

Article 33 on the settlement of disputes was also somewhat controversial, principally because it provides for compulsory fact-finding at the request of any party to a dispute. Any compulsory dispute-settlement procedure is bound to draw strong objection from certain countries,¹¹ even if all that is compulsory is fact-finding, and even if that only becomes compulsory after negotiations have failed to settle the dispute within six months. The ranks of these “automatic objectors” were swelled somewhat by a few upstream states,¹² who were evidently reluctant to surrender whatever leverage their position on an international watercourse conferred upon them. Yet facts are of critical significance with regard to the core obligations of the Convention. For example, how can

¹¹ E.g., China and India. Verbatim record, 99th plenary meeting, *supra* note 4, at 7 (China) and 9 (India).

¹² E.g., France, Israel (effectively upstream on the Jordan) and Rwanda. These states, together with China and India, generally maintained that the principle of free choice of means should have been followed in Article 33. Verbatim record, 99th plenary meeting, *supra* note 4, at 8 (France), 11 (Israel) and 12 (Rwanda). In a separate vote on Article 33 in the Working Group, the following five countries voted in the negative: China, Colombia, France, India and Turkey. The tally was 33 for, 5 against, with 25 abstentions.

states determine whether their utilization is “equitable and reasonable” under article 5 without an agreed factual basis? And how can a state establish that it has sustained significant harm if the state that is alleged to have caused the harm denies that it has caused it or that any harm has been suffered? The importance of facts in this field is no doubt what led the ILC to depart from its usual practice by including an article on dispute settlement in its draft. Article 33 also provides for states to declare upon becoming parties to the Convention that they accept as compulsory the submission of disputes to the International Court of Justice or to arbitration in accordance with procedures set out in the Annex to the Convention.

TO WHAT EXTENT DOES THE CONVENTION REFLECT CUSTOMARY INTERNATIONAL LAW?

I would now like to turn very briefly to the question of the extent to which the Convention reflects rules of customary international law. I think it may be said with some confidence that the most fundamental obligations contained in the Convention do indeed reflect customary norms. Indeed, in the *Gabčíkovo-Nagymaros* judgment the Court said that the adoption of the Convention “strengthened” the “principle” of the “community of interests” in an international watercourse.¹³ While the International Law Commission does not take a position on whether a particular article or paragraph is a codification of international law or an effort to progressively develop that law, it seems reasonable to conclude on the basis of state practice that at least three of the general principles embodied in the Convention correspond to customary norms. These are the obligations to use an international watercourse in an equitable and reasonable manner, not to cause significant harm, and to notify potentially affected riparian states of planned measures on an international watercourse. Of course, other provisions of the Convention, such as some of those relating to the environment, are closely related to, or even flow from these principles. To the extent that these provisions are based on the fundamental principles, they too might be said to reflect custom.

I will add just one additional word on this subject, and it relates to the World Court’s judgment in the *Gabčíkovo-Nagymaros* case. As I have already indicated, the Court referred several times in its judgment to the right to an equitable and reasonable share of the uses and benefits of an international watercourse.¹⁴ Notable for its absence was any reference to the “no-harm” principle. Hungary had relied fairly heavily upon this concept in its pleadings, but the Court did not accept its invitation to use it as a basis of its judgment. I do not believe that means the “no-harm” rule has been significantly weakened; but it suggests that the Court views the principle of equitable utilization to be the more important of the two.

¹³ *Supra* note 6, para. 85, slip op. at 47.

¹⁴ *Id.* para. 78 and 85.

CONCLUSION: THE CONVENTION'S ENVIRONMENTAL PROVISIONS

As a conclusion, I would like to comment upon the environmental provisions of the Convention in terms of how they compare with similar provisions in other instruments. First and foremost, it must be borne in mind that this is a universal, framework agreement. Because of this fact, one cannot expect either the level of detail or the degree of “Greenness” that one might find in a bilateral or regional instrument. Indeed, a number of proposals were made during the U.N. negotiations for strengthening and, it was said, “updating” the provisions of the Convention from an environmental standpoint. Most of these proposals came from Western European delegations, but a few came from other regions, such as Latin America. Very few of these proposals were ultimately accepted. One cannot say, therefore, that stronger environmental provisions are missing from the Convention because they were not thought of in the negotiations. The fact is, they *were* thought of, but were simply not acceptable to a sufficient number of delegations.

A second point also relates to the fact that this is a *framework* instrument. It is therefore intended to be supplemented by more detailed agreements concerning specific watercourses shared by two or more countries. The level of protection that might be appropriate for Canada and the United States, for example, might not be found suitable by other countries. But I would submit that the Convention does provide an appropriate framework for the negotiation by riparian states of agreements suited to their circumstances and needs.

Chapter 3

Introduction to transboundary waters negotiation

The compulsory literature for this theme builds on the previous themes. It further aims

- to be a more in-breadth coverage of international freshwater management
- to show the wide variety of issues, contexts, and solutions chosen
- to identify general “lessons” on conflict prevention/resolution and cooperation.

The text by *Mostert, 2003*, contains 7 sections where section 1 is an introduction.

Section 2 contains the theoretical framework used for the report. That include discussions on that Negotiation processes can be analyzed in terms of the following elements: the actors involved; the context; the strategies employed; the process itself and; the outcome.

Section 3 gives an overview of the development of international cooperation in freshwater management. It describes the different contexts. Further, it gives an outline of the process that led to international agreements and discusses the strategies that were used for reaching these agreements.

Section 4 describes the wide variety of institutions for international freshwater management. It describes the scope of the institutions, the organizational frameworks that have been set up, the applicable procedures, and the financing of the institutions. Separate attention is paid to the issue of public participation.

Section 5 describes the effectiveness of the different institutions. It discusses whether the formal institutions function effectively in practice, whether they promote further cooperation, and what the overall effect is.

Section 6 contains fifty-four lessons that could be drawn on promoting cooperation and preventing conflict in international freshwater management, based on the case studies and partly on other literature.

Section 7 forms the conclusion of the report. It contains seven key messages, evaluates the research, and gives several recommendations for further research.

Compulsory literature from:

Eric Mostert: Conflict and Cooperation in the Management of International Freshwater Resources: A Global Review, UNESCO-IHP, 2003

<http://unesdoc.unesco.org/images/0013/001333/133305e.pdf>

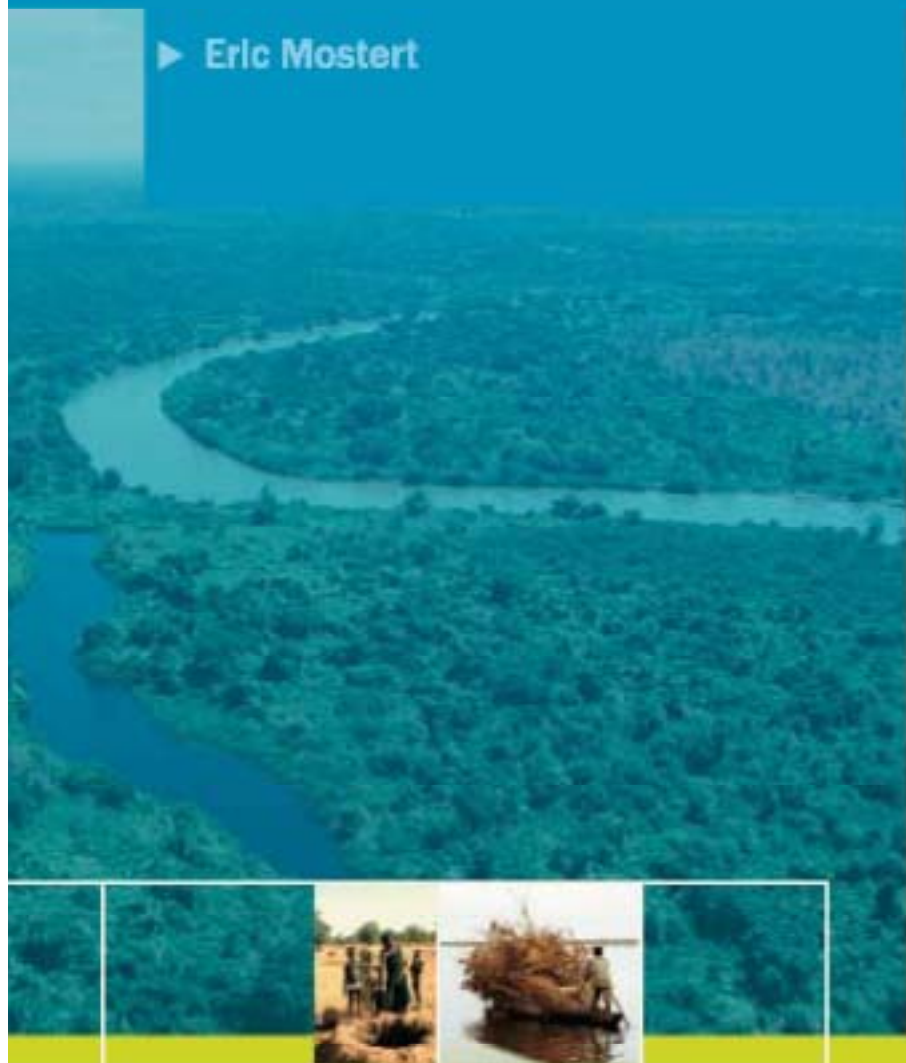
Reference literature to be used for the Role play exercises:

Jerome Delli Priscoli, Institute for Water Resources, USACE: Participation, consensus building, and conflict management training course: tools for achieving PCCP. UNESCO-IHP, 2003

<http://unesdoc.unesco.org/images/0013/001333/133308e.pdf>

Conflict and Co-operation In the Management of International Freshwater Resources: A Global Review

► Eric Mostert



2. CONFLICT AND COOPERATION IN INTERNATIONAL FRESHWATER MANAGEMENT

Studying and comparing different examples of conflict and cooperation in international freshwater management requires a common theoretical framework. This framework should be general enough to apply to many different cases, specific enough to ensure that all cases are analyzed in the same way, and open enough to allow surprises and not to exclude or overemphasize particular aspects of international freshwater management.

This section tries to develop such a framework. Section 2.1 gives some more background information on the different types of international freshwater management issues. Section 2.2 discusses the different types of international water conflicts, the different forms of cooperation, their causes, and their motivations. Section 2.3 gives an overview of the conflict prevention and cooperation process. The issue of how to determine and evaluate the effects of institutions receives separate attention in Section 2.4. Section 2.5 discusses the different levels that are involved in

international freshwater management and argues that it is often misleading to treat states as unitary actors and focus solely on national governments. The section closes with a short summary of the theoretical framework (Section 2.6).

2.1. International Freshwater Issues

In March 2000, the World Water Vision was presented at the Second World Water Forum and Ministerial Conference in The Hague. The Vision is based on the assumption that there is a water crisis, which is going to get worse if no action is taken. Presently, about 20 percent of the world population does not have access to safe and affordable drinking water. More than 800 million people – 15 percent of the world's population – are chronically undernourished. Unregulated access and subsidized energy have led to overpumping of groundwater and falls in groundwater tables of several meters per year. Many valuable wetlands have disappeared, and many rivers are heavily polluted. Moreover, because of population growth, average annual per capita water availability is projected to fall from 6,000 cubic meters today to 4,800 cubic meters per day by 2025. Some 3–4 billion people – nearly half the world's population – will live in moderately or heavily water-stressed countries (Cosgrove and Rijsberman, 2000).

Immediate action is needed. However, a complicating factor is the fact that many freshwater resources are located in more than one country. There are more than 250 international river and lake basins in the world, covering more than 45 percent of the land surface (Wolf et al., 1999). In addition, many groundwater aquifers extend beyond national boundaries. Unilateral action by any one of the countries concerned is often ineffective, inefficient, or outright impossible. For instance, downstream countries often lack good sites for water storage dams. These can often be built at lower financial and environmental costs in an upstream country. Unilateral action can also significantly harm other countries and lead to a serious conflict. The main examples are upstream pollution and upstream water diversions. International cooperation is therefore needed, but the problem is how to achieve this.

To get a clearer view on the possibilities for international conflict and cooperation, it may be useful to distinguish between three types of issues: collective problems, negative externality problems, and positive externality problems (Marty, 2001). In the case of collective problems, all states concerned can benefit from finding a solution. Many issues concerning international lakes and boundary stretches of rivers are of this type: reducing pollution of these common waters, ecological restoration, joint development, and so on can benefit all countries concerned. The potential for cooperation is therefore large, yet achieving it is not necessarily easy.

In the case of externality problems, the interests of the countries concerned are fundamentally different. A negative externality problem occurs when (ongoing or planned) activities in one country have negative effects in another. Prime examples are pollution and water diversions in an upstream country. A positive externality occurs when (ongoing or planned) activities in one country have positive effects in another country. An example is a dam that would reduce flooding problems downstream. In the case of negative externalities the affected country A would like country B to stop or not start with a specific activity, whereas in the case of positive externalities country A would like country B to start or continue with an activity. Particularly in the case of negative externalities the potential for conflicts is large. Yet, as we will see, even in such cases cooperation has developed.

2.2. Water: Conflicts and Cooperation

Water can play different roles in conflicts. In “real” water conflicts, water is the *object* of the conflict; for example, states quarrel over scarce resources or water pollution.

Water can also be an *instrument* in a conflict. This occurs for instance when states are in conflict on some other issue and an upstream state threatens to divert an international river, not because it needs the water, but to harm or exert pressure on the downstream state. An extreme example is the pollution of drinking water sources. Finally, water can act as a *catalyst* for international conflicts. Water shortages within a country can create internal political instability, which in turn can increase international instability (cf. Libiszewski, 1995).

The intensity of water conflicts can range from minor disagreement to serious tension, open dispute, and even armed conflict. Described in this way, some degree of conflict is inevitable in international freshwater management. The main task of those involved is to manage the conflict, prevent escalation, and promote mutually beneficial cooperation.

Cooperation can mean different things. It could mean that different parties join forces in order to reach common goals. This description of cooperation is applicable in the case of collective problems. However, cooperation does not require common goals. Cooperation can also mean that the cooperating partners reach a compromise to prevent escalation, or that they jointly formulate a package deal that serves their (different) objectives as much as possible. (Compare the distinction in negotiations theory between distributive and integrative bargaining: dividing the pie and increasing the size of the pie, respectively.)

The main aim of the PCCP project is to enhance conflict prevention rather than conflict resolution and to “tip the balance in favor of cooperation potential away from potential conflict.” The potential for conflicts can be measured in terms of three possible sources or aspects of conflicts (Mostert, 1998b):

- conflicting goals (interests and/or fundamental values; cf. the distinction between collective, positive and negative externality problems)
- bad relations
- different perceptions of the relevant facts.

Conflicting goals can lead to conflicts in which water is the object, whereas bad relations are more likely to lead to conflicts in which water is an instrument. Different perceptions can lead to all types of conflicts. The three causes are, however, related. For instance, bad relations and lack of trust can result in communication problems, less understanding of different perceptions, and less concern for the interests of other parties. This in turn may worsen relations, and so on. It is important to pay attention to all three aspects of conflicts and not focus only on conflicting interests or perception issues, as some approaches in political science and psychology do.

The potential for cooperation can be approached from the positive side or from the negative side. Positively, the potential for cooperation lies in the potential benefits it brings, such as better water quality, less overpumping, more hydropower, more water for irrigation, and restoration of wetlands. Negatively, the impetus for cooperation consists of the costs of conflict, including both direct costs such as the suffering caused by war, and indirect costs: the foregone benefits of cooperation in other sectors.

2.3. The Conflict Prevention and Cooperation Process

The conflict prevention and cooperation process can be modeled as a cyclic process (Figure 1). It starts with a potential for conflict and cooperation. This potential is determined by the hydrological, institutional, socio-political, and economic context. Next, cooperation can develop. Cooperation usually takes the form of an “agreement.” This agreement can be implicit or explicit, written or unwritten, and legally binding or not. Examples include formal treaties, private law contracts, customary law, shared

understandings, and even a shared culture and cultural practices. Most agreements need to be implemented next. This may change the context, create a new potential for conflict or cooperation, and start a new cycle.

The process can also take a different course. Sometimes the potential for conflict and cooperation does not result in an agreement, but in an escalating conflict (not included in the figure). Moreover, sometimes an agreement is reached but not implemented. This can necessitate the negotiation of a new agreement, but it can also result in an escalating conflict. Finally, agreements can also be reached if there is an actual conflict and not just a potential, as many peace treaties have shown. Conflicts can de-escalate as well as escalate.

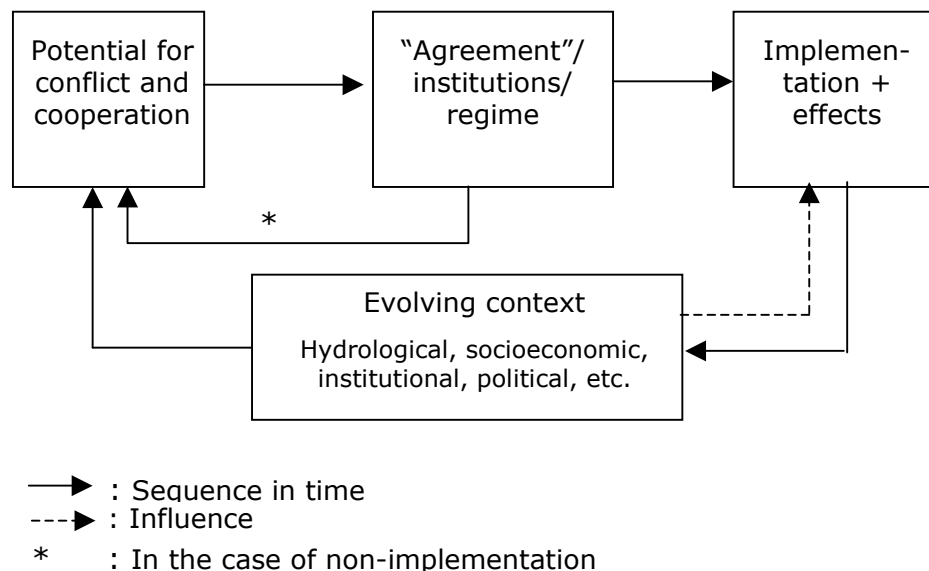


Figure 1. Schematic overview of the conflict prevention and cooperation process (excluding serious escalation)

2.3.1. Context

To understand the conflict resolution and prevention and cooperation, one first needs to understand the major management issues, the players involved and the freshwater resource involved. This requires a basic understanding of the context or rather contexts. Below a “typology of contexts” is given, with different aspects that may be important in specific cases (not limitative).

- *Hydrological context.* Precipitation, evaporation, discharge, recharge, abstractions, water pollution, actual water quality, and the water quality needed for different uses and ecosystems, morphological aspects such as erosion and sedimentation, hydropower potential, and so on.
- *Socioeconomic context.* Uses and users of the freshwater resource, in-stream uses, economic circumstances of the different users, social position, degree of organization and power, regional and other disparities, need and potential for economic development, the different national cultures (Box 3), and the like.
- *Institutional context.* National and international water managers and commissions, decision-making rules, existing operational rules, water use and provision rules (Section 2.3.4).
- *Political context.* National, subnational, and international political dynamics, international relations and mutual trust (or mistrust), power, and similar factors.

The context is not stable. Conflicts and cooperation lead to changes in the hydrology, to new infrastructure, more or less water abstraction and water pollution, more or less poverty, worse or better international relations, and so on. Consequently, the context should not be analyzed only at the start of the process: its evolution should ideally be followed.

Information on the context is often scarce and difficult to obtain and the reliability of the information is often low or unknown. Many abstractions and emissions are not registered, water quality is often not monitored or the results are kept confidential, groundwater data are often lacking, and so on. Besides, the data can often be interpreted in different ways. Consequently, the “objective facts” of the case are often very controversial. Uncovering such controversies is part of understanding the context.

As argued in Section 2.5, the context explicitly includes the national context. Moreover, the context can include issues that have nothing to do with freshwater management if these issues involve the same or partially the same parties (issue linkage).

Box 3: Culture, conflict, and cooperation

The term “culture” refers to the patterns of feeling, thinking, and acting that members of a specific group (for instance, a nation) have in common. It consists of fundamental values, rituals, “heroes,” and symbols, and colors the ideas of its members. It predisposes them towards certain types of behavior, and gives meaning to these behaviors (Hofstede, 1991; Faure and Rubin, 1993). These culture-specific types of behavior in turn reinforce the culture concerned (Thompson et al., 1990).

Using ample survey material from fifty-three countries, Hofstede (1991) has identified five cultural dimensions that differ significantly from country to country:

- masculinity
- individualism–collectivism
- uncertainty avoidance
- power distance
- time frame: short-term versus long-term orientation.

In “masculine cultures” (for example, the United States and Great Britain), assertiveness and competition have a positive value. In such cultures conflicts tend to be solved by a “good fight” (Hofstede, 1991; Avruch and Black, 1993). In more “feminine” cultures (for example, the Netherlands and the Scandinavian countries), conflicts tend to be solved through negotiations and compromise.

In “collectivist cultures” (for instance, Indonesia), individuals are first and foremost members of a group that offers lifelong protection in return for unconditional loyalty. They derive their identity from the group. Harmony within the group is a prime concern and conflicts have to be prevented, or at least formulated so that no one “loses face.” Mediation may work better than unassisted negotiations because it is easier to make concessions without losing face to a mediator than to the parties with whom there is a conflict (Cohen, 1993). Conflicts between groups are often not solved but suppressed and may result in an armed struggle, at least when the cultures concerned are also uncertainty averse. “Uncertainty averse” means that members of these cultures

feel threatened by uncertain or unfamiliar situations (as in the case of Israel and the Arab countries; Hofstede, 1991).

"Power distance" refers to the degree to which the less-powerful members of a group expect that power is divided unequally and accept this (or, conversely, totally reject it). In cultures with a small power distance and little uncertainty aversion (such as Great Britain), the preferred conflict resolution methods are informal, flexible methods. If the power distance is small but uncertainty aversion high (as in Germany), the preferred methods are formal, impersonal procedures. If the power distance is large and uncertainty aversion high (for example in France), the preferred methods are bureaucracy and hierarchy. Finally, if the power distance is large but uncertainty aversion low (as in Indonesia), the preferred method is also hierarchical, but without the structuring of activities characteristic of bureaucracies (Hofstede, 1991). Hierarchical resolution of conflicts between countries is often not possible, so international conflict resolution could be especially difficult in the case of hierarchical cultures (cf. Verweij, 2000).

Complications can occur when the parties in a conflict come from different cultures. Culture influences the perceptions of the parties and the values to which they adhere, so different cultures can mean different perceptions and values. Misunderstandings can occur easily when the same actions and words may have different meanings. Problems may also occur if one party sees the other party, whether correctly or not, as culturally arrogant and dominant. Relations can improve if one of the parties shows an interest in the culture of the other and common cultural elements are discovered (Salacuse, 1993). Whenever there are large cultural differences, it may be useful to have experienced diplomats undertake the negotiations rather than high government officials with little international experience. One could also use a mediator as a kind of "cultural interpreter" (Avruch and Black, 1993; Cohen, 1993).

A few limitations of Hofstede's theory need to be mentioned. First, subcultures – national and international ones – can be at least as important as national cultures. For instance, environmentalists and bureaucrats in one country may have more in common with their foreign counterparts than with each other (cf. the "cultural theory" of Thompson et al., 1990; Verweij, 2000). Different subcultures may prevail at different times. For example, in Japan two types of negotiation exist that are prevalent in different periods: the consensus ("feminine") type of negotiation and the warrior ("masculine") type (Faure, 2001). Behavior is therefore less predictable than Hofstede's typology suggests. For subcultures, moreover, other dimensions rather than the five listed may be important. Finally, most concepts of culture generally can be misused. Culture may be used to stereotype people or as an excuse for failing negotiations. If the concept is not specified, it can be misused to "explain" everything that cannot be explained otherwise.

2.3.2. The Potential for Conflict and Cooperation

The analysis of the context should make it possible to identify the main issues and players and the potential for conflict and cooperation. It should be possible to characterize the main issues as collective problems, positive externalities, or negative externality problems (Section 2.2). As argued, the cooperation potential is highest in the case of collective problems and conflict potential is highest in the case of negative externality problems. Yet one should also pay attention to subjective perceptions and to relational aspects, including the degree of trust or mistrust and the balance of power.

2.3.3. Development of Agreement (or of a Serious Conflict)

The potential for conflict and cooperation gives the background for the negotiation process. Negotiation processes can be analyzed in terms of five elements (cf. Faure, 2001):

- the actors involved
- the context
- the strategies employed
- the process itself
- the outcome.

The *actors* in negotiations can be individuals, groups, organizations, and states. They include not only those at the negotiation table, but also influential audiences, such as the media, parliaments, and public opinion. The local population and other groups that may be affected by the outcome may be excluded if they are not listened to and lack the resources to make themselves heard.

The actors are determined largely by the *context*. For instance, in a democracy the media and public opinion can be influential, while in a dictatorship they usually are not. Yet, the context does not determine everything. Actors themselves decide whether to enter into negotiations or not and whom to consult or not. Key actors may have the power to invite other actors to the negotiation table or reject them. This may be part of their strategy.

Strategy can be defined as "the general orientation of the action which each negotiator adopts to achieve his/her goals" (Faure, 2001, p. 18). One possible strategy is to make the solution of an issue that is of concern for another actor dependent on the solution of an issue that is important to oneself. This is called "issue linkage." Other possible strategies include threatening, advocating more research to take the heat out of the conflicts or to delay, and offering financial compensation or contributions to the costs of works. Another strategy is to foster good relations, give in on less important points, and create a "reservoir of goodwill" (LeMarquand, 1977) to use when issues arise that are important for you. Strategies can be characterized as more or less cooperative, more or less flexible, and so on. One can hypothesize that in masculine cultures the less cooperative strategies are more popular, and in feminine cultures the more cooperative ones (cf. Hofstede, 1991; Box 3).

The *process* describes the interactions of the actors within the evolving context, employing strategies and negotiation tactics. It focuses on the dynamics of negotiation and on the developments in time. It is often useful to distinguish several rounds of negotiation. If in any phase the interactions become more cooperative, we may expect to see an improvement in the relations, more agreement on the facts, and more consideration of the interests of the other parties. If relations become more conflictual, we may expect the opposite.

The *outcome* of the process is what the actors are ultimately interested in. The immediate output of cooperation is an explicit or implicit agreement. This usually still needs to be implemented to obtain the outcome. Often further agreements are needed, especially in the case of a framework agreement. Negotiations often continue right into the implementation phase, as agreements can never be specific and flexible enough to cope with every eventuality. However, the earlier agreements set the framework for the later negotiations.

2.3.4. The Agreement

The agreements that are reached can be analyzed in terms of the institutions established. Institutions can be described as:

Rules of the game or codes of conduct that define social practices, assign roles to the participants in those practices, and guide interactions between the occupants of these roles.

(Young, 1995: 33)

Three types of institutions can be distinguished (Ostrom, 1992). *Operational rules* determine who can make which use of the resource (use rules) and who should make which contribution to providing or maintaining the resource (provision rules). Examples include international rules on water allocation (use rules) and treaty provisions concerning the construction of joint infrastructure (provision rules). *Decision-making rules* determine how the operational rules are decided upon. These include for instance public participation requirements. Closely related are *constitutional rules*. These determine who is entitled to take decisions. In international freshwater management this is usually national government, but sometimes lower-level governments are entitled to conclude international treaties, or competencies are delegated to international or supra-national organizations.

While some authors limit the term "institutions" to the rules that are followed in practice (for example, Ostrom, 1992), others focus exclusively on rules that have been enunciated officially or on the organizational structure that has been established: the formal institutions. A complete description of cooperation and conflict requires attention to both. Formal institutions are established time and again, which in itself is already enough justification to study them. Sometimes they are effective and sometimes they are not. Yet informal institutions are important too. For instance, for decision making in a river basin commission, the cultural backgrounds represented and the practices that have developed in the commission can be just as important, if not more so, than the pertinent treaty or bylaw.

2.3.5. Implementation

The implementation of an agreement can mean different things, depending on the content of the agreement. It may for instance entail the actual installation of a river basin commission foreseen in a treaty, the conclusion of further agreements, the construction of infrastructure, and/or compliance with specific rules by different government bodies and water users. Implementation can also be lacking. As discussed, this can give rise to new conflicts, but even if agreements are implemented correctly, new conflicts can arise or new potentials for cooperation can develop.

2.4. Assessing the Effects

The effects of the process can be assessed in different ways. A first approach is to look whether the agreement is actually implemented. This is fairly straightforward, if the agreement is clear and reliable data is available.

A second approach is to see whether the goals of the pertinent agreement have been reached. Even if the goals have been reached, however, this may not be due to the agreement itself. An international agreement may aim to improve water quality, but if the water quality actually improves, this could also be due to an economic recession resulting in less industrial activity or to improved regulation at the national level irrespective of the agreement. Attributing goal achievement to an agreement requires, first, the development of a detailed causal chain from the agreement to its implementation and on to goal achievement, and second, sufficient evidence for each link in this chain ("pattern matching"; Yin, 1986).

A third approach is to assess the effectiveness of agreements by considering broader goals, such as the extent to which the interests of the countries involved have been satisfied. Attributing goal achievement to the agreement remains a problem. An additional problem is how to select and specify the relevant goals. The selection is

never a neutral activity (but neither is selecting the officially stated goals). One approach is to refer to principles such as those in the Dublin Statement and the UN Watercourse Convention (ACC/ISGWR 1992, UN, 1997). Though widely accepted, they are not universally accepted and need to be translated in practical terms before they can be used for evaluating the effects of agreements.

For the PCCP project two obvious criteria for evaluating agreements are the promotion of further cooperation and the prevention of escalation. Other criteria are the challenges mentioned in the Hague Declaration (2000), the outcome of the Ministerial Conference in March 2000:

- *Meeting basic needs.* Drinking water and sanitation; empowerment of people, especially women, through a participatory approach.
- *Food supply.* Food security (not necessarily food self-sufficiency); more efficient agricultural water use and more equitable allocation.
- *Protecting ecosystems.* Ensuring the "integrity of ecosystems" through sustainable water resources management.
- *Sharing water resources.* Promotion of cooperation and development of synergies at all levels.
- *Managing risks.* Coping with floods, droughts, pollution, and other hazards.
- *Valuing water.* Water management that reflects the economic, social, environmental, and cultural value of water; more cost recovery of water services, while respecting the basic needs of vulnerable groups and equity.
- *Governing water wisely.* Involvement of the public and the interests of all stakeholders should be included in the management of water resources.

2.5. The International and the National Level

The present report covers cooperation and conflicts in which at least two countries are involved. Yet countries cannot be equated with states or national governments. International problems are often caused by domestic factors. For instance, a national government may have a very good water use policy, but an international water allocation conflict may still develop if lower level governments issue too many abstraction licenses or if there are many illegal abstractions. Resolving such a conflict usually requires the involvement of the lower level governments and the water users. This makes it more likely that any international agreement that is reached will also be implemented in practice.

In some cases lower level governments are entitled to conclude international agreements. The three regions in Belgium (the Flemish, Walloon, and Brussels Capital regions) provide just one example of this. Informal technical cooperation between experts is also quite common.

Sometimes government is not involved at all. One example is private litigation. In the 1980s, Dutch greenhouse farmers who use Rhine water for their crops sued the French potassium mines in the Alsace region because their discharges into the Rhine damaged the crops. Other examples are the many cases of transboundary cooperation by public and economic interest groups, such as international associations of environmental groups or of industries.

In several cases there is a government layer above the national level. Many international and a few supra-national bodies exist that play a role in international freshwater management: river basin commissions, boundary commissions, lake commissions, regional economic cooperation bodies, and so on (Section 4). Even if these bodies are strictly intergovernmental and lack decision-making powers, they still change the playing field and channel interactions.

Besides all this, it is usually not correct to treat national government as a unitary actor. National governments usually consist of different sectoral ministries, and

parliaments often contain many sectoral specialists. The different sectors may not always agree on the national position concerning international freshwater issues. For instance, a ministry for energy production or for water management may favor the construction of a hydropower dam on an international river, whereas the ministry of environmental protection may be against (cf. the situation in the late eighties in Hungary: Várkonyi, 1990). Similarly, differences may exist between national governments and local governments or communities, between different local governments or communities, between governments and groups of water users, between different groups of water users, and within groups of water users.

To understand the development, content, and effectiveness of international agreements, it is essential to get a clear view of the constellation of actors and their activities. Who represents a country in international negotiations? Who do they get their information from? What is the relative power of the different actors? On environmental issues countries are usually represented by their environmental ministries. These ministries may use international agreements to introduce stricter environmental regulations in their own country than would have been possible in a direct confrontation with the different domestic interests (Golub, 1996; Bernauer and Moser, 1996). However, such a strategy may also fail. Agreements may not be ratified due to national opposition or they may be ratified but not implemented. Environmental ministries (and other sectoral representatives in other negotiations) may therefore also decide to consult beforehand with the other sectors.

Figure 2 gives an overview of the different cooperative or conflictual relations that may exist within international freshwater management.

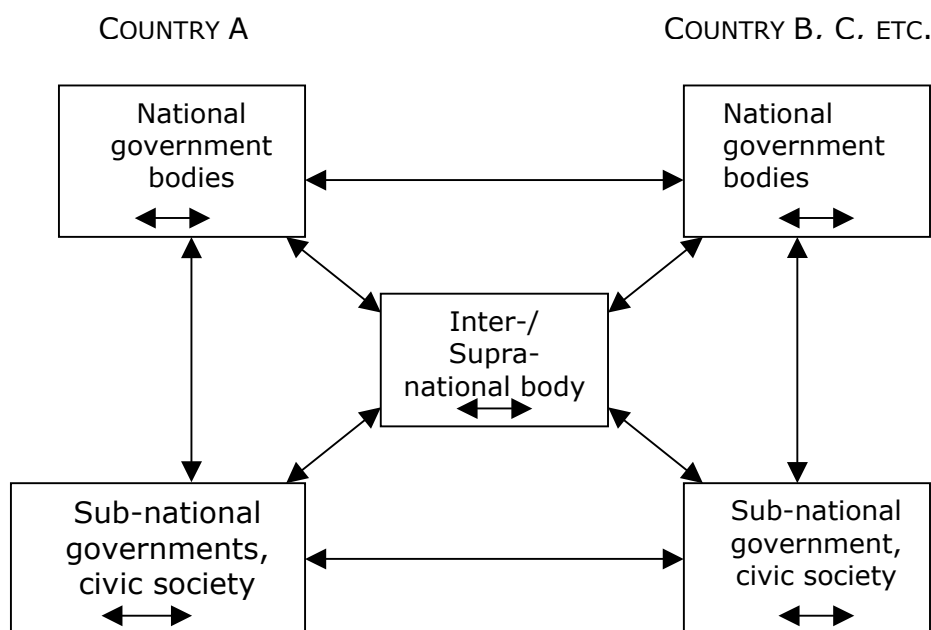


Figure 2. Potentially conflictual or cooperative relations in international freshwater management

2.6. Assessing International Freshwater Management

The present report will assess the effectiveness of international freshwater management using the approach outlined above. Four groups of variables will be used (Figure 3):

- the context
- the negotiation process that leads to the agreement
- the design of the international agreements/institutions
- the outcome.

The context and the negotiation process are discussed in Section 3. The institutions themselves are described in Section 4. Section 5 discusses the outcome. Section 6 and Section 7.1 contain the lessons that can be drawn and seven key messages.

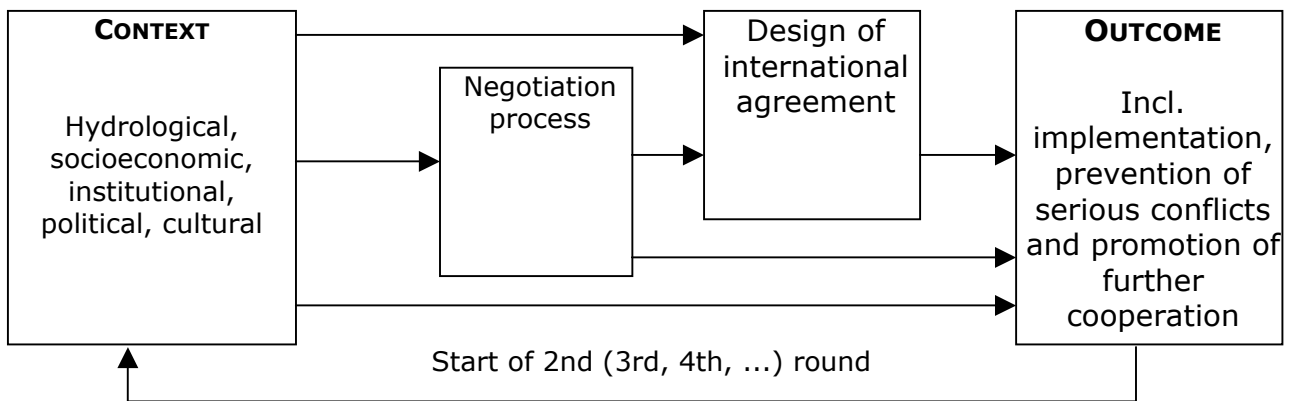


Figure 3. Explaining the effectiveness of international freshwater management

3. THE DEVELOPMENT OF COOPERATION

This section gives an overview of how cooperation develops in international freshwater management. Section 3.1 describes the different contexts. Section 3.2 gives an outline of the process that led to international agreements. Section 3.3 discusses the strategies that were used for reaching these agreements.

The section is based on the different cases studied for this report. Box 2 lists all the cases and contains references.

3.1. The Context of International Freshwater Management

3.1.1. Natural Conditions

The starting points for international freshwater management are the natural conditions: climate, topography, geology, existing ecosystems, and so on. These determine water availability and the possibilities of different forms of water use, such as fishing, rain-fed and irrigated agriculture, hydropower, and shipping. The cases studied in this report show a wide variety: small and large rivers, small and large basins, lakes, aquifers, in moderate and in tropical climates, with and without large intra- and interyear variability, in mountainous and flat terrains, and so on. Consequently, the analysis in this report is potentially widely applicable.

3.1.2. Water Uses and Socioeconomic Development

The second group of factors concerns actual water uses. These depend not only on the natural conditions, but also on the level of socioeconomic development. For example, in developed countries industrial water use is usually economically very significant. In the most-developed countries industrial water use is often relatively efficient and the

problems of industrial pollution have largely been solved. The Meuse and Scheldt basins (France, Belgium, the Netherlands) offer two examples, despite remaining problems such as accidental pollution. In moderately developed countries, industrial water pollution can be very serious. In addition, much urban wastewater is not treated. These pollution problems can give rise to traditional upstream–downstream conflicts. The problems are greatest if the downstream country is more developed economically and has a stricter pollution control policy than the upstream country. An example is the Tijuana river basin (USA–Mexico).

Pollution can also be caused by agriculture (pesticides, nutrients). The most common agricultural water problem is, however, water use. It has been estimated that worldwide 66 percent of all surface water abstraction is for agricultural purposes, mainly irrigation. In some countries this is even as high as 90 percent (Shiklomanov, 1999). This means that improvements in agricultural water efficiency can significantly reduce overall water scarcity.

When discussing agricultural water use, it may be worthwhile to distinguish between high and medium-income countries, poor countries, and very poor countries. High and medium-income countries have more flexibility in reducing agricultural water use than other countries. Agricultural production could be reduced because agricultural workers laid off can be absorbed by other sectors of the economy and food can be bought from abroad. Of course, the process might be very painful for the people concerned, and during an economic depression unemployment might increase.

In poor countries, the opportunities for reducing agricultural water use are much smaller since the population relies far more on the food they grow for themselves and there are few alternative sources of income.

In very poor countries, agricultural water use is sometimes very limited because the funds or the organization for irrigated agriculture are often not available. People rely for their livelihood on rain-fed agriculture, flood recession farming, or fishing. As the case of Senegal shows, improving these sectors may be more beneficial for the people concerned and more economically viable than the introduction of large-scale irrigation (Adams, 2000).

Irrigation often requires the construction of dams and reservoirs. Other functions of dams and reservoirs are the supply of drinking water, hydropower production, flood protection, and improvement of navigation. Large dams are often very controversial. Some people see them as the best or only means to feed the growing world population, produce environmentally friendly energy, and eradicate poverty. Others emphasize the economic and environmental costs of large dams, the economic benefits of natural rivers and floodplains, such as fishing and recession farming, and problems such as forced relocation and limited compensation for the local population. Without going into the large dams debate (see for instance WCD, 2000 and reactions to it), it is clear that dams on international rivers can create a great deal of international tension in water-scarce regions. Examples include the Indus, the Euphrates, the Ganges, and the Spanish–Portuguese rivers. However, dams can also promote international cooperation, as in the case of dams in boundary stretches. Examples include the Senegal River and the Salween River. Especially in the latter case, however, many seriously doubt the benefits for the local population. Skeptics include international human rights and environmental NGOs (see, for example, Moe, 2000) but also governmental organizations; the US Department of Labor, for instance, has stated that Myanmar is using forced labor for large infrastructural projects like dams (US Department of Labor, 2000).

Other types of water management infrastructure can give rise to similar conflicts and discussions. The Alpine Rhine case, discussed in Section 3.3, offers an example of this.

In many of the basins studied, nature conservation has become a serious concern, including basins in developing countries. For this to become a concern,

people must first believe that there is a real or potential impact on the ecosystem concerned. Second, this impact should be considered serious, either because it affects humans making use of the ecosystem or because the ecosystem in itself is considered valuable (has an "intrinsic value"). Ecosystems are valued for their own sake especially in the rich part of the world, such as Europe and the United States, and by international NGOs coming from these parts. However, in other parts of the world nature sometimes also has a special religious or cultural meaning. In basins such as those of the Scheldt and the Rhine, so much nature has been lost that nature *development* has become an important issue. Nature development means that favorable conditions are created for the development of ecosystems that are considered valuable (for example, dykes are removed to recreate wetlands). Sometimes nature development requires continuous active nature management, such as felling trees in river meadows.

A completely different water use is the use of rivers as national boundaries. Since rivers tend to meander and change their course, boundary problems can occur. Examples include the Ganges–Brahmaputra case and the Rio Grande case.

A fundamental issue is often population growth. Population growth usually increases pressure on freshwater resources. Water demand rises, land use intensifies, more rapid erosion may occur, areas may become flood prone, and flood risks may increase. This can give rise to international tension. There are several ways to make the use of water and land resources more efficient, allowing more people to live in the area concerned. A complicating factor is that most basins with a high population growth are to be found in the so-called developing countries, which in addition often have little precipitation and high evaporation (Shiklomanov, 1999).

3.1.3. Actors

The actors involved in international freshwater management vary according to the level of socioeconomic development (cf. Section 2.4). In the "developed" western countries the main actors are the main water use sectors. These differ from case to case, but usually they include industry, agriculture, households, and sometimes also shipping and hydropower. Each sector has its own government agencies, often with direct links to their counterparts abroad. Sometimes international freshwater management can be explained better in terms of conflicts between sectors than in terms of conflicts between countries. For instance, the improvement of the Rhine's water quality since the 1960s is largely due to increased pressure on industry, coming from increased environmental awareness and legislative initiatives at both the national and the European Union level. The intergovernmental International Commission for the Protection of the Rhine played a facilitating role, but it was not the driving force (Mostert, 1999; see also Section 5.3).

In developing countries too there are different water use sectors. A major difference is the presence of international donors and, sometimes, international NGOs. The distance between the population and national government is sometimes larger, due to limited means of communication, different political systems, or both. Consequently, a different typology of actors may be useful: (1) national governments and bureaucracies; (2) international donors; (3) international NGOs; and (4) the local population (Adams, 2000, on the Senegal River).

The prime concern of local populations is usually to safeguard their livelihood. The interests of the national government bureaucracies may focus on the interests of the country as a whole, the interests of the capital, the interests of the ruling elite, or the specific sectoral interests which they represent, such as commercial farming or hydropower production. International river basin commissions are usually intergovernmental and often sectoral, and focus on the same types of interests. In the case of differences between the local population and national governments,

international donors sometimes side with national government either for altruistic reasons or to get (infrastructure) projects implemented, show results to their own constituencies, and further the interests of national firms that may get contracts. In other cases international donors may give more weight to the interests and the views of the local population. International NGOs usually support the local population and/or the local environment.

3.1.4. Political and Institutional Context

The political context plays an important role in several respects. The international political situation determines how good the relations are between the countries involved in an international freshwater issue. Obviously, it is much easier to solve water management problems if relations are generally relaxed rather than if they are tense, although tense relations do not make problem solving impossible (see Section 3.2).

The national political context is important in two respects. First, it determines which national players can influence the international policy of the country concerned and which cannot. Second, the constitution of a country can complicate international cooperation. Reaching agreement with a unitary state requires agreement with its national government. Reaching agreement with federal states (or unitary states that function in practice as a federal state) may require that all the federal states agree with each other. This may be quite complex, as shown by the case of the Meuse and the Scheldt rivers (Belgium). Yet there are also advantages. Regional interests are not overlooked and implementation of the agreement at the regional level might be less problematic.

3.1.5. Culture

A final element of the context is the national culture. The role of culture is discussed in Box 3. The cases studied for this report represent a very wide variety of national cultures (Hofstede, 1991). The lessons drawn from their analysis (Section 6) should therefore be applicable in a wide variety of cultural contexts.

3.2. The Development of Cooperation

3.2.1. Potential for Cooperation or Conflict

Given the wide variety of contexts encountered, it should come as no surprise that international cooperation in the cases studied developed in quite different ways. As argued in Section 2.3, international freshwater management starts with a potential for cooperation or conflict. This potential is a function of the natural, socioeconomic, political, and cultural context. It can be measured in terms of:

- goals (conflicting or converging interests and fundamental values)
- relations (good or bad)
- perceptions (factual controversies).

Section 3.1.2 gave an overview of the different international issues encountered. The most common issue in the set of cases studied was water scarcity and water allocation, followed by hydropower potential, water pollution, flooding, shipping, boundary issues, and habitat protection or development. All water allocation cases and most others could be qualified as “negative externality cases,” meaning that action by one basin country concerned had negative effects on the others.

The Lake Peipsi, the Senegal, and the Alpine Rhine cases could be qualified as “collective problem cases” since the problems were defined in such a way that all basin countries had an interest in their solution (management of a common lake,

integrated development of a common river, restraining the flooding of a boundary river). However, the interests of the countries were not always equally large, and within the countries there were sometimes clear conflicts of interests.

The Mahakali case involved the joint development of a river for irrigation and hydropower production and therefore could be misconstrued as a collective problem case. The interests of India were so much larger than those of Nepal, however, that the cases should rather be seen as a "positive externality case": one country trying to persuade another country to take action that would benefit the first country (Marty, 2001).

In a number of cases, relations between the countries were strained and no satisfactory solution has been found to date (the Euphrates and the Ganges–Brahmaputra cases). Nonetheless, in a few cases agreement was reached despite strained relations. In the case of the Indus River, India and Pakistan agreed that each state would have complete control over its own tributaries, thus minimizing the need for continuous cooperation. Other cases where cooperation developed despite strained (or at least not relaxed) relations were the Senegal River and Lake Peipsi, both of which can be characterized as collective problem cases. In other cases international water management problems were solved after international relations had improved or as a means of improving the relations (for instance, the Rio Grande case).

In a few cases the strained relations were caused by inequalities between the countries concerned. This is especially apparent in the case of Nepal and India (Mahakali) and, historically, the Swiss cantons and Austria (Alpine Rhine). To a lesser extent it also occurred between the Netherlands and the Walloon region (Scheldt and Meuse cases), and between the United States and Mexico. As argued in the previous section, large differences in socioeconomic development can mean different levels of environmental awareness. In addition, different levels of expertise and different opportunities to conduct research can cause controversies about facts.

Factual controversies were not discussed in detail in the literature on the cases, but it is known from other literature that they can play a very important role. In the Pancheshwar case an important issue was whether the studies should be conducted by India (as India preferred) or by external consultants (preferred by Nepal). Research is never completely neutral. Even the most conscientious researchers leave their personal mark on the results, or the mark of the organization that determined the terms of reference of the research. Data availability is usually limited and data reliability is limited or unknown, resulting in a lot of uncertainty. This uncertainty is – consciously or unconsciously – "filled in" by the researchers and their concerns and interests. Moreover, implicitly, many choices are made during the research itself; for example, some possible solutions are studied and others are not. Consequently, research conducted by or on behalf of one party may not always be accepted by the other parties. They may either challenge the data or interpretations or – especially if they have limited scientific expertise and lack funds to hire it – opt for a highly politicized approach to the issue at stake (Collingridge and Reeve, 1986; Frankena, 1988; Jasanoff, 1990).

Factual controversies and overly political approaches could be prevented by conducting more *joint* research, as for example, in the framework of a river basin commission. As shown by the International Commission for the Protection of the Rhine and many other commissions, this can result in a common factual basis for management (Mostert, 1999). In addition, such technical cooperation could be used to build up mutual trust between the countries concerned and might prove to be more robust than cooperation at the political level. Cooperation at the political level tends to stop when international relations deteriorate, but low-profile technical cooperation can continue, and this can be a good basis for renewing cooperation at the political level when international relations improve again (for example, Savenije and Van der Zaag, 2000; Wolf, 1997).

Finally, the potential for cooperation can increase significantly when there is a disaster or a crisis. A pollution incident with highly visible and well-publicized effects, such as the Sandoz disaster in the Rhine basin, a severe drought, or severe floods can convince the public and the politicians that something should be done. (Of course, disasters can also create serious conflicts. The Chinese symbol for crisis consists of two characters, the first meaning threat, the second opportunity.)

3.2.2. Negotiation Process

Given a certain potential for conflict or cooperation, negotiations can start, ultimately aiming for an agreement. The case studies included in this report generally gave little information on the negotiation process itself. Hardly any information was available on the tactics employed at the negotiation table. Yet, no indications were found that the general lessons from the literature on negotiations (for instance, Fisher and Ury, 1981; Mastenbroek, 1996) do not apply to international freshwater issues. More information was available on the general strategies employed (Section 3.3), the duration of the negotiations, and the role of technical cooperation.

Surprisingly, technical cooperation did not seem to play a large role. This might be due to the cases selected or to literature on these cases. However, it might also be because of the fact that the factors explaining technical cooperation are very similar to the factors explaining cooperation generally (cf. Chenoweth and Feitelson, 2001). Data and information can be used in negotiations and legal proceedings, so it is not always in the interest of the country concerned to give all the information it has. Technical cooperation does require a basic level of mutual trust. However, once this level is present, technical cooperation can be used to increase mutual trust and develop a common factual basis for management. In addition, or alternatively, cooperation could start with a small project with a large chance of success, again to instill patterns of cooperation (Wolf, 1997). In general, negotiations should start with the less controversial issues (Brehmer, 1989; cf. Vlek and Cvetkovich, 1989).

The length of the negotiation process ranged from between one and four years (Columbian Amazon basin, Lake Peipsi, Senegal River and Niger River), to thirty years (Scheldt River and Meuse River), or even more than 100 years (Alpine Rhine). The short periods usually apply to framework agreements that need further elaboration (for instance, the Columbian Amazon) or to modifications of existing ineffective institutions (for example, the Senegal River). The development of effective international cooperation usually takes ten years or more, starting from the official recognition by at least one of the countries concerned that cooperation is needed. To this we may add the time it takes before issues are officially recognized.

3.3. Strategies

Effective negotiations result sooner or later in an agreement or agreements. Different strategies are used to reach agreement. In theory, reaching agreement is easiest in the case of collective problems since all countries concerned have an interest in their solution. Even so, as witnessed in the Alpine Rhine case (see also below), it may take more than 100 years before agreement is reached, due for instance to bad international relations, inequalities in expertise, domestic conflicts of interests, lack of trust that the other country will honor its part of an agreement, and limited opportunities to ensure this.

In the case of negative externality problems (usually upstream–downstream problems), fundamental conflicts of interests need to be overcome. A way of doing this is to link the upstream–downstream issue with other issues in which the upstream country is primarily interested (“issue linkage,” see Section 2.3). This was tried for instance in the Meuse and Scheldt case. In 1967 Belgium wanted to discuss the

deepening of the Western Scheldt, the navigation way through the Netherlands to the Belgian port of Antwerp. The Netherlands agreed to this if at the same time two other issues were discussed that were of interest to the Netherlands: the pollution of the Scheldt and Meuse rivers and water allocation in the Meuse. However, no solution could be found in this regard because of internal differences in Belgium. The harbor of Antwerp is located in the Flemish region, whereas much of the pollution reduction efforts and other measures would have to be taken in the Walloon region. In other words, the costs and benefits of a package deal would have fallen on different groups in Belgium, and the upstream–downstream conflict could not be overcome. A definitive solution came only in 1994–5, after a few more issue linkages without these particular problems (Meijerink, 1999; Mostert, 2001).

In several other cases issue linkage played a role, either at the international level (the Euphrates case) or at the domestic level (the Colorado River). In one case the possibility of international court action played a role (the Colorado River salinity problem). In some cases external donor funding has stimulated cooperation since such funding is often dependent on international agreement (for example, the Niger River). In other cases the military strength of one country may have contributed to the conclusion of an agreement (the Pancheshwar project). Such forced agreements are usually not very stable and effective, and the Pancheshwar project has still not been constructed.

Another strategy for reaching agreement is “side payments,” for example, paying for pollution reduction, as happened in the Rhine basin with the French potassium mines (Dieperink, 1997, 1998). In addition, “slag cutting” can be employed, which means that sectoral government bodies use their privileged access to specific international arenas in order to introduce a more ambitious policy domestically than would be possible if they confronted other sectors directly (Golub, 1996; see also Section 2.5). No clear example of the latter mechanism was found in the cases studied.

Especially if relations are strained and mutual trust is lacking (as in the case of Pakistan and India discussed earlier), control over the implementation of the treaty is a serious and important issue. Unless all states concerned trust that the others will honor their part of an agreement, no agreement will be reached or, if there is already an agreement, no implementation will take place. The control issue can sometimes be solved physically, for example, when a project can be located in two countries. In other cases effective compliance mechanisms and conflict resolution procedures may need to be devised.

The Alpine Rhine case offers an interesting illustration of the problems of trust and control. The Alpine Rhine is a boundary river between Austria and Switzerland. To reduce flooding, both countries have for centuries encroached upon the floodplain and built ever-higher levees independently of each other. This resulted in higher flood risks on the opposite bank and in a “levee race.” In 1892, it was decided to increase the discharge of the river by cutting off two of its bends: the Diepoldsauer cut-off upstream through Switzerland and the Fussacher cut-off downstream through Austria. Austria did not want to start the construction of the Fussacher cut-off if the Swiss did not simultaneously start the construction of the Diepoldsauer cut-off, fearing that otherwise this cut-off would not be constructed at all. Technically, the Diepoldsauer cut-off was probably not necessary to solve the flooding problem, but politically the cut-off had been necessary to get the required support within Austria for the 1892 agreement. Yet, the Swiss had serious doubts about the technical feasibility of constructing the upstream Diepoldsauer cut-off before the completion of the downstream Fussacher cut-off. In the end, enough trust developed for the Austrians to construct the Fussacher cut-off first and for the Swiss to construct the Diepoldsauer cut-off afterwards (Marty, 2001).

This last example points to the importance of maintaining or developing good relations and mutual trust. In fact, this was the most common and most powerful strategy for reaching agreement in the cases studied. One could also call this “good neighborliness,” “reciprocity,” or the creation of a “reservoir of goodwill” (LeMarquand, 1977). It implies that countries are willing to compromise on some points that are more important for the other countries than for themselves, expecting that the other countries concerned will in turn reciprocate. Maintaining or developing good relations constitutes a long-term investment, with long-term benefits for all countries concerned that outweigh the short-term benefits of less cooperative behavior. It could also be seen as a relaxed form of issue linkage. Issues do not have to coincide in time, there are fewer factual controversies because of the good relations and mutual trust, negotiations can be shorter, there is no need for strict compliance procedures, and management can be more flexible. If the relations are good any water management problem can be solved, or at least serious escalation can be prevented.

4. INSTITUTIONS FOR MANAGING INTERNATIONAL FRESHWATER RESOURCES

This section describes the formal institutions that have been established for managing international freshwater resources, using nineteen institutions as an example. Attention is paid to the scope of the institutions (Section 4.1), the organizational frameworks that have been set up (Section 4.2), and the procedures within these organizations (Section 4.3). Public participation receives separate attention (Section 4.4). The information for this section comes from research by the FAO in Rome for the PCCP project. Details on the individual institutions can be found in the research report “Institutions for International Freshwater Management” (Spreij, 2002; for a different overview see Kliot et al., 2001).

4.1. Scope

The institutions studied showed a wide variety in geographical scope (Table 1). Many of them apply to complete river or lake basins or major sub-basins, and sometimes their activities are not limited to water issues only, but include regional economic development. The basin institutions usually deal with the integrated management of the basin or at least with a wide array of water uses. Yet, in practice one can see a distinction between, on the one hand, more development-oriented basin institutions in the so-called developing world, such as the Mekong Commission and the OMVS in the Senegal basin, and on the other hand, more protection-oriented basin institutions in the “developed” world, such the commissions for the Rhine and the Danube. The latter often focus on pollution control and nature issues, whereas the former often focus on developing or managing infrastructure, such as dams for hydropower production or irrigation. Institutions in all parts of the world deal with water allocation issues.

The river or lake basin institutions are usually involved in planning and policy preparation for their basin and often conduct studies or coordinate research and monitoring. They usually do not regulate the use of the basin, although some have some powers in this respect, for example the Mekong commission. When ministers or high-level politicians are involved, as is often the case (next section), they can take politically binding decisions. If not, they have primarily a coordinating and advisory role.

Several institutions deal primarily with boundary waters or, occasionally, boundary basins: a Finnish–Swedish and a Finnish–Russian commission, the International Boundary and Water Commission (USA–Mexico), and the International Joint Commission (United States–Canada). Compared with basin institutions, they

tend to deal more with management rather than policy issues and often limit themselves strictly to issues with a transboundary impact.

Table 1. Formal institutions for international freshwater management I

<i>Resource/institution</i>	<i>Geographical scope</i>	<i>Functional scope¹</i>	<i>Tasks and powers²</i>	<i>Organisation³</i>
<i>Africa:</i>				
Joint Authority for the study and development of the Nubian Sandstone Aquifer ²	Aquifer	A	I,MR,PD	M,S
Kagera Basin Organization	Sub-basin	I,E	A?	D,S
Lake Chad Basin Commission	Basin	I	A,I,PP	H,CS,S
Niger Basin Authority	Basin	I	A,PD,R	H,M,CS,N,S
Nile Basin Initiative	Basin	I	F,PP	M,CS,S
Permanent Okavango River Basin Water Commission	Basin	A,N,Q,W	A,MR,PP	D
OMVS (Senegal Basin)	Basin	I, esp.W	MR,O,PD	H,M,CS,W,N,S
<i>Asia:</i>				
Permanent Indus Commission	River system	A	R	2 commissioners
Mekong River Commission	Lower basin	I	MR,PD, R	M,CS,W, S,N
<i>Europe:</i>				
ICPDR (Danube)	Basin in member states	I	A,MR,PP	(M),D,W,S
Finnish–Norwegian Boundary Waters Commission	Boundary waters	I (trans-boundary only)	A	D
Finnish–Swedish Frontier River Commission	Boundary basins	Esp. W and Q	MR,R	D,secretary
Joint Finnish–Russian Commission	Boundary waters	I (trans-boundary only)	MR,R	D
International Commission for the Protection of the Rhine	River/basin in member states	I	A,MR,PD	(M),CS,W,S
<i>North America:</i>				
International Boundary and Water Commission	Boundary waters	I	A,F,MR,O	N+S
International Joint Commission ²	Boundary waters	I	A,R	D,N+S,W

<i>South America:</i>				
Intergovernmental Coordinating Committee (Plata basin)	Basin	I	A,I,MR	M,CS,N,S
Salto Grande Joint Technical Commission	Part of river (hydro-electric complex)	H,S	F,PP, esp. O	D,W?,S
Uruguay River Management Commission	Part of river	I	MR,O,R	D,WS

Notes:

- 1: A = water quantity, E = economic development, H = hydropower, I = integrated/all, N = nature protection/management, Q = water quality, S = shipping, W = water works generally.
- 2: A = advising/coordinating, F = feasibility studies/coordinating donor funding/project management, I = information exchange/clearing house function, MR = conducting or coordinating monitoring and research, O = operating infrastructure, PD = determining policy, PP = policy preparation/planning, R = regulating water uses/allocating water.
- 3: CS = civil servants/commissioners in plenary commission or "technical advisory commission," D = composition delegations up to member states, H = heads of state in commission or regular conferences, M = ministers in commission or regular ministerial conferences, N = national sections or commissions, S = separate secretariat/permanent staff, W = working groups, expert groups and/or advisory bodies.

Some institutions refer only to the main course of the river or only a part thereof, or sometimes to the main course and some tributaries and distributaries. Some, like the Permanent Indus Commission, deal primarily with water allocation, while others have a more integrated scope.

Finally, very few institutions deal with aquifers. Only one, and quite a recent one – the Joint Authority for the study and development of the Nubian Sandstone Aquifer – is included in the overview, despite efforts to find more. This institution is involved in research and planning and information exchange. For the Guarani aquifer (Argentina, Brazil, Paraguay, and Uruguay) the establishment of an institution is presently being discussed. The European Union has adopted a Water Framework Directive (2000/60/EC), which requires the preparation of national and international river basin management plans that will pay attention to both ground and surface water.

4.2. Organizational Framework

The organizational frameworks set up for managing the freshwater resource range from extremely simple to very complex. This can be explained partly by the limited or broad scope of the institution, but other factors must be partly responsible, such as cultural preferences for complex hierarchical structures or for simple and flexible structures, the impression of well-developed cooperation that complex structures may give, or simply the ideas of the consultants involved in designing the institutions.

The Permanent Indus Commission has the simplest organizational set-up: two commissioners, one for Pakistan and one for India, who meet at least once a year. The Indus treaty as a whole is set up to minimize the need for further cooperation and interaction (Section 3.2).

Next in complexity come the Finnish–Russian and Finnish–Norwegian boundary waters commissions and the Permanent Okavango River Basin Commission. They consist of national delegations. The Finnish–Swedish Frontier River Commission, the Kagera Basin Organization, and the Joint Authority for the Nubian Sandstone Aquifer

have, in addition, a permanent secretariat. In the Joint Authority for the Nubian Sandstone Aquifer the countries are represented at ministerial level.

The most elaborate set-up is that of the OMVS (Senegal river). The supreme governing body is the Conference of the Heads of State, its supervisory body is the Council of Ministers, and its executive organ is the Office of the High Commissioner, which has several departments. Moreover, there is a general advisory body for the Council Ministers, the Permanent Water Commission, and there are two further consultative bodies, the Advisory Committee with representatives from governments, financial institutions, and the OMVS itself, and the Regional Planning Committee, which advises on the availability of water resources in the basin to meet the regional development plans of the member states. The member states also have National Offices, which are represented in the Advisory Committee. The Diama Dam and the Manantali Dam are managed and exploited by two separate companies, the SOGED and the SOGEM. The Council of Ministers acts as "General Assembly" of these companies.

A quite common model for the protection-oriented river basin commissions in Europe is to have a general assembly with high-level civil servants, working groups for specific topics with governmental and non-governmental experts, and at the highest-level, ministerial conferences, although the latter are officially not part of the commission (examples include the Rhine, Danube, and Meuse and Scheldt commissions). The work of these bodies is coordinated by a relatively small secretariat. In addition, national committees often exist to coordinate the national input into the commissions. Where they do not yet exist, as in the Netherlands, they may be established in the future to better implement the European Water Framework Directive and its planning provisions.

The two North American Commissions, the USA–Mexican International Waters and Boundary Commission and the USA–Canadian International Joint Body, are organized in two national sections.

Nearly all river basin organizations have legal personality of some sort. They can hire staff, sign contracts, and so on, usually according to the law applicable at the location of the headquarters of the organization (for example, the Danube Commission). Some are international bodies (the Lake Chad, the Mekong, the Uruguay, and the International Boundary and Waters Commissions). In other cases the staff enjoy certain diplomatic immunities and/or tax exceptions (the Plata, Salto Grande, the Finnish–Swedish Frontier River Commissions, the Kagera Basin Organization, and the Niger basin Authority).

As this section is based primarily on the analysis of documents, it is not clear how active organizations such as the Kagera Basin Organization presently are, or whether all subsidiary organs and working groups of the different commissions are active. Yet, most commissions are known from other sources to be active or even very active.

4.3. Procedures

Different rules apply to the functioning of the different organizations. Some are to be found in the relevant treaties, but many are also contained in bylaws. The most important rule is the means for taking decisions. Usually this is by unanimity or consensus. Apparently, states want to keep control. In two cases – the International Joint Commission and the Salto Grande Joint Technical Commission – decisions are taken by ordinary majority, but in both cases there are only two member states. Consequently, unless there is serious disagreement within a national delegation, a majority effectively means unanimity. The Finnish–Swedish Frontier River Commission can take decisions by qualified majority, but this commission also consists of only two delegations. The joint Authority for the Nubian Sandstone Aquifer can take decisions

by ordinary majority on some issues and by qualified majority on others; it has four member states, but it does not have many real competences. The Danube Commission, which is very active and has many different tasks, can take decisions by qualified majority except on financial matters, which require unanimity. To get decisions implemented, however, consensus will be needed in many more matters. Formally, however, it can be considered to be the most advanced of the river basin commissions – if, that is, one sees supra-national river basin organizations as the way ahead (cf. Ast, 2000; Mostert, 1998a).

Table 2. Formal institutions for international freshwater management II

<i>Resource/Institution</i>	<i>Decision making¹</i>	<i>Information exchange/ Prior notification</i>	<i>Funding²</i>	<i>Conflict resolution procedures³</i>
<i>Africa:</i>				
Joint Authority for the study and development of the Nubian Sandstone Aquifer ²	M, Q on some issues	Information exchange, no prior notification.	C,(A)	–
Kagera Basin Organization	U	–	C	A
Lake Chad Basin Commission	U	Yes	C,F (not implemented)	C,A
Niger Basin Authority	U	Yes	C,A	C
Nile Basin Initiative	–	–	C	–
Permanent Okavango River Basin Water Commission	U	Yes	C (limited)	–
OMVS (Senegal Basin)	U	Yes	C,P,(A)	A,ICJ
<i>Asia:</i>				
Permanent Indus Commission	–	Yes	F (not implemented)	C,A
Mekong River Commission	U	Yes	C,(A)	C,A (opt.)
<i>Europe:</i>				
ICPDR (Danube)	Q, U (finances)	Yes	C	C (opt.), A or ICJ
Finnish–Norwegian Boundary Waters Commission	–	–	C (necessary?)	–
Finnish–Swedish Frontier River Commission	Q	Yes	C	A

Joint Finnish–Russian Commission	U	Yes	–	C,A
International Commission for the Protection of the Rhine	U	Yes (no explicit not. req.)	C,P (chlorides)	A
<i>North America:</i>				
International Boundary and Water Commission	U	Implicitly	P	C
International Joint Commission ²	M (two delegations)	Yes	C	C=A
<i>South America:</i>				
Intergovernmental Coordinating Committee (Plata basin)	U	Very limited	C,F	–
Salto Grande Joint Technical Commission	M (two delegations)	Limited	P	A
Uruguay River Management Commission	U	Yes	C	C

Notes:

1: U=unanimity, O=ordinary majority, Q=qualified majority.

2: A = joint acquisition of international aid by commission, C = financial contribution for operating secretariat, F = international fund, P = project-specific arrangements.

3: A=arbitration, C = conflicts are discussed in or decided by the commission, ICJ=international court of justice.

–: no specific provisions.

The participating states usually have to inform the other basin states of the state of the resource, the management of the resource, and planned developments, either directly or through the commission. Sometimes a whole list of items on which information is to be provided is given (as with the Danube Commission), but sometimes the obligation is formulated quite generally or qualified by phrases such as “to the extent permitted by its laws and procedures” (Okavango Commission). In a few cases the treaty does not contain a specific provision on prior notification, but the obligation can be inferred from other provisions, for example, concerning the tasks of the commission that is set up (the Rhine Commission and the International Boundary and Water Commission).

The financing of the organizations concerned clearly depends on their functions and their structure. In nearly all cases the running costs of the organization are covered by financial contributions by the member states. The Permanent Indus Commission and the International Boundary and Waters Commission are the exceptions, as the former consists of two national commissioners only, and the latter of two national sections with no permanent joint staff or other common expenses. For

joint water works the costs and benefits, such as hydropower produced, are usually shared on a project-by-project basis. The tasks of the Niger Basin Authority explicitly include borrowing of funds and the reception of donations and legacies. Other organizations are in practice involved in securing or coordinating donor funding. Although it cannot be proven on the basis of the present research, some may even have been set-up exclusively to obtain international aid, as international cooperation is often a precondition for such aid. In three cases the pertinent treaties mention an international fund for financing projects. In one case this fund seems to be active (Plata basin), but in the other two cases the fund seems never to have been established (Indus and Lake Chad).

In all organizations conflicts are bound to emerge sooner or later. Some will not be serious and can be easily resolved by the countries concerned. Others will prove more intractable, and for these the treaties studied contain several procedures. In some cases the plenary commission will discuss the conflict or will act as arbiter. This is the case in the Lake Chad Basin Commission, the Permanent Indus Commission, and several more. Alternatively, or in addition, the states may use an arbitration procedure, involving for instance the establishment of a commission with one representative per state concerned and one additional chairperson appointed by agreement among the representatives concerned. Sometimes arbitration is optional (for instance, the Danube Commission), but sometimes it is obligatory for all member states (for example, the OMVS and the Permanent Indus Commission). In the case of the Danube Commission the member states may also opt for proceedings before the International Court of Justice. In the case of the OMVS the International Court of Justice functions as a court of appeal following arbitration.

4.4. Public Participation

Public participation in the different organizations is very limited, with few exceptions. The tasks of the organizations often include information exchange, and many have a public relations and communication department. In addition, many organizations publish reports and have web sites (Table 3). Yet in most cases this does not mean that citizens and NGOs have a right of access to information. Often information exchange is limited to exchange between the member states, as in the case of the Joint Authority for the study and development of the Nubian Sandstone Aquifer. It is not clear how the different information and public relations departments see their task – public information or public relations – and how active they are. Some web sites only give very general information, while access to the Internet in many countries is still very limited. Finally, the organization itself usually decides what information to make public and what not.

Participation in decision-making is even more limited. Sometimes the organization may invite observers to its meetings, but these are usually international organizations, international donors, and other government bodies. Reportedly, international NGOs attended the latest meeting of the Summit of Heads of State and Government of the Niger Basin Authority. The Finnish–Swedish Frontier River Commission invites opponents to express their opinion when it receives an application for a permit for a work that may cause damage or result in changes in the aquatic environment.

The North American bodies and the Rhine and the Danube commission are most active in the field of public participation (Milich and Varady, 1999; Assetto and Mumme, 2000; Mostert, 2000; also see for the Mekong and the Murray-Darling Chenoweth and Bird, 2000). They have very informative web sites, publish a lot of reports (mostly free of charge), and often organize consultations. In addition, international NGOs have observer status and participate actively in the plenary commission and/or in different subsidiary organs. Finally, NGOs are often involved in

the national preparations for the meetings of the commission and in the implementation of the decisions of the commission.

Table 3. Public participation in international freshwater management

<i>Resource/institution</i>	<i>Access to information/active dissemination</i>	<i>Participation in decision making</i>
<i>Africa:</i>		
Joint Authority for the study and development of the Nubian Sandstone Aquifer	–	–
Kagera Basin Organization	Publications	–
Lake Chad Basin Commission	Tasks include dissemination of information on projects	–
Niger Basin Authority	Reports and web site	International NGOs attended the latest meeting of the Summit of Heads of State and Government
Nile Basin Initiative	Reports and web site	"Cooperating organizations" that support NBI may attend meetings by invitation
Permanent Okavango River Basin Water Commission	–	–
OMVS (Senegal River)	Reports. Web site in preparation. Regional Documentation Centre	Observers may be admitted to meetings
<i>Asia:</i>		
Permanent Indus Commission	–	–
Mekong River Commission	Reports and web site	May invite observers to its meetings
<i>Europe:</i>		
ICPDR (Danube)	Reports. The ICPDR has a web site	International NGOs have observer status (active role in expert groups)
Finnish–Norwegian Boundary Waters Commission	–	–
Finnish–Swedish Frontier River Commission	–	In application procedure for permits for works
Joint Finnish–Russian Commission on the Utilization of Frontier Watercourses	–	–
International Commission for the Protection of the Rhine	Free reports, web site, newsletter	International NGOs have observer status

North America:

International Boundary and Water Commission	US Section: reports and web site.	–
International Joint Commission	Reports and web site Information Office	Public hearings on “references,” consultations with the public at large

South America:

Intergovernmental Coordinating Committee (Plata Basin)	Function to disseminate information, web site	–
Salto Grande Joint Technical Commission	Web site, Public Relations Department.	–
Uruguay River Management Commission	Reports and web site	–

Note: – means no specific provisions.

The main question is whether the limited public participation is a problem. The more parties are involved in negotiations, the more complex the negotiations become. Besides, complete openness on very sensitive issues may make it impossible for states to reach an agreement: the possibilities for freely exploring possible solutions is severely restricted if the different constituencies can scrutinize each and every step that the negotiators take. Yet having no public participation at all can result in limited support for the agreements that are reached, in ratification problems, and in limited or no implementation. If the agreements are nonetheless implemented, the results could be very detrimental to groups that were not involved in their negotiation (cf. the Rhine, the Alpine Rhine, the Salween River and the Senegal River cases). Additionally, members of the public and NGOs could supply important information and come up with creative solutions. Public awareness of water issues and public support for water policy could increase. Furthermore, public participation can be seen as a right of citizens and NGOs (UN-ECE, 2000; Roberts, 1995; Webler and Renn, 1995; Woerkom, 1997). Finally, in the Rhine and the Danube Commissions the contributions of international NGOs are usually appreciated, and if some information is confidential, this is respected.

5. THE EFFECTIVENESS OF THE INSTITUTIONS

This section describes the effectiveness or ineffectiveness of the institutions for managing international freshwaters. Little information is available on this. Treaties and other official documents define the formal institutions that have been established, but it is often not clear whether they are operational in practice, for example, whether all commissions are still active. In other cases it is clear that the institutions are operational, but it is not clear whether the goals that have been set have been reached. If the goals have been reached, it is often not clear whether this is due to the institutions or to other factors. Finally, effective institutions may have negative side effects and “ineffective” institutions may have positive side effects (see Section 2.5).

Nonetheless, effectiveness is the litmus test of institutional development. Fortunately, some information can be found, albeit from a limited number of cases only. Section 5.1 discusses how the institutions function in practice. Section 5.2 discusses whether the institutions promote further cooperation, as this is of special interest for the PCCP project. Section 5.3 discusses the overall effect in terms of the

stated goals of the institutions and in terms of the seven challenges mentioned in The Hague Declaration.

5.1. The Institutions in Practice

If we look only at whether institutions have been put into practice, many institutions included in this report have been highly or at least partly effective. Many commissions have been set up, and many of these are very active, such as the commissions for the Rhine, the Scheldt, the Meuse, the United States–Mexican and United States–Canadian border waters, the Senegal River, the Niger River, the Aral Sea Basin, the Murray-Darling, the Danube, and Lake Peipsi. A positive impression therefore, but perhaps more case studies have been published on effective commissions than on those that are ineffective. The present activities of the Kagera Basin Organization are not very clear, and it is doubtful that all subordinate bodies of all the organizations are very active. In a few cases institutional development is still limited (for instance, the Euphrates).

Special conflict resolution procedures were established in many of the cases, but there is no information whether these were actually used. However, this suggests that the institutions were effective rather than ineffective. There is one well-known example of the actual use of conflict resolution procedures: the Gabčíkovo-Nagymaros case between Hungary and Slovakia. In this case, Hungary complained about the construction of a dam on the Danube upstream in Slovakia. Slovakia referred to a treaty of 1977 allowing construction of the dam. The case was brought before the International Court of Justice in The Hague by special agreement between the two parties (International Court of Justice, 1997). In essence, the Court determined that neither state had kept to the provisions of the 1977 treaty and that they had to reach agreement on the management of the Danube in the spirit of the 1977 treaty, using current environmental standards and norms. This was not much help to the states since they had come to the Court because they could not reach an agreement in the first place. Nonetheless, the judgment is important as it places international water law in the context of sustainable development (Hey, 2000).

International freshwater resources are not always managed as originally agreed in every case. The Gabčíkovo-Nagymaros case is an example of this: Hungary stopped its contribution to the joint project and then Slovakia built a different dam than had been agreed. In the case of the Senegal River, the manager of the Manantali dam did not always deliver the promised artificial flood releases, and when large quantities of water were released the downstream flood-recession farmers were not always told in advance (Adams, 2000)

However, agreements are often complied with. To give but a few examples: in the Alpine Rhine case two river bends were cut off to reduce flooding, as agreed; the Rio Grande was “rectified” to reduce flooding, as agreed; in the Senegal River, dams were built, as agreed, despite the problems mentioned earlier.

In other cases, agreements are neither complied with nor violated, but they are simply not implemented. This is especially true of broad framework conventions. Their goals are often very ambitious, but also abstract and non-committing. They usually require further implementation agreements, and these often do not come about easily. For instance, the 1976 chemicals treaty on the Rhine stipulates how pollution with chemicals is to be reduced in general, but specific agreements have to set emission standards for individual substances. Such agreements have been made for only a few of the substances found in the Rhine.

The problems with broad framework agreements have led Marty (2000) to conclude that framework agreements are not advisable. He advocates a “functional approach” to managing international water conflicts, in which issues are addressed one by one as they arise, as opposed to a basin-wide integrated approach. Not only is

a functional approach more politically feasible than an integrated one, but it also reduces scientific-technical complexity and the number of actors involved, thus saving time to develop institutions. Moreover, a functional approach allows for more specific agreements, and specific agreements are better implemented. This is all true, yet it is not the whole truth. As will be argued in the next section, framework agreements can establish organizational set-ups that promote further cooperation. Framework agreements should of course be well drafted and they can cause controversies where, for example, they contain vague principles. In addition, narrow agreements can create significant negative side effects. For instance, treaties promoting only irrigation agriculture may harm flood-recession agriculture, fisheries, and the environment. The Rio Grande rectification project, discussed by Marty (2000), became necessary because of the upstream Elephant Butt dam. This dam had been constructed by the United States to implement a water allocation treaty between the United States and Mexico and deliver agreed water quantities to Mexico. However, it also resulted in more sediments being deposited by the tributaries downstream of the dam and consequently in more flooding problems.

An interesting issue is whether legally binding agreements are better implemented than non-binding agreements. The Rhine case seems to suggest that this is not the case. Until 1986 the main method of pollution control at the international level was to develop uniform emission limits for individual substances. However, few such standards were developed. After 1986 the Rhine Action Plan was developed. Because it was not legally binding, countries were willing to subscribe to more ambitious goals and agreement could be reached sooner, at a time when there was still a lot of public concern about pollution issues. Yet the agreement was still politically binding, and its goals were more than achieved (cf. Victor et al., 1998; see also Section 5.3).

It should be remembered that the action plan was effective in a very specific context. Environmental awareness was high and the political will to do something was present just after the Sandoz disaster, a serious pollution incident. In other countries and in other situations, a non-binding action plan may not be taken seriously, or it might be agreed upon without ever intending to implement it. Nonetheless, legally binding agreements can have shortcomings too; so non-binding agreements deserve serious attention.

5.2. Further Cooperation

There is ample evidence that intergovernmental commissions can promote further agreement. Moreover, despite the problems discussed earlier, many framework agreements have been implemented, or at least partially implemented. In fact, many framework agreements establish intergovernmental commissions. Examples include the Meuse and the Scheldt protection treaties of 1994–5, which established the Meuse and the Scheldt Commissions against pollution and included in their tasks the establishment of action programs. In 1998 such action plans were in fact agreed upon, even though their contents are still limited. In 2000, the Water Framework Directive of the European Union (2000/60/EC) was published. As discussed, this directive requires national and international river basin management plans. The Meuse and Scheldt river basin states have decided that the existing commissions will facilitate the necessary intentional coordination, thus building on the experiences gained.

There are other examples of successful commissions and framework agreements. The framework of the International Commission for the Protection of the Rhine made possible a solution to pollution by potassium mines in France (financed by the countries suffering from the pollution, however). In the framework of the International

Boundary and Waters Commission (United States–Mexico) the salinity problems of the Colorado River could be addressed effectively.

It is difficult to say why some commissions are not very active while others manage to develop solutions to complex problems. It might be that some framework agreements are never meant to be implemented but are simply concluded to appease the other basin states or please international donors. Nonetheless, if well drafted, the agreement cannot be ignored totally. Framework agreements can stimulate further cooperation, provided data and information are shared, mutual trust is fostered, and generally everything has been done that was necessary to reach the framework agreement in the first place.

5.3. Overall Effect

The effects of the institutions are the most difficult aspects to discuss, and the least information is available. Using the Rhine as an example, it is undeniable that the water quality has improved a lot since 1970. Some explain this by referring to the activities in the framework of the International Commission for the Protection of the Rhine. Others, however, point to factors such as increased environmental awareness, public pressure on industry, technological developments, the culture of private business, the cooperative rather than adversarial relations between industry and government, national legislation, and legislation of the European Union. To complicate the picture, the Rhine pollution was one of the factors that instigated the environmental legislation of the European Union. It may also have had some influence on public opinion and on national legislation. Public opinion in turn has had an effect on national and European legislation and on industry (Mostert, 1999; Verweij, 2000). In such a context it is not possible to identify a single cause of improvements. Rather, one should think in terms of a network of causes and effects involving many different actors at many different levels, and with many positive and negative feedback mechanisms (cf. Figure 2). International freshwater institutions can certainly play a positive role in such networks.

What one should not do is to look only at the officially stated goals. Whether these goals have been reached is a legitimate question worthy of study, but possible side effects need to be studied as well. Two cases in point have been discussed earlier. In the Senegal River case, according to Adams (2000), irrigated agriculture did increase, at least initially, but at the expense of flood-recession farming, fisheries, the environment, and the health of the local population. In the Salween River case, hydropower is presently being produced, but probably at the expense of the local population.

The general impression of all case studies taken together, even if this impression cannot be “proven,” is that well-designed institutions deliver positive effects, and badly designed institutions deliver negative effects or no effects at all because they do not function in practice. The main issues for international freshwater management then become what constitutes a well-designed institution and how to develop such an institution. The cases studied and the literature give many suggestions. These are listed in the next section.

6. LESSONS ON PROMOTING COOPERATION AND PREVENTING CONFLICTS

This section presents the main lessons that can be drawn from the research on promoting cooperation and preventing conflicts in international freshwater management. These are organized in accordance with the analytical framework used (Figure 3):

- the context for cooperation and conflict resolution (Section 6.1)
- the process of cooperation and conflict resolution (Section 6.2)
- institutional design (Section 6.3).

Many lessons are based on, or confirmed by, the case studies included in this report (Sections 3–5). Other lessons could not be confirmed by these case studies due to a lack of data and are therefore based primarily on more general literature, indicated in this section and throughout the report (cf. Section 7.2).

6.1. Context

1. Achieving cooperation is easier in the case of collective problems than in the case of externality problems. In the former case the challenge is to realize the win-win solution that is already there. In the latter case there is a zero-sum game with a winner and a loser, unless the scope of the problem can be broadened and a win-win game can be created.
2. The likelihood of conflicts is highest in the case of negative externality problems, but even in these cases cooperation is possible.
3. The likelihood of collective problems and consequently the potential for cooperation is highest in relatively underdeveloped basins. The likelihood of negative externality problems and therefore the potential for conflict is highest in highly developed basins.
4. Bad international relations seriously complicate the development of cooperation and can cause or exacerbate conflict. In some cases it may be necessary to improve the relations before the water management issues can be solved, but water management issues can also trigger the development of better relations.
5. Differences in levels of economic development may exacerbate conflicts but they may also help to solve conflicts. They can exacerbate conflicts if they result in very different levels of environmental awareness and different development priorities, or if they result in “international jealousy.” However, economic differences also create possibilities for mutually beneficial exchanges, such as water in return for development support.
6. Other contextual factors that need to be taken into account include the differences among various national cultures, and the domestic political and management system (role of different government levels, sectoral cohesion or fragmentation, role of interest groups, ethnic groups, and so on).
7. Generic international water law usually offers limited guidance because the main principles “no significant harm” and “reasonable and equitable utilization” are quite abstract and may conflict with each other in individual cases, especially in highly developed basins where the present utilization could be interpreted as not equitable (cf. Caflisch, 1998; McCaffrey, 1998).

6.2. Process

6.2.1. Timing

8. Cooperation should start long before serious conflicts have become overt (Wolf, 1997). Unfortunately, proactive problem solving is not very likely (Marty, 2001).
9. Whenever possible, cooperation should start with technical cooperation, such as information exchange or joint monitoring. This helps to preclude data disputes later on, provides patterns of cooperation, develops trust in the absence of intense political tension, and results in a sound factual basis for an agreement (Brehmer, 1989; cf. Vlek and Cvetkovich, 1989; Wolf, 1997).
10. In addition, or alternatively, cooperation could start with a small project that has a good chance of success, again to provide patterns of cooperation (Wolf, 1997).

11. In general, negotiations should start with the less controversial issues (Brehmer, 1989; cf. Vlek and Cvetkovich, 1989).
12. The development of cooperation is a slow and often incremental process requiring an optimistic approach from all concerned (see, for example, Johnson, 2000).
13. Small disasters can promote institutional development, but only as long as the memory of the disaster is still fresh. Water managers should be prepared to act quickly when an opportunity occurs.

6.2.2. Scope and Parties

14. Serious attention needs to be given to the scope of the negotiations and to the parties to be involved.
15. A broad scope can make the negotiations very complex, making it more difficult to reach agreement. Yet, issues other than water should be considered as well: to facilitate issue linkage, overcome win-lose struggles, and create win-win solutions.
16. Agreements are easier to reach if fewer parties are involved (Marty, 2001). However, excluding basin states from the process can lead to conflicts with these states or to suboptimal solutions.
17. Excluding water use sectors, NGOs, and the local population from the process may result in worse management since important local information and interests are not taken into account. Generally, this calls for different forms of public involvement (see also point 45).
18. Excluding water use sectors, NGOs, and the local population from the process may also result in ratification problems and in implementation problems. Again, this calls for different forms of public involvement.

6.2.3. Conducting the Negotiations

19. Negotiations should start with an exploratory phase in which several potential solutions can be explored without committing any party. If possible a minimum of three alternatives should be considered in each phase of the negotiations to prevent entrenched battles over two opposing alternatives.
20. Effective exploration may require a high degree of confidentiality, especially in the case of controversial issues or bad international relations. This does not mean that water users and NGOs should not be involved (cf. points 17–18), but if they are involved, they should observe confidentiality.
21. The mandates of the negotiators should not be too strict, as this would limit the possibilities to explore new solutions.
22. Focusing on the underlying interests rather than conflicting positions reduces the chance of hard confrontations and deadlocks and increases the chance of an integrative agreement that meets all interests as far as possible (Fisher and Ury, 1981).
23. Further activities that promote agreement are searching for common interests and principles and for solutions that, while promoting one's own interests maximally, are also acceptable for the other parties. Each party should let the other party "score," that is, make concessions on points that are important for the other party but less important for the party making the concession (Fisher and Ury, 1981).
24. Generally, effective negotiators try to understand the interests, concerns, and anxieties of the other parties.
25. While negotiations can be hard, it is essential to foster and maintain a good atmosphere and mutual trust (Mastenbroek, 1996).

26. One should be reluctant to try to pressurize other parties and influence the balance of power to get more out of the negotiations, since such activities can easily spoil the atmosphere and cause disruptive power struggles (Mastenbroek, 1996).
27. If the parties in a conflict cannot find a mutually satisfactory solution, it may be advisable to jointly appoint a facilitator or an arbitrator. Their role may be to assist the negotiation process or to advise on substantive issues, such as draft solutions. In the latter case their advice may be purely "advisory" or it may be binding.
28. Involvement of a third party may be especially appropriate in the case of large cultural differences, since third parties can act as "cultural translators." In the case of so-called "collective cultures," losing face is an important concern and concessions can be made more easily to third parties.
29. There is sometimes the option to go to court. However, courts focus on the legal aspects of conflicts, which often does not solve the real problem (Painter, 1995).
30. Each individual negotiator or organization has to maintain the trust of its constituency or constituencies to prevent ratification problems later on.

6.2.4. Reaching Agreement

31. Reaching agreement requires that all parties (a) see the agreement as "fair," and (b) are confident that the other parties will comply with it.
32. Confidence in compliance by the other parties requires (a) confidence that the other parties have the necessary legal, financial, and other resources, and (b) mutual trust, or alternatively control, over implementation.
33. Control over implementation can be physical, for example, because a project is located in both countries, or can be ensured through effective compliance mechanisms (Wolf, 1997; Marty, 2001; Bazeman, 2001).
34. That being said, the most common and compelling reasons for concluding agreements are the wish to maintain good relations and reciprocity.
35. Extensive external financing may help in reaching agreement or may even be essential, but in itself it is not sufficient.
36. Issue linkage may help to overcome conflicts of interests. Issues that could be linked include for instance control over land in return for control over water, water in return for development aid, and upstream pollution control or reductions in water diversions in return for downstream improvement of navigation channels.
37. Issue linkage does not work if (a) issues are linked to intractable issues; (b) costs and benefits fall on different national groups, and those groups having to bear the costs are powerful enough to prevent the ratification of the agreement; or (c) states cannot make credible commitments to comply with all parts of the agreement. The latter can be especially problematic if issues in more than one sector are linked and the sectors operate relatively independently.
38. In the case of relatively independent national policy sectors an additional mechanism for reaching agreement is so-called "slack cutting." This implies that sectoral government bodies use their access to international fora to introduce ambitious sectoral policies through international agreements, thus circumventing national opposition from other sectors (Golub, 1996). However, ratification and implementation of the agreements reached in this way may be problematic.
39. When discussing water allocation, it may help to focus not purely on water quantities, but instead to adopt an economic view. Focusing on water quantities only turns water allocation problems into a pure zero-sum game: one party's gain is another party's loss. Focusing on the economic benefits of water may make it clear that these differ between countries. Water may then be exchanged

for other goods or for money. In addition, an economic view may reveal that the value of the contested amounts is quite limited. If desalination is an option, the value can never be higher than the costs of desalination. In all this, distributional issues and the position of the underprivileged should not be forgotten.

40. It may be useful not to negotiate until all matters are settled, but instead make a framework agreement that sets principles and establishes an organizational framework as a starting point for further negotiations.
41. However, there are also dangers if promises are not fulfilled (Marty, 2001) or if framework agreements contain provisions that are unclear, or controversial, or restrain further negotiations too much. Consequently, framework agreements should be phrased very carefully and their purpose should be very clear.
42. For reasons such as equity and "controllability" (cf. point 33), agreement is sometimes only possible on technically suboptimal solutions. These may be preferable to no solution at all.

6.3. Design of Institutions

6.3.1. General

43. Agreements with a narrow scope are easier to reach and more effective in terms of the stated goals, but their effectiveness in terms of broader goals can be lower.
44. Agreements that are specific are more difficult to reach, but also more effective.
45. Non-binding agreements such as "action plans" deserve serious attention. Non-binding agreements can often be more ambitious than legally binding agreements, they can be reached more quickly, and their implementation does not have to be a problem since they can still be politically binding. In some countries or situations, however, non-binding agreements may not be taken seriously and may be agreed upon without ever intending to implement them.

6.3.2. Organizational Structure

46. International commissions can perform many useful functions in the management of international basins, such as coordination of research and monitoring, coordination of river basin management among the participating basin states, planning, coordination of international development aid, and compliance monitoring. Provided their functional scope is sufficiently wide, they offer a framework for discussing contentious issues and developing cooperation (International Workshop 2000, recommendation no. 24). For international freshwater resources located in more than two states, they seem almost indispensable.
47. Commissions with executive tasks or regulatory powers may be a good option for very specific tasks with an international scope, such as shipping and the operation and management of specific waterworks (International Workshop 2000, recommendation no. 25). It is usually not feasible to establish bodies that have both broad decision-making powers and a broad functional scope, nor is it in most cases necessary.
48. International commissions with primarily a coordinating role should typically have a large geographical scope, ideally complete basins or aquifers. The geographical scope of management and regulatory bodies should depend on their specific tasks.
49. The organizational structure should not only facilitate the necessary coordination between countries, but also within the countries: between different government levels and government sectors, and between government generally and water users and the local population. This can improve the quality and "fairness" of the

international decisions and improve their implementation. Means include ensuring a broad composition of national delegations and national sections, national consultations, and decentralization.

50. The internal structure of an international commission, and the number of subsidiary bodies and expert and working groups, should reflect the complexity of the issues it deals with, but the structure itself should remain simple and transparent. A separate secretariat or executive organ is usually advisable to support or execute the work of the commission or authority.

6.3.3. Decision-Making Rules

51. Formal requirements to inform and consult the public could result in a very formal approach to public participation. Yet they help to ensure that other interested parties become informed at an early phase and can raise objections or give suggestions while these can still be taken into account. Moreover, formal requirements can initiate and promote less formal and more active forms of public participation (Mostert, 2002; cf. points 17 and 18).

6.3.4. Substantive/Operational Rules

52. Operational rules should be specific with respect to the goals, and flexible with respect to the means to be employed (Marty, 1991).
53. If the goals cannot be made specific enough, the means should be concrete. However, operational rules should consider intra and inter-year variability and uncertainty. In addition, there should be a procedure for modifying the substantive rules in the case of changed circumstances, such as new technologies and climate change, and of new information (cf. Wolf, 1997).
54. Operational rules should consider groundwater as well as surface water, water quality as well as water quantity, land resources (for example, erosion control) as well as water resources, and energy uses as well as consumptive uses.

7. CONCLUSION

This final section contains the conclusions of the research. It extracts the essence from the lessons learned and formulates seven key messages (Section 7.1). It evaluates the research that was conducted (Section 7.2), and finally, it gives three suggestions for future research (Section 7.3).

7.1. Key Messages

1. International freshwater management is becoming increasingly important for meeting basic water needs and providing food security.

Due to population growth, water scarcity will increase drastically in the coming decades. Effective water management is needed in order to meet the needs of present and future generations and protect the environment on which we depend. Since many freshwater resources transcend national boundaries, a great deal of international cooperation is needed. Only then can we prevent serious international conflicts and provide the services that society needs.

2. There is no single best way to manage international freshwaters.

The best way to manage international freshwater resources depends on a large number of factors such as hydrology, the national and international political situation, the cultures of the countries concerned, and the types of management issues.

Consequently, what may work in one context does not necessarily work in another context.

3. Commissions or other platforms should be constructed internationally and nationally where the main actors can meet: national governments, lower level governments, water users, local populations, and NGOs.

International freshwater management requires first and foremost that the main actors meet and discuss issues. International river basin commissions or authorities offer good platforms for this. However, links with lower level governments should be maintained or established as well since effective implementation of international agreements often depends on actions at such levels. Similarly, links should be established with government sectors such as agriculture and power production and with NGOs and individual industries, farmers, and consumers. This could be done for instance through national water councils, informal consultations, and water users' associations.

4. International agreements should have a sufficiently broad scope.

In theory, international agreements should have a comprehensive scope and cover all aspects of international freshwater management. This would facilitate optimal utilization and protection of the resource at stake. In practice, agreements often have a narrow scope because they are usually developed in response to pressing individual issues, and agreements with a narrow scope are often easier to reach and implement. Nonetheless, there are limits to this form of pragmatism. Agreements regulating surface water use may result in groundwater over-exploitation, agreements allocating water quantities without referring to the quality may result in serious problems if water quality does deteriorate, and agreements furthering one water use sector may harm other water use sectors even more. A possible way out of this dilemma is a combination of a broad framework agreement and more specific agreements for individual issues.

5. The single most effective strategy for reaching agreement is the wish to develop and maintain good relations and reciprocity.

Reaching agreement can often be difficult as interests usually differ. Strategies such as issue linkage may help. By far the most effective strategy is the wish to maintain good relations and reciprocity. If relations are good, countries will be willing to compromise on points that are more important for the other countries concerned than for themselves, as they can expect the other countries to respond in kind. There is less need for strict compliance mechanisms and management can react more flexibly and quickly to changing circumstances. If relations are good, all freshwater management issues can be solved, or at least serious escalation can be prevented.

6. Joint or internationally coordinated research can improve the scientific-technical quality of international agreements; unilateral research usually cannot.

The countries concerned should not only agree upon international agreements, they should also make sense. They should be based on sound knowledge. Research conducted or controlled by one country may not be very useful in this respect. Even if scientifically perfect, such research is unlikely to be accepted by the other countries concerned as they were not involved in defining the terms of reference and cannot be certain of its quality. The only way out of this is to conduct joint or internationally coordinated research. International commissions can play an important role in this. The research may want to focus on the best feasible solution rather than the optimal solution, since some solution is often better than no solution at all.

7. All stakeholders should participate in institutional development.

All stakeholders should participate in institutional development, directly or indirectly, including lower level governments and civic society. In this way different points of view and more information can be incorporated in the resulting institutions, fewer negative side effects will occur, and the legitimacy and effectiveness of the institutions will be enhanced.

7.2. Evaluation

The conclusions of any research are only as good as the research itself. Therefore, the research itself needs to be reviewed. Attention should be given to the research strategy, the availability and reliability of the data, the theoretical framework, and the validity of the conclusions reached.

7.2.1. Research Strategy and the Data

The research strategy can be characterized in three phrases: comparative case study research, secondary analysis, and a qualitative approach. Since many cases were included, a broader view could be developed than in many of the papers, articles, and monographs studied. More conclusions could be drawn, more support for the conclusions could be found, and some provisional conclusions could be qualified and improved.

There was a downside to including many cases. For practical reasons use had to be made of published case studies. Most did not contain all the information that would be required according to the theoretical framework used. In particular, good information on the tactics used during negotiation and on the effectiveness of the institutions was scarce. Moreover, the research became dependent on interpretations given by others. The latter limitation became very clear in the Salween case. From the papers by Hashimoto (1996) and Raj Onta et al. (1996), it seemed that the Salween River was an example of effective international cooperation. Hashimoto (1996) mentioned the presence of an ethnic group living on both sides of the border between Myanmar and Thailand as promoting cross-border communication and cooperation. Other sources, however, observe that ethnic minorities are suppressed and are used as forced labor in Myanmar (for example, Moe, 2000; US Department of Labor, 2000). Given the nature of the research, this issue could not be studied in detail. However, it shows how tricky it is to rely on other people's interpretations. On the Salween example a range of papers and articles could be found, but other case studies rely on one source only.

In practice, these two downsides are not as important as they may seem at first sight. Several case studies included were very detailed and thorough (for example, Meijerink, 1999; Verweij, 2000; Marty, 2001). In addition, the relatively large number of case studies meant that information gaps in one case study could be filled by others. Furthermore, it is unlikely that all case studies show the same type of bias. The limited and often unknown data reliability did mean that the filled-in "template for analysis" (Annex II) for each case study could not be annexed to this report. These were purely for internal use as *aide-mémoires*. Collectively, they give a good impression, but individually their quality is not always known.

The overview of the formal institutions presented in Section 4 is based on a separate set of case studies. These could be published separately (Spreij 2002), as they are based on formal documents such as treaties and bylaws. Data reliability is therefore far less of a problem.

Given the data limitations, and the number of factors taken into account compared with the total number of cases, only a qualitative approach was feasible. This may sound like a limitation of the research, but it is only a limitation within the

traditional approach to science called “positivism.” While quantification and strict methodologies can be very useful, they can hide many subjective interpretations under the different figures and statistical correlations, and may reduce openness to new insights. Even if a quantitative approach had been possible, a qualitative approach would have been justified.

7.2.2. Theoretical Framework

The theoretical framework used for this research was presented in Section 2 and is reflected in the “template for analysis.” The introduction to Section 2 gave three criteria for the theoretical framework:

- It should be general enough to apply to many different cases.
- It should be specific enough to ensure that all cases are analyzed in the same way.
- It should be open enough to allow surprise conclusions and not to exclude or overemphasize particular aspects of international freshwater management.

The first two criteria did not pose any problems during the research. The third criterion is generally the most problematic. It is not possible to check the appropriateness of a theoretical framework against the results of the research because the results are based on the very same framework; factors or perspectives left out at the beginning of the research do not suddenly pop up at the end. Yet, some external checks are possible. The theoretical framework incorporates many different disciplinary approaches that are often much more narrow. Moreover, the results of the research do not seem to contradict common sense or extra-scientific knowledge. Practitioners can be the judges of that, the only condition being that they are willing to consider new information and approaches that may conflict with their preconceived ideas. Fellow scientists could contribute criticism from different scientific perspectives. Yet research that incorporates all possible perspectives and factors will always remain unachievable as some perspectives are incompatible, and anyway the research would become insurmountably complex.

7.2.3. Validity of the Conclusions

In the end, the main issue is whether the conclusions of the research are valid. The fifty-four lessons drawn in Section 6 are all confirmed by at least one of the cases studied or, if data was lacking, supported by the more general literature on negotiations and international freshwater management (Sections 2–5 and references in Section 6). This literature is usually based on empirical research or on ample practical experiences. If one of the working hypotheses that the research started out with (Annex I) was contradicted, the hypothesis was modified or removed.

The seven key messages presented in Section 7.1 are a selection from and a compilation of the lessons. They are all based on or confirmed by the case studies and only to a very limited extent on the general literature.

The lessons and key messages can be considered as valid, although naturally other researchers might have arrived at somewhat different but equally valid interpretations of the data: the data limitations give enough leeway for that. It is even more likely that future research will necessitate a reconsideration of some of the conclusions. Our knowledge will continue to develop, and so will international freshwater management.

7.3. Recommendations for Future Research

The main recommendation for future research follows from the limitations of the present research discussed in the preceding section. More thorough monographs are needed on individual cases that discuss the different perspectives on the issues at stake – national, sectoral, NGO perspectives, and so on – describe the negotiation process in detail, and assess the effectiveness of the institutions that are established. Quite a lot of detail will be needed. These monographs should make comparisons with other cases in order to prevent too hasty generalizations. The present report and the literature mentioned in it could be used for this purpose. The lessons given in Section 6 and the key messages in this section can act as hypotheses to be tested and developed further.

More case studies exist than those included in this report; the research has been broad, but not exhaustive. More published case studies could be collected, and these can further refine the conclusions of this report. At this stage, however, the published case studies would have to be really detailed in order to develop our knowledge further.

Finally, let us turn to participatory water management. Participatory water management is mentioned in all major international declarations of the past decade: the Dublin principles, the Hague Declaration, the Bonn Declaration, and so on. Yet in very large international river basins it is really difficult to involve the public. The distances are large; different languages are often spoken; the attitude of the public towards the authorities and vice versa may differ from country to country, and so on (Mostert, 2002). Individual farmers and other water users and small NGOs can be reached best at the local level, but some management issues have a much larger geographical scope, so the results of public participation at lower levels have to be scaled up somehow to higher levels. How to organize this is an important topic for research. Within Europe a large EU-funded research project has started, the HarmoniCOP project, prompted by the recent Water Framework Directive of the European Union. In other parts of the world, this is an equally important topic. Interesting comparisons could be made between the different regions around the world, thus increasing our understanding of all parts concerned. The research could simply compare the public participation methods and approaches used, or analyze the effectiveness of these methods and approaches within their hydrological, socioeconomic, political, and cultural context. Action research could also be conducted. In this type of research the researcher, together with the different actors, organizes and evaluates public participation as a kind of pilot project. This type of research is especially appropriate where experiences with public participation are very limited or non-existent.

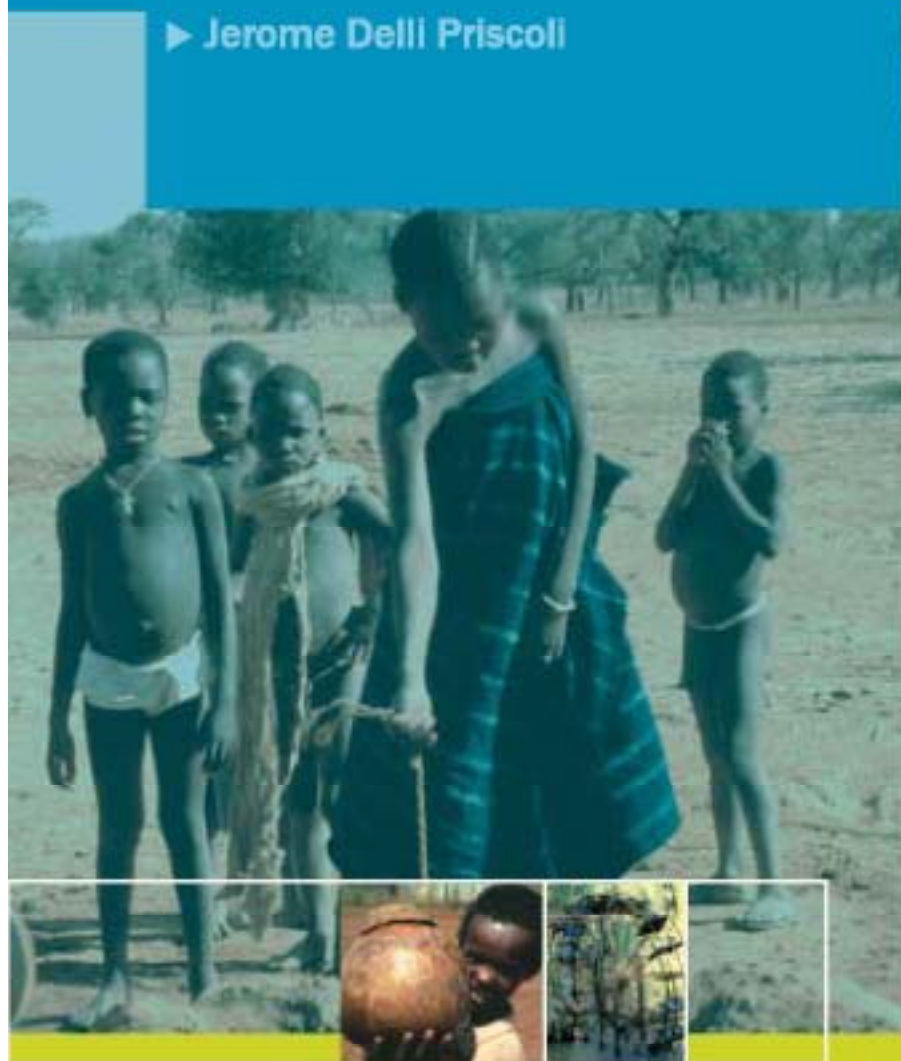
This brings us to the practical application of the lessons drawn in this report. Given the significance of effective international freshwater management, this is of the utmost importance. Needless to say, this report does not contain concrete recipes for success. Each situation needs a tailor-made solution, based on extensive knowledge of local conditions. However, it is hoped that this report will provide inspiration.

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Participation, Consensus Building and Conflict Management Training Course

► Jerome Dell Priscoll



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PARTICIPATION, CONSENSUS BUILDING, AND CONFLICT MANAGEMENT TRAINING COURSE (TOOLS FOR ACHIEVING PCCP)

Prepared by Jerome Delli Priscoli

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INTRODUCTION: WELCOME TO THE PARTICIPATION, CONSENSUS BUILDING AND CONFLICT MANAGEMENT TRAINING COURSE

(Tools for Achieving PCCP)

1. Training Context and Need

The world has changed for water resources managers, planners and decision makers. Today, especially in the context of new demands for integrated water resources management (IWRM), water managers and planners often work in teams involving multiple disciplines, not just engineering and associated technical fields. Increasingly they work in multi-agency teams, which involve a variety of public, NGO, and private sponsors. Today's water managers and decision makers must consult with a broader range of stakeholders, publics, and NGOs – locally, regionally, and often internationally. And, they must do all this while operating in a world of increasing demands on water.

Technical excellence remains necessary for creating sustainable water management decisions, perhaps even more so than ever. People all over the world need technical engineering competence more than ever before. However, it is not sufficient in itself. The ability to put that competence at the service of those who need it depends, in many cases, on changing the relationship between the experts and those whom they are serving. This course aims at helping to build, to modify, or to create such new functional relationships.

The new water resources decision-making environment requires at least two sets of skills. First, it requires excellent and broad technical skills that reach across disciplines to consider alternatives that in the past were often not evaluated. In addition, today's water decisions often rest on a scientific basis that is itself incomplete. This sometimes means that water decision makers must first get agreement on what studies need to be conducted and what data should be collected, to ensure that decisions are based on science, not rhetoric. As a result, water planners and managers need a breadth of technical knowledge that goes beyond the traditional excellence in engineering.

Second, water planners and managers need another set of skills: the skills of designing and conducting processes that draw together partners, stakeholders, and publics, resulting in decisions that enjoy broad cross-sectoral, and often transboundary, public support. The era where water planners and managers decide–announce–defend is rapidly disappearing. In this new era, water management is done with (as opposed to being done “for” or “to”) potentially affected agencies, public and private organizations, individuals, and others.

This course teaches this second set of skills. These are the skills that will help water resources decisions makers avert conflict, deal with conflict should it arise, and use water decisions as a venue for dialog when others are closed to parties locked in various types of non-water conflicts. In short these are tools to help water resources decision makers take the PCCP road.

2. Training Objectives

By the end of this course you will be able to:

- Identify the characteristics of effective participatory, consensus building, and conflict management processes.

- Design and facilitate multidisciplinary teams, as needed in IWRM, a variety of interactive workshops, and large and small meetings.
- Identify behaviors that escalate conflict during a dispute with other agencies, stakeholders, or the public – and identify behaviors that halt this escalation.
- Select appropriate techniques for a participatory process.
- Design basin-wide organizations and frameworks for action.

3. Training Methodology

This course is designed to teach *skills*, as well as concepts. When learning a skill, it is not enough just to “know about” it. Skills have to be practiced, preferably in conditions that replicate the circumstances under which they will be used. For this reason, the general sequence for each skill taught in this course is:

- brief presentation
- a class activity or team exercise in which you apply the skill
- a class discussion or debriefing to focus in on key issues or important things that were learned from the activity.

This means that the course is interactive, and your active participation is an essential part of your learning. Look upon each team exercise, for example, as another opportunity to learn more about working in teams. Also, remember that all skills require practice, and the more you practice them the better you will get. This course will give you the basics of each skill. But look on this training as simply getting launched and then reinforce the skills you learn with regular practice when you get back on the job.

4. Training Materials

The workbook consists of essays and exercises. The essays are written by practitioners: professionals who have used the tools for many years in water management situations throughout the world. In most cases, they are composites constructed from several essays on the topic by the author(s). The authors are trainers as well as practitioners. The course presentations follow the essays closely. The exercises, in some cases tested over many years, have been chosen and developed specifically for the skill or process that is being taught. Most are based on real cases. Attribution is provided for all materials where appropriate. The truth, however, is that the materials have evolved over years of training water managers and decision makers.

PARTICIPATION, CONSENSUS BUILDING, AND CONFLICT MANAGEMENT

Policy Makers Tools for Achieving PCCP

Agenda

DAY 1

8:30–9:00	Registration
9:00–9:30	Introduction and Needs Assessment (Using and Demonstrating Nominal Group and Prioritizing Techniques)
9:30–9:45	Review Agenda: Objectives and Process of Course
9:45–10:30	Group Exercise: Bargaining Game (Inter-Group Behavior)
10:30–11:00	Break
11:00–11:30	Presentation: Why Water Managers Need Process Tools Defining Concepts and Terms
11:30–11:45	Group Exercise: Values Line Up
11:45–12:30	Presentation: Values the Heart of Process Tools
12:30–2:00	Lunch (Suggest a Speaker from Middle East Water Negotiations)
2:00–2:45	Presentation: Participation Tools
2:45–3:30	Group Exercise: Basic Communication Skills Active Listening (Exercise) Congruent Sending (Communicating your Concerns)
3:30–4:00	Break
4:00–5:30	Presentation and Group Exercise: Working Effectively in Teams (Exercise: How Disputes Escalate)
5:30–5:45	Debrief the Day

DAY 2

8:30–8:45	Review the Day
8:45–9:15	Group Exercise: Negotiation Simulation (Business Eggs)
9:15–9:45	Presentation and Debrief of Exercise: Causes of Conflicts
9:45–10:30	Presentation: A Continuum of Conflict Management Tools
10:30–11:00	Break
11:00–11:30	Presentation: Negotiations
11:30–12:30	Group Exercise: Negotiations (Office Furniture)
12:30–2:00	Lunch (Free)
2:00–2:30	Presentation: Facilitation
2:30–3:30	Group Exercise: Facilitation (Fantasmia: A World Bank Participatory Assessment or North Caucasus Power)
3:30–4:00	Break
4:00–4:30	Presentation: Mediation and Arbitration
4:30–5:00	Group Exercise: Mediation and Arbitration (International Fisheries)
5:00–5:15	Debrief Day

DAY 3

8:30–8:45	Review of the Day
8:45–9:15	Presentation: Identification and Assessment of Stakeholders
9:15–10:30	Group Exercise: Identification and Assessment of Stakeholders (Jerome River)
10:30–11:00	Break
11:00–11:30	Presentation: Designing Workshops
11:30–12:30	Group Exercise: Designing Workshops (World Water Meeting)

12:30–2:00	Lunch (Suggest Speaker from South Asia Indus)
2:00–2:30	Presentation: Ends of Water Negotiations Basin Organizations and Action Frameworks: Incentives for Cooperation
2:30–3:30	Group Exercise: Designing River Basin Organizations and Action Frameworks
3:30–4:00	Break
4:00–4:30	Presentation and Discussion: Computer Based and Software Uses for Process Tools
4:30–5:15	Practicum: Q & A and Consultations on Specific Needs with the Instructors

1. OVERVIEW: WHY WATER MANAGERS NEED PROCESS TOOLS

1.1. Introduction: Why Use Stakeholder Participation, Consensus Building, and/or Dispute Management in Water Management?¹

Professionals in many countries have moved from public involvement that meant informing and educating the public to involvement that means receiving information from, and being educated by, the public. Today, the major concern is, how can interested parties agree? In short, we have moved from the idea of educating stakeholders and publics, to also being educated by them, to now mutually deciding with the publics and stakeholders.

Generally, the following six goals for participation, conflict management, and consensus building are the most common. While all are rarely achieved, mixes of these goals may be attained.

- To build credibility with those who will be affected, those who will pay, and those who will use the project. While the point does not need to be elaborated, many recognize that a credibility gap has existed between the policy makers and significant segments of the public.
- To identify public concerns and values. There are many techniques that do this in a form that is relatively open and straightforward.
- To develop consensus among the affected parties, users, and those who pay. In difficult controversies, consensus is rarely achieved, but it is satisfying when it is.
- To create the greatest number of "unsurprised apathetics." In many cases, not everybody needs or wants to be involved in every issue all of the time. Most people are partially involved, but these people should not be surprised. They should be kept informed, in other words, "unsurprised."
- To produce better decisions. Public involvement can often produce better "technical decisions" than a strictly technically oriented decision process.
- To enhance democratic practice.

Stakeholder participation, consensus building, conflict management, and dispute resolution mean many things to many people. Whether or not they are good often seems to be "in the eyes of the beholder." There are numerous arguments for stakeholder participation, consensus building, conflict management, and dispute resolution in water resources management. Here are eight of the more important areas of argument.

1. To help meet the ethical dimensions of water management.
2. To meet legal or formal policy requirements.
3. To link water management with the civic culture.
4. To help manage the tension between the technical and political.
5. To help reconcile the discontinuities between geographic and jurisdictional boundaries.
6. To find and build common ground and move from extremes.
7. To improve consensus building and conflict management.
8. To reach sustainable or durable agreements.

1.1.1. Ethical Dimensions of Water Management

Since there is no life without water, those to whom it is denied are denied life. Water for all and meeting minimum human needs are vitally tied to the principle of human dignity, shared by all contemporary religious faiths.

We can see profound ethical implications in all aspects of traditional water uses: flood control and management, drought contingency planning and management, irrigation, hydroelectric power and agriculture, water supply and sanitation, navigation, ecological maintenance and health, public health and disease control, and many others. Ethical considerations of these uses concern the distribution of benefits and costs of the services, who gets how much of the water and who pays, the distribution of risks, and who is vulnerable and to what degree. Today, this includes provision for nature and ecology as well as people.

Ethical implications are also clear in all aspects of water management decision making such as planning, regulating, operating, financing and investing, and designing and implementing. They concern:

- Who participates, and what are the decisions they participate in?
- Do they have input to the formulation of options, or only an opportunity to react to options already formulated?
- How and what type of opportunity costs are considered?
- The valuing, implicit or explicit, in trade-off decisions.
- The level and type of information open to the public.
- Disclosure and characterization of impacts.
- The way professionals interact with non-professionals and the use, as well as misuse, of technical and professional information.

In the face of such ethical responsibilities it is difficult to justify the familiar model: decide and inform the client community, and then justify the decision (that is, decide, announce, and defend). This old model must be – and is being – replaced by another approach in which the participants jointly share information, diagnose the problem, reach an agreement about a solution, and implement it. The “decide–inform–justify” approach usually builds on a paternalistic (albeit often nobly motivated) professional ethic. The professionals formulate alternatives or determine options. Then, for the good of society, they inform the public and thereby justify those decisions.

While often attached to the traditional engineer’s mentality, this old model is finding new life among many contemporary environmental regulators! However, the ethical basis of such professionalism is changing. For example, few of us go to the doctor and say, “heal me.” Instead, we participate in the diagnosis as well as in the healing process itself. This also happens when we turn to traditional, technical, and governmental agencies. We must find new ways to jointly diagnose problems, to decide on plans of actions, and to implement them. This notion of professionalism is driven by a new ethic of “informed consent” as opposed to paternalism.

It is not that engineers, scientists and technical professionals have become irrelevant. We need them more than ever. However, for their expertise to be put in service, new relationships must be built with those whom they serve. This new model of “informed consent” demands broader understanding by all stakeholders of the special ethical demands faced by decision makers.

Today we are coming to understand that there is not one but many possible ecological futures, that we must actually design and choose our future. This is the challenge of environmental design: the co-creation of our ecology. We already see this practically in new programs that actually engage in proactive ecological design such as environmental restoration and wetland construction. Some call this the adoption of a Promethean environmental archetype and the rejection of an Arcadian archetype to fuel our search for sustainability.

Ecology and water disputes must overcome the syndrome of advocacy science if we are to preserve the legitimacy of the scientific enterprise, which is so necessary for water management. We must ask: what are the ethics of using science to persuade

publics, especially under conditions where there is fundamental disagreement among scientists and where even the models and data themselves are weak?

Participatory processes force all of us to confront these questions.

1.1.2. To Meet Legal and Formal Requirements

Often managers use process tools, "because the law mandates public involvement." But what is behind the laws? To begin with, we are now in a new era of environmental concern. Values throughout industrial societies and elsewhere have been shifting. There is increasing concern for environmental quality and public health (Milbraith, 1984).

These concerns have manifested themselves as new demands on the technical decisions made in the water resource field. Environmental values must now be integrated into actual engineering design, not simply be added as afterthoughts for predetermined solutions. This has meant broadening the alternatives considered, from traditional structural measures to non-structural and behavioral measures.

Initially, participation processes were greeted with skepticism within technical agencies and a naive euphoria among environmental interest groups. With more experience, the subtleties of public and stakeholder involvement have become apparent. What happens after everybody has articulated his or her interests? What happens after we have listened to the different and competing views? These questions have been prominent for the last four or five years. Can public involvement created by raising and articulating interests lead to consensus or agreement sufficient for action?

Many in the environmental community have been surprised that participation processes do not always lead to ideal environmental solutions. Many professionals in technical agencies have seen them as producing more legal stalemate by providing access for new interest groups. Many have seen public involvement as a means to stop or stalemate decision processes. As such, public involvement has become another straw on the camel's back, burdening the legal court system. Indeed, in many Western countries, the courts have become the major instrument for resolving environmental disputes.

However, the court system in the United States has become overloaded. Litigation takes a long time and rarely produces solutions that are satisfying to any of the parties involved. Also, solutions are reached in a way that separates rather than brings together those with substantive technical environmental expertise. Even though the court system or adversarial process predominates in the US system, more than 80 percent of those cases that start in the adversarial process are settled out of court. So participation and conflict management have taken on new meaning, that is, to "off-load" the legal system.

Throughout the Western democracies, administrative processes, which some once thought to be purely technical, are more clearly recognized as having political dimensions. Many decisions thought to be purely technical are actually political, that is, they affect the distribution of values throughout society. Most managers in administrative agencies are actually managing the gray area between technical and political. While asked to be technically competent, they must be politically realistic. The process approaches have become a means for managing this gray area between the technical and the political.

1.1.3. Water Management, Civic Culture, and Decision-Making Efficiency

Participatory processes, specifically, and process tools generally, build on a classical notion in democratic theory: that those who are affected by decisions should have a say in them, because in doing so they will become better citizens. And it is often the physical and water infrastructure that citizens see directly affecting their lives.

Building that physical water infrastructure in a collaborative and participatory way is now an important means for building the civic infrastructure and the civil society, or what many call the governance environment. However, this is not new. Fountains of ancient Rome, like standpipes in small villages today or in medieval cities of Europe, have played roles in building civic culture as well as quenching thirst. They were occasions for civic dialog and meeting places central to creating a sense of civic belonging and responsibility. Indeed the fountain was truly a civic work. It was a gathering place of nations, believers, and unbelievers. We should not forget that civil society, civic culture, and civil engineering share common roots. Whether it be irrigation associations, community water and sewage, or even large-scale multipurpose river operations, water management forces us to connect and balance rights to water with responsibilities for managing water. Most democratic theorists see the experience of such balancing as central to development of civic society.

In short, participation forces us to be more than simply “water customers” or “water clients.” Rather, we become “water citizens.” Nevertheless, there is a tension between a technical subculture that looks to rationality and efficiency and sees participation as delay and even sub-optimality, or as producing decisions that cannot be implemented. Figure 1 portrays the underlying democratic faith of participation in the technical water management decisions.

Model I is the traditional model where the agency decides and then tries to sell its plans to the stakeholders (SHs). While it is possible to move from problem to decision quickly, this may not actually be as efficient as it seems. Implementation is likely, in the new environment of water, to take a long time. Decision makers in this model often fall into the trap of spending time and resources selling the decision, resources that could have been more effectively spent on creating options.

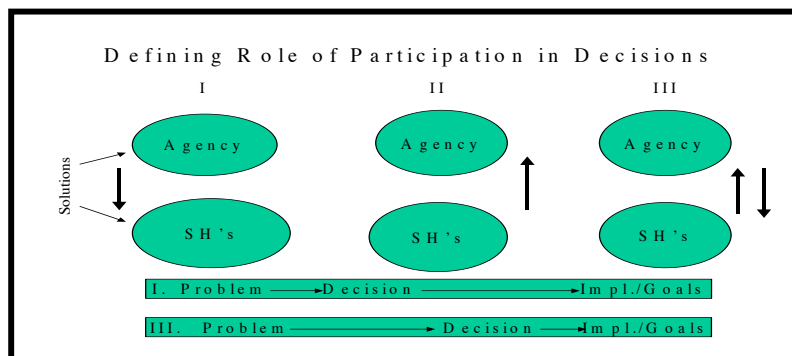


Figure 1. Defining the role of participation in decisions

Model II is equally flawed. The model says that whatever the SHs decide is what we do. This model is not participation. It is unrealistic. It ignores the need for technical support and a reality check. Consensus is critical but consensus alone, without technical competence, cannot manage basin or watershed.

In Model III, there is meaningful and mutual give and take among SHs and decision makers. This signifies the real influence of each on the other, and mutual learning. In this model, moving from problem to decision does take longer and may appear at first to be inefficient. However, once it is taken, implementation is rapid and more solid. Model III represents good participation in water resources management and river basin organizations (RBOs).

Today the use of process tools is doing more than making our democratic institutions perform better. The tools are becoming catalysts for new civic partnerships and even new governance structures that transcend the old.

1.1.4. Tensions Between the Political and Technical

Few issues intertwine the technical and political as does water management. Even a cursory look at history shows that the interaction between the political and the technical is complex.

Traditionally we seek to separate the technical and political. The political is usually seen as legislative voting, and the technical is usually seen as implementing the decisions of executive agencies. In complex water management decisions, this distinction breaks down. Often it is with the implementation or administration of general laws that the distribution of impacts becomes clear. Politics is "who gets what, when, and how." Often the "what" and the "where" only become apparent in implementation. Thus, administrators of technical agencies begin to appear as the bestowers or deniers of political benefits. And this is becoming more and more true as we become more complex.

To manage this gray area, scholars and commentators from Habermas to Robert Reich have been calling for a new paradigm of public dialog that leads to civic discovery. This call reflects the chief goals of participatory processes: to foster deliberation, to encourage social learning, to create new alternatives, and to build or enhance through empowering experiences the civic infrastructure.

Much of the water legislation of the 1970s and 1980s, in the United States and now in many lenders' and donors' policies, has included a litany of impact assessment requirements such as community impact, risk, and environmental assessments. Each is essentially the recognition that traditional decision-making processes somehow do not include significant and appropriate values.

Unfortunately, many have come to see even these assessment techniques in purely technical, rational, analytical, and value-free terms. The truth is that water decisions fall somewhat between the clearly technical and clearly political. Essentially we are seeking the reasonable, not just the rational. While the rational may be a necessity, it is not a sufficient condition.

A far more profound principle or norm for water managers lurks behind all this. We must seek to put that which we do (our technology) into the service of that which we believe (participatory democracy). Once again, water management is leading the way. Participatory processes, at their best, help us manage this gray area and to provide representative participation in technical/administrative decisions.

1.1.5. To Find Common Ground and Move from Extremes

Practically, participation processes and conflict management programs should visibly isolate extremes. This sounds manipulative and somehow distasteful. Let me explain. Programs should create incentives for participants to find and move to a middle ground. Public involvement programs should facilitate a shared ownership of solutions, alternatives, and recommendations such that alternatives may be implemented. This means creating an environment where compromise is acceptable. As we have learned, public awareness rapidly becomes more than public information. Public information and public relations are critical skills to be used but they are not sufficient in and of themselves.

While practical people understand that not all conflict will be solved short of court, war, or other adversarial methods, public involvement programs seek to solve as much conflict as possible without going the expensive route of litigation. Public involvement and conflict management programs attempt to create an environment where the alternative viewpoints are synergized into creative solutions that have not been previously conceived, rather than canceling out one another.

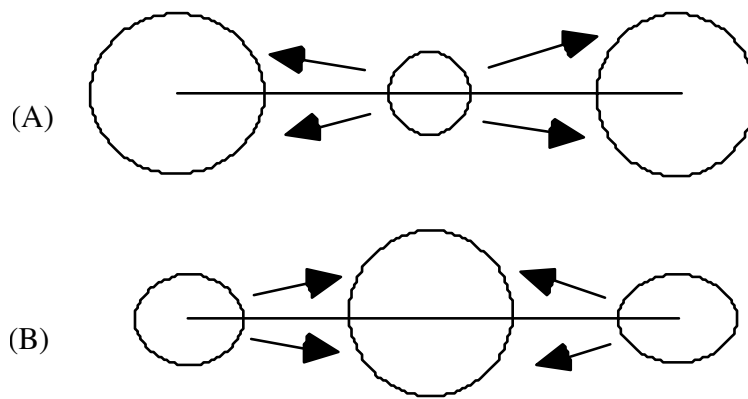


Figure 2. Visibly isolating extremes

Figure 2 graphically outlines this concept. In a traditional adversarial model, as shown in Figure 2(A), the only way to play is to be “for” or “against.” The pressures are to move to the extremes and out of the middle ground. Those in the middle will either drop out or gravitate to the extremes. We hire our lawyers to characterize and to do battle for us. There is little reward to be found in the center.

Successful resolution begins with finding shared middle ground and creating alternatives, as represented in Figure 2(B). To a great degree, excessive reliance on the adversarial paradigm excludes building the shared ground. Although useful and necessary, the adversarial model is not always effective. In planning water resources development, once we assume that we will resort to the adversarial model or to the courts, all of our planning documentation subtly transforms our professional problem analysis into building a “case” under the legal “rules-of-evidence.” In short, the means – litigation – has become the end. It has become the pervasive normative guide for data collection across disciplines. Polarization is thus assured. The system, whose conflict resolution ability we strongly believe in, begins to generate more intractable conflict than it solves.

So what do we do? First of all, extremes exist; we all know it and we should recognize them. Ignoring extremes does little good. Figure 2 aims to show that we should visibly isolate such extremes. That is, we should recognize and publicize them, so that those who participate at the extremes do so publicly. That is, the cost for participation at the extremes is to be identified with extreme positions. Providing “reasonable” alternatives to what appear to be “irrational” extremes makes it hard for extreme positions to maintain broadly based constituencies.

Many who are at the extremes are committed and have valid and important reasons for their stance. One of the more important reasons is that by so locating themselves, they help move society’s consciousness toward what they view as important and truthful values. For a public agency, however, the objective is usually to find sufficient ground on which to build enough will to act. This means ensuring that broadly based constituencies have alternatives. If there are broadly based constituencies supporting extreme positions, then, indeed, solutions will move in their direction. However, we have frequently found that reliance on adversarial models allows the claim for broadly based constituencies by extreme positions without clear and visible proof of such constituency support.

To many, this model appears counter-intuitive. After all, it requires a certain faith in the ultimate reasonableness of humans. However, such faith and reasonableness is, to a great degree, what our democratic systems are about. Indeed, much of our public involvement, conflict management activities, and administrative processes are about helping our democratic systems to adapt to changing conditions. This adaptation itself

is built on such faith in reasonableness. Many of the decisions that we seek in the environmental area are, in fact, a search for the “reasonable” as opposed to some view of the “rational” decision.

1.1.6. Consensus Building and Conflict Management

Figure 3 outlines a two party dispute. We frequently think of negotiating as moving along the line between point A, where wins, to point B where B wins or gives in. Consequently our image is that good negotiations should bring us to point B where we gain and lose equally.

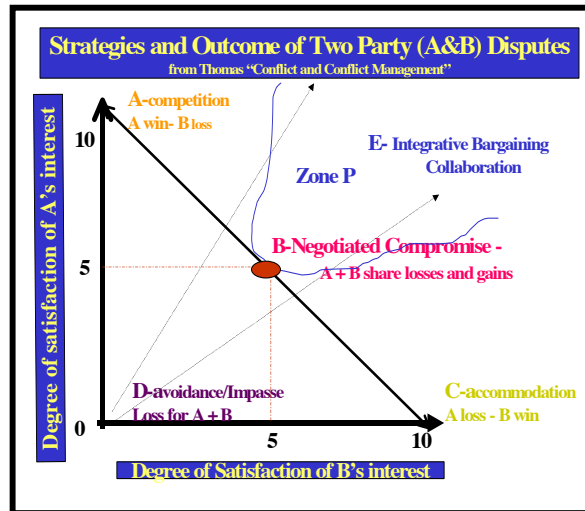


Figure 3. Strategies and outcome of two-party (A and B) disputes

However, this win-lose view rests on an assumption that water is a zero sum game. Indeed, if we think this way, we will create just that. The reality is different. There are many opportunities to move beyond the A-B line out to point E and zone P, an area negotiators call “integrative bargaining.” That is, we can create options that expand the pie, often options that no one party thought of before they began. This is similar to the established notion of multi-objective water planning and operations.

However, the question is “how do we get into zone P?” More often than not we get there with the help of processes such as mediation or participation.

Herein lies one of the great values of participation: helping us move into this zone of integrative bargaining.

Doing so is not magic, and it is not idealistic. It depends on negotiating on interests, discovering shared interests, and building on them. Interests are not the usual positions we hear in negotiations. For example, the statements of “no more wetland fill,” or “not one drop more of water for them,” or “no more living on the flood plain” are positions. Interests are revealed when we ask why these statements are being made. For example, no more loss might be driven by the interest in maintaining a functioning ecosystem that stores floodwaters and nourishes a fisheries industry. Suddenly we see interest underlying position. Helping stakeholders to reveal their interests, jointly educate each other on them, and use them to build options is at the heart of participation and consensus building.

Interests are based on values or views of the way the world ought to be. For example, Figure 4 portrays a recent case where water resources planners needed a projection for electrical energy demand in the Pacific Northwest of the United States to the year 2010. Top professionals, using excellent models that were internally flawless, made each of the projections. Not surprisingly, the utility interests projected an increased need while the environmental interests projected a decreased need for electric energy. Projections made by a major university and a consulting firm fell in-

between. Although one cannot predict the absolute number, by simply knowing who made the projection, one can easily project the relative positions of the projections. Essentially these professional and technical projections are elegant statements of how these organizations feel the world "ought to be." That is, they contain political messages and are at root value statements.

Even if rarely acknowledged, it is no surprise that projections are value based and assumption driven. However, to engage in the crucial assumption game requires a working knowledge of modeling and technical proficiency. Consequently, those for whom these projections are made are frequently excluded from the game. Therefore it is little wonder that the people whom the projections serve feel no ownership in the projections and subsequently ignore or reject them.

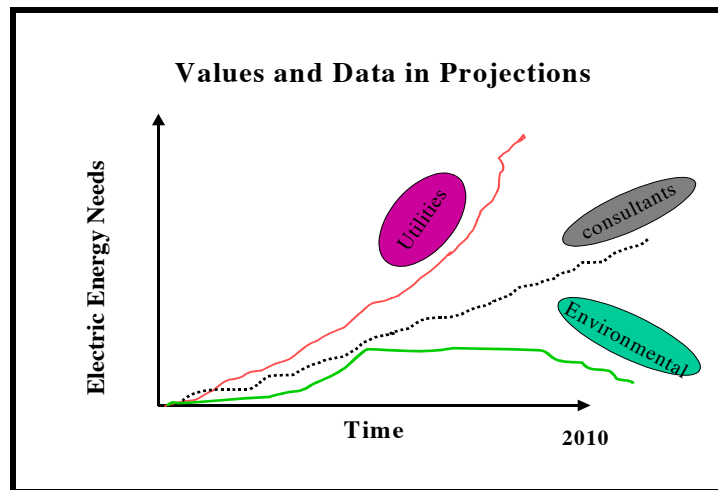


Figure 4. Values and data in projections

In short, the projections are neither purely technical nor political. They are a hybrid. The water resources professional must now be able both to draw the lines that are seen in Figure 4 and to encourage a broadly based value consensus around the assumptions underpinning these lines. The second point must be emphasized. The professional must understand values; alternatives must be designed which service this range of values – all as a precursor to building consensus on action. Engineering design must start with knowledge of values, and design to those values rather than start with engineering options and forcing stakeholder (SH) values to fit. Traditional technical alternatives frequently carry with them sets of values that represent a far more narrow set of values than is necessary to satisfy this requirement. In short, another technical model, which the engineers proposed to use here, is unlikely to solve the problem. Some other process tool, which gets at underlying values and interests, is needed. Participation of SHs is necessary for this.

There is some confusion over participatory processes and conflict management. Many participation successes were achieved during the 1970s and 1980s, but there were also many lingering problems and discontents. Chief among these was the notion: "Public participation got people talking and us listening to their needs, but we do not seem to come to closure and to reach agreement." In response to this sentiment and to the growing litigiousness in US society, the field of alternative dispute resolution (ADR) emerged in the early 1980s. ADR used much of the rhetoric and process skills found and developed in the participation experiences. For example, facilitation, mediation, neutral party assistance, and the early notions of interest-based negotiation, which is parallel to value-based alternatives, started to be used to solve disputes before going to court.

The participation experience was born of multi-party, multi-issue disputes, usually precipitated by new ecological value challenges. ADR began by focusing on mediation and various forms of non-binding arbitration born of the more traditional model of labor-management disputes involving limited numbers of parties and more discernible interests. Practitioners in both of these traditions have come together in a variety of professional forums and societies. The growth of environmental mediation is one major example.

But important differences between participation and ADR exist beyond these convergences. Participation has been driven primarily by values of empowerment, creativity, and open access to government. ADR, while not ignoring such values, has been sold more on the values of efficiency, timeliness, and the cost effectiveness of decision-making processes. These values of empowerment – open system access, efficiency, and timeliness – can and often do conflict. In the end, some people may just not agree among themselves, or with water managers, or other decisions, but we will all have to learn to live together while we disagree. In this sense, participation is far more than conflict resolution. Participation seeks to help us discern public interest and community will, and to articulate preferred futures. I think the political philosopher Ben Barber puts it best when he says, "Participation teaches us the arts of democracy."

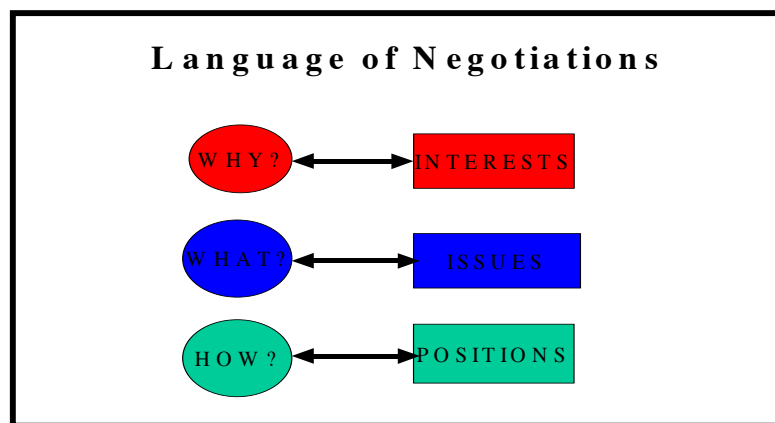


Figure 5. Language of negotiations

The demands for participation in water management and ecological decision making are both indicators and symptoms of problems in water management and democratic institutions. The values held by those whom administrators and executives serve are changing. Older administrative organizations and institutions, which themselves are the embodiment of values from previous times, have often lagged behind their publics. New publics bring new demands. At the same time, the complexity of decisions increasingly raises the question of how to achieve democratic accountability. Our water resources demands do not conform to traditional jurisdictional boundaries. The ethical basis of professionalism is now moving from paternalism to informed consent. Participation is a means to adapt and to make our democratic institutions work better in this context. But participation is also helping to reinvent our civic cultures.

Participation is a means to achieve important psychological transference within our publics: that is, from passive victims of, or reactors to, risk toward active choosers of levels of risk. Figure 5 outlines the new language of negotiations that captures these ideas.

At its best, participation can connect us and perhaps break down stereotypes. It can help us walk in the other person's shoes. It can be a symbolic act of reconciliation

and a vehicle for forgiveness and healing, which are prerequisites for management of ethnic and distributive conflicts.

1.1.7. Discontinuities Between Geography and Jurisdictions

Our water problems are integrated around watersheds and river basins. However, our administrative units to deal with them are fragmented. Participatory processes are essentially tools to help us bridge the discontinuity between geographical and jurisdictional boundaries found in water resources management.

Neither effluent from waste facilities nor polluted groundwater can be contained within traditional jurisdictional entities, nor can the problems they create be solved by members of one jurisdiction; throughout the world, such resources issues will increasingly drive political and international decisions. But these resources are spread across state, local, provincial, federal, and international boundaries. Organizations and institutions built on traditional jurisdictional boundaries seem deadlocked by the NIMBY ("not in my backyard") syndrome.

Ultimately, participation is a bottom-up phenomenon. Participation becomes a driving force for the vertical (state, local, and regional) as well as the horizontal (across agency) negotiations vital to decisions, which rarely fit traditional jurisdictional boundaries.

This is most clear in river basin management. Throughout history, the river basin has played a major role in unifying communities and stimulating trade and the emergence of large political-economic organizational units. Historical examples illustrate that communities were integrated through the management of water and land resources for agriculture, river navigation, and settlement networks based on agrarian productivity and transport modes. River navigation also facilitated the integration of raw materials and manufactured goods from different parts of the basin and among basins, and spawned NGO advocacy groups such as boatsman associations along the Rhine and Danube during the time of the Roman Empire.

Today, internationally, new publics are demanding new institutions and forums for negotiations, which often cross traditional jurisdictional and/or national boundaries. The issues themselves are also spawning new affinity groups or NGOs such as environmental groups, which operate across those boundaries. The influence of such cross-jurisdictional groups could become important in certain regions. At the bottom line, IWRM, the centerpiece of world debate on water policy, cannot be achieved without participatory processes.

1.1.8. To Achieve Sustainable and Durable Agreements and Settlements

To achieve a durable settlement, there are at least three types of interests that generally must be met (Lincoln, 1986). These are:

- *Substantive interests*: that is, content needs, money, time, goods, or resources.
- *Procedural interests*: that is, the needs for specific types of behavior or the "way that something is done."
- *Relationship or psychological interests*: that is, the needs that refer to how one feels, how one is treated, or conditions for ongoing relationships.

These interests can be seen in Figure 6, often called the "satisfaction triangle." The above interests are represented on three sides of the triangle. Ideally, any public involvement and conflict management process would be designed to seek point A. This point, in some sense, represents an optimal satisfaction of the procedural, psychological, and substantive interests of each of the parties. Frequently, technical professionals, in designing conflict management and public involvement processes, implicitly or subconsciously behave as if they are reaching for point B.

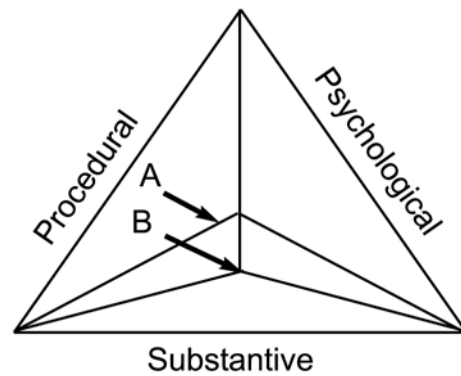


Figure 6. Satisfaction triangle

This point represents a situation that is high on the substantive or content aspects of the situation but relatively low on the psychological and procedural aspects. The point of this triangle is that public involvement and public awareness require an explicit design that seeks to maximize procedural and psychological as well as substantive concerns. This is often uncomfortable and, in fact, often beyond the skill of many water resources professionals.

We know we have achieved procedural satisfaction when the parties to the process say they would use the process again. We will speak in a moment of different process techniques that have been developed over the last ten or twelve years. Substantive satisfaction is familiar to us. It is the water resources context with which we spend our lives. We know when we have achieved it.

How they felt when they . . .

<i>(Won) (1)</i>	<i>(Lost) (2)</i>
Great	Taken advantage of
Victorious	Demoralized
Wonderful	Helpless
Superior	Inferior
Strong	Weak

Figure 7. Defining psychological satisfaction

Psychological satisfaction is a little more difficult to conceive. Figure 7 outlines one way to understand psychological satisfaction. The figure contains two columns: "Won" and "Lost." The words under each column indicate how people may feel when they perceive they have either won or lost in a dispute (Lincoln, 1986). As you read down each column, you can probably think of other words that express your own feelings when you have either won or lost in a dispute. Now, the following questions can be posed. What possibility exists for a durable settlement if one party feels the way that is described by the words in column (1) and the other party feels the way described by the words in column (2)? Can a durable settlement exist when both parties feel as described by the words expressed in column (2)? The answer in both cases is that there is little or no possibility! Parties must come close to feeling as described by the words in column (1) for durable settlements to exist. The point for us, as technical professionals in water resources, is that we must explicitly design processes that will result in such feelings.

1.2. Policy Context of Process Tools and Water Management

Figure 8 outlines the policy world of the water manager. As we can see, the policymakers are not one entity. They include elected and administrative officials of various types. We all know that elected officials can have tremendous disagreements among themselves. This is also true of administrative officials and professional civil servants who frequently represent agencies with different missions. Indeed, scientists themselves often disagree. It doesn't take experience with too many controversies for one to recognize a variant of Newton's Second Law, "For every Ph.D., you can find an opposite and equal Ph.D."

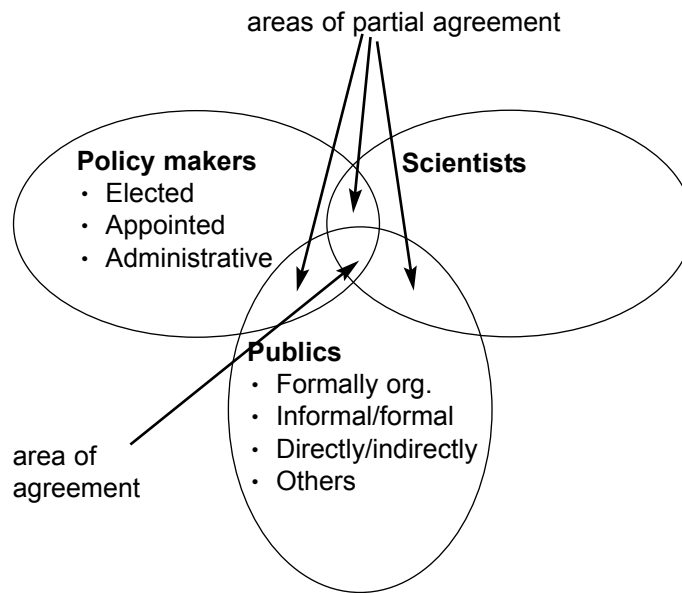


Figure 8. Policy world

There are many ways of looking at the public and stakeholders. Indeed, there is no single public but rather, many publics. For a controversy, we might find publics that are formally or informally organized. We may find publics who are directly affected and those who are indirectly affected. I am sure we can draw clearer distinctions; however, the point is that we are seeking to understand how public awareness helps us reach some agreement among the three elements in Figure 8, no matter how we subdivide them. The overlapping area in the middle of these circles represents this agreement. However, agreement itself should be explored further.

Figure 9 explores the nature of agreement in a simple two-by-two table (Vlachos, 1988). This table outlines agreement or disagreement among these three distinct groups over either the goals or the nature of a problem. Depending on the nature of agreement, different analytical activities on policy processes are called for. As the table demonstrates, Cell 1 is called "objective analysis." Such analysis is appropriate here because agreement on the goals and the nature of the problem exists. Cell 4 indicates disagreement on the goals and disagreement on the nature of the problem. Such a situation requires some type of inspiration or other charisma. While we frequently act as if we are in Cell 1, the normal condition for water resource situations is Cell 4. While frequently not conscious of our behavior, we usually seek to move immediately from Cell 4 into Cell 1; however, this does not work and usually we are frustrated.

Cell 2 represents a disagreement over goals but a general agreement on the nature of the problem. In this cell, we use analysis or other forms of negotiations. In Cell 3, we find disagreement on the nature of the problem and some general

agreement over the goals. In this case we look at joint problem solving, negotiations or other collaborative approaches.

The point is that to get to Cell 1 – that place where most technical people are most comfortable – we must usually move through either Cell 3 or Cell 2. This is true because much of the environmental conflict we encounter is not based primarily on “facts” but values. Resolution depends on dealing with the interest and values or other causes at stake in a controversy. These causes usually are beyond facts.

Actually we usually spend much time moving between Cell 2 and 3, that is, discussing goals, coming to agreement on the goals and then redefining the nature of the problem and then going back to goals. This iterative process is the crux of planning. It is not possible to state how much iteration is necessary between 2 and 3. It is only important to know that we must move through analytical activities implied by Cells 2 and 3 before we move to what is identified as Objective Analysis in Cell 1. In other words, we must understand the sources of conflict and design processes to deal with them, and that is what is implied by moving between Cell 2 and Cell 3.

		Goals	
		Agree	Disagree
Nature of problem	Agree	1. Objective analysis	2. Conjoint analysis Negotiation
	Disagree	3. Problem solving Negotiation	4. Inspirational Charisma

Figure 9. Nature of agreement in policy world

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2. TECHNIQUES

2.1. A Continuum of Conflict Management and Dispute Resolution Tools and How to Choose Them: Overview of Alternative Dispute Resolution (ADR)²

(adapted from James L. Creighton and Jerome Delli Priscoli, *Second Ten Year Reader*, IWR, USACE 2001 and *Overview of alternative Dispute Resolution* ADR-96-5.)

Conflict and disputes are a fact of life for water professionals.³ The question is how you manage them. You can avoid a dispute, but that has a way of coming back to haunt you. You can engage in confrontation, but sometimes that leads to bitter battles that are not only costly but may damage important working relationships. You can get a decision from a higher authority, whether a boss or a judge, but there are always costs and risks associated with that as well.

The best solution is an agreement among the parties to the dispute. But how can you get such an agreement? That is what conflict management, dispute resolution, and consensus building are all about: they are tools to reach mutual agreements. These tools can be used to get agreements within your own organization, reducing the amount of energy lost to unproductive conflict or personal animosity. They are also helpful in getting agreements among agencies, getting a commitment to a common goal, reducing the costs and delays associated with litigation, avoiding violence, and even building cooperative relationships.

2.1.1. What is a Dispute?

Different people have different goals and interests. That is so obvious it is almost a cliché. But it is also why we have conflict. Most of the time, we simply pursue our different interests, but occasionally, as people pursue those goals and interests, they clash. When they reach a point of incompatibility or non-reconciliation, we describe it as a dispute or conflict. There is always the potential for conflict, but it takes something more to create the spark that brings about a dispute.

Sometimes that spark is provided by competition or by change. The situation itself may force a clash. Some typical situations that can lead to disputes include:

- interdependence of people and tasks
- jurisdictional ambiguities
- functional overlap (turf)
- competition for scarce resources
- differences in organizational status and influence
- incompatible objectives and/or methods
- differences in behavioral style
- differences in information
- distortions in communication
- unmet expectations
- unmet needs or interests
- unequal power or authority
- misperceptions
- historical animosities
- ethnic stereotyping.

Disputes always involve at least two parties, each of whom is trying to do a good job of meeting his or her own objectives. By the nature of the situation or circumstances,

they come to see each other as obstacles to meeting their objectives. Now we have a dispute.

Unless there is some sort of intervention, this dispute may grow to the point that the parties come to see each other as adversaries, even as "the enemy." Communication becomes distorted. People view each other as stereotypes, not as human beings. Each new escalation in aggressive behavior is justified as a counter-response to the other person's perceived aggression. When this kind of polarization occurs, most of us assume that we are now in a struggle to "win," even if it means that the other person will lose. We have a "win-lose" battle. Or, it is sometimes called a "zero-sum game," meaning that everything you gain – dollars, status, power, authority – must be at someone else's expense (or vice versa).

When this kind of dispute occurs, it is usually dysfunctional, whether within or between organizations or among nations and across water sectors. It can prevent people from working together even when they share common goals. It can cause such anger and stress that the relationship is destroyed, even though it has been and could continue to be of benefit to the parties. Disputes chew up time and resources needed for more productive projects.

While conflict is inevitable, it does not have to end in polarized disputes. In fact, if handled well, conflict can even be healthy. Among the positive things conflicts can bring about are:

1. Conflicts identify problems that need to be solved.
2. Conflicts bring about change, permitting adjustments to be made without threatening the stability of the relationship.
3. Conflicts can change the way we think about things, preventing "group-think."
4. Conflicts help to clarify our purpose: what is important to the organization or us.

The difference is how the conflict is managed. This is a key concept. One of the key jobs of a manager is to manage conflict so that it does not become dysfunctional. Just turning it over to the attorneys or generals is not a solution. Dispute resolution *is* management.

2.1.2. What is Dispute Resolution and Conflict Management? What is Alternative Dispute Resolution (ADR)?

ADR is an alternative to adversarial processes such as litigation or administrative processes that result in "win-lose" outcomes. It involves structuring the process to minimize the destructive elements and promote productive uses of conflict. It involves the application of theories, procedures, and skills designed to achieve an agreement that is satisfying and acceptable to all parties.

Conflict management attempts to achieve a "win-win" solution through what is called interest-based bargaining, as distinct from positional bargaining, the form of bargaining with which most people are familiar. Here is a comparison of these two approaches: (note also 3.2.2.).

Interest-Based Bargaining

Interest-based bargaining involves parties in a collaborative effort to jointly meet each other's needs and satisfy mutual interests.⁴ Rather than moving from positions to counter-positions to a compromise settlement, negotiators pursue a joint problem-solving approach, identifying interests prior to examining specific solutions. After the interests are identified, the negotiators jointly search for a variety of alternatives that might satisfy all interests, rather than arguing for any single position. The parties select a solution from among these mutually generated options. In this approach, the emphasis is on cooperation, meeting mutual needs, and the efforts of the parties to

expand the bargaining options so that a wiser decision, with more benefits to all, can be achieved.

Positional Bargaining

Positional bargaining is a negotiation strategy in which a series of positions (alternative solutions that meet particular interests or needs) are presented to other parties in an effort to reach agreement. The first or opening position represents the maximum gains hoped for or expected in the negotiations. Each subsequent position demands less of an opponent and results in fewer benefits for the person advocating it. Agreement is reached when the negotiators' positions converge and they reach an acceptable settlement range.

The difference between interest-based bargaining and positional bargaining is not just procedural. Rather, they reflect fundamentally different attitudes about how to handle disputes, as shown in Figure 10 below:⁵

<i>Attitudes of interest-based bargainers</i>	<i>Attitudes of positional bargainers</i>
Resources are not limited. All negotiators' interests must be addressed for agreement to be reached. Focus on interests not positions. Parties look for objective or fair standards that all can agree to. Negotiators believe there are multiple satisfactory solutions. Negotiators are cooperative problem solvers rather than opponents. People and issues are separate; respect people, bearing hard on interests. Search for win-win solutions.	Resources are limited. The other negotiator is an opponent; be hard on him/her. A win for one means a loss for the other. The goal is to win as much as possible. Concessions are a sign of weakness. There is a right solution – mine. Be on the offensive at all times.

Figure 10. Different attitudes to disputes

But why should water managers worry about reaching mutually acceptable agreements? The reason is that people act differently when they have participated in a decision and feel they have control over the outcome. For example:

- When people feel that their participation can make a difference in the outcome of a decision-making process, they are more likely to participate seriously and cooperatively.
- When people feel they have some control over the process that generates solutions, they are more likely to be willing to consider and evaluate the alternatives in a serious and responsible manner.
- When people believe that their participation has been genuine, that the process for reaching a decision has been fair, and that all sides had a chance to influence the outcome, they are far more committed to implementing the solutions that have been developed.⁶

- When disputes remain unresolved for prolonged periods of time there is damage to important relationships.

There are internal costs, as well, when disputes remain unresolved. Studies in the United States have shown that 30 percent of first-line supervisors' time and 25 percent of all management time is spent on resolving disputes. More than 85 percent of those leaving jobs do so because of some perceived conflict. Almost 75 percent of job stress is created by disputes.

2.1.3. Benefits of Conflict and Dispute Management: Benefits of Using ADR

Some of the benefits of conflict and dispute management tools ADR include:⁷

- *Voluntary nature of the process:* Parties choose to use procedures because they believe that they hold the potential for better settlements than those obtained through litigation or other procedures involving third-party decision makers. No one is coerced into using these procedures.
- *Expedited procedures:* Because procedures are less formal, the parties are able to negotiate how they will be used. This prevents unnecessary delays and expedites the resolution process.
- *Non-judicial decisions:* Decision making is retained by the parties rather than delegated to a third-party decision maker. This means that the parties have more control over the outcome and there is greater predictability.
- *Control by managers:* Procedures place decisions in the hands of the people who are in the best position to assess the short and long-term goals of their organization and the potential positive or negative impacts of any particular settlement option; this means decisions are made by those who best know the needs of their organizations. Third-party decision making often asks a judge, jury, or arbitrator to make a binding decision regarding an issue about which he or she may not be an expert.
- *Confidential procedure:* Procedures can provide for the same level of confidentiality as is commonly found in settlement conferences. Parties can participate in ADR procedures, explore potential settlement options, and still protect their right to present their best case in court at a later date without fear that data divulged in the procedure will be used against them.
- *Greater flexibility in the terms of settlement:* Procedures provide an opportunity for the key decision makers from each party to craft customized settlements that can better meet their combined interests than would a settlement imposed by a third party. Conflict management enables parties to avoid the trap of deciding who is right or who is wrong, and to focus the key decision makers on the development of workable and acceptable solutions. Procedures also provide greater flexibility in the parameters of the issues under discussion and the scope of possible settlements. Participants can "expand the pie" by developing settlements that address the underlying causes of the dispute, rather than be constrained by a judicial procedure that is limited to making judgments based on narrow points of law.
- *Savings in time:* In many cases where time is money and where delayed settlements are extremely costly, a resolution developed through the use of an ADR procedure may be the best alternative for a timely resolution.
- *Cost savings:* Procedures are generally less expensive than litigation and certainly less than overt violence. The cost of neutrals is typically less than that of attorneys. Limiting the costs of discovery and speeding up the time between filing and settlement can reduce expenses and avoid delay costs. These front-end expenses are often the most costly components of legal costs.

2.1.4. Dispute and Conflict Management Using ADR

There are certain general principles that underlie the use of conflict management and dispute management tools. These include the following elements.⁸

Define the Problem, Rather Than Propose Solutions or Take Positions.

This step is rooted in three observations about human behavior:

- *Everybody starts out with a different definition of the problem.* Because of differences in roles, organizational responsibilities, personal values, different information bases, and so on, people have very different perceptions of what the problem is. An environmental specialist may view a tree alongside the road as a "visual resource." A timber expert might view the same tree as a "renewable resource," while a traffic safety expert sees it as "a fixed hazardous object." All of these perspectives are accurate, but limited by the confines of that individual's role. Whenever you start to address an issue, you must spend time understanding what the problem is as others see it.
- *People will not accept there is a need for a solution until they accept there is a problem.* No one wants to accept an onerous solution until he or she is first convinced there is a compelling problem that needs to be solved. The expert who sees the tree as a visual resource doesn't have a problem (assuming the tree is healthy) until the other two experts propose to cut it down; one because it is dangerous to drivers, and the other because of its economic value. Since the visual expert does not have a problem, he or she is very unlikely to accept the need to cut the tree down. Until people buy into a common definition of a problem, they are not willing to talk about solutions that impact them.
- *The solution first proposed becomes the definition of the problem.* Both the safety expert and the timber expert might propose that the tree be cut down. But in so doing they have not only set off a controversy: they have limited the range of possible solutions. They have defined the problem as "whether or not to cut down the tree." In doing so, they cut out many possible solutions. If, instead, the problem were defined as "how to provide safety to motorists," then the alternatives to cutting down the tree might include safety barriers or a minor relocation of the road. If the problem is "providing sufficient harvestable timber," then there may be solutions that are less visually sensitive than cutting down a tree located right next to the road.

The central theme that emerges from these observations is the need to define the problem properly and get commitment to that problem definition before even beginning to consider solutions. Otherwise, people begin reacting to each other's proposed solutions (positions), and the problem is defined in ways that are not acceptable to all parties and that limit the potential for a mutually acceptable solution.

View the Situation as an Opportunity for Collaboration, Not Competition

Look for "win-win" solutions rather than "win-lose" or "winner-takes-all" outcomes. Since disputes often come up in competitive situations, where there are perceived or actual incompatible goals or scarce resources, it is easy for the emphasis to be placed on competition, rather than on the shared goals and mutually beneficial aspects of the relationship. In fact, competition can easily turn into an adversarial relationship, which at the extreme may involve extremely distorted communication, behavior designed to "get even" with the other side, or even abusive behavior.

By shifting the emphasis to the fact that there are shared goals, it is possible to collaborate, even if some interests are not compatible or are in competition. At their core, all conflict management techniques assume a willingness to collaborate,

although most techniques assume that the willingness to collaborate will grow as people build increased trust and confidence in each other. But to even initiate procedures, the parties must believe that some collaboration is at least possible, and worth the risk of trying.

Negotiate Over Interests, Not Positions

While people's interests must be met for them to be satisfied, this does not mean that the final solution must correspond with their initial position: this is one way in which conflict management and dispute resolution tools differ from traditional negotiation approaches. The traditional form of negotiation – positional bargaining – starts out with both sides taking fixed positions, often accompanied by accusations about how the behavior of one side has done the other side damage. Then the parties make a series of reciprocal concessions until they are able to achieve an agreement. Because they start from positions, and then make concessions from them, the best that can occur in positional bargaining is a compromise. That is, the agreement inevitably does not meet some of the parties' needs, but meets just enough that the agreement is still tolerable.

But people's positions are not necessarily the same as their interests. Interests are the fundamental desires and needs that people are trying to meet through negotiation. They are the reasons behind the positions people take. If a union takes the position that a pay rise must be at least 8 percent, it is doing so on behalf of such interests as the economic well-being of the workers and the need of the union to be perceived as effective on behalf of the workers. There might be other ways to meet those interests, but the union has chosen the position that an 8 percent pay rise is the way to do so.

That's the point: if you concentrate on interests, there are many ways those interests can be met. If you concentrate on positions, then any concession is perceived as a loss. In addition, the position you pick may be unacceptable to the other party, whereas some other way of meeting your interests completely might be entirely acceptable.

In interest-based negotiation the parties go through the following steps:

- Educate each other about fundamental interests.
- Jointly identify options that could be mutually beneficial.
- Agree on criteria about how to determine when an acceptable solution has been identified.
- Jointly create a solution that meets the needs of all parties.

With interest-based negotiation, the possibility exists that all parties may be able to meet all their needs in the situation – something considerably better than a compromise – although these needs may not be met in the ways people expected when they started the process.

Employ Effective Communication Skills

To create the circumstances for collaboration, participants need to employ communication skills that encourage collaboration rather than make others feel defensive or adversarial. In tense situations, most of us resort to accusation, negative characterizations of the positions of others, or even personal attacks, in an effort to get our way. The result, of course, is that people dig in more and defend themselves. Also, many people listen just enough to get their own argument ready.

People who are skilled at conflict management often receive specific training both in listening skills and in communicating feelings and concerns in a way that does not increase defensiveness. Sometimes these skills are brought into the situation by a third party who helps people communicate more effectively. If people cannot listen

effectively, the third party helps them to understand each other's position, and restates accusations in such ways that feelings are communicated without putting the other person down or making the situation more adversarial.

Design the Process to Address the Type and Sources of Conflict

There are very different types of conflict, and it is important to recognize these different types because very different dispute resolution strategies are needed depending on which type of conflict is involved in your situation. Many conflicts involve more than one of these sources of conflict, so it may be necessary to employ several different strategies, or approach the different types of conflict sequentially.

The five basic sources of conflict are:

RELATIONSHIP CONFLICT

This is conflict rooted in poor communication, misperceptions, dueling egos, personality differences, and stereotypes. This kind of conflict produces strong emotions and often must be addressed before people are able to resolve other forms of conflict. Sometimes this kind of conflict is resolved by increased communication or by getting to know each other better. But in polarized situations, increased communication may actually reinforce misperceptions and stereotypes. In such situations, the intervention of a third party is often needed to create an appropriate climate for better communication.

DATA CONFLICT

This conflict results from a lack of important information, contradictory information, or misinformation. It may also involve different views as to which information is important or relevant, different interpretations of the data, or different assessment procedures. In a conflict situation, conflicts over data are sometimes hidden because people may break off communication. They do not even know that they are arguing from a different set of facts. These conflicts are often resolved quickly once communication is re-established and there is an open exchange of perceptions and information. In other situations the information needed may not exist, or the procedures used by the parties to collect or assess information are not compatible. In this situation, resolution may require that the parties agree on a strategy to get the information they need to resolve the issue.

There is a tendency among water professional to define most water conflicts or potential conflicts as data problems. The unspoken assumption is often "if they only had better information they would understand and agree." However, perfect information could result in understanding the conflict perfectly and no resolution.

VALUES CONFLICT

Values conflicts occur when people disagree about what is good or bad, right or wrong, just or unjust. While people can live with quite different values systems, values disputes occur when people attempt to force one set of values on others or lay claims to exclusive values systems that do not allow for divergent beliefs. Resolution of values disputes sometimes occur, at least over time, as people educate each other about the basis for their beliefs. Beliefs about environmental values, for example, have changed considerably over the past two decades, at least in part because of this education process. Values conflicts can also be resolved when people build upon their many shared values, rather than concentrate on their differences. Or values conflicts may be resolved when the situation is structured so it is not necessary to resolve the differences.

STRUCTURAL CONFLICT

Structural conflict means that the situation is set up in such a way that conflict is built in. The "structure" that causes the conflict may be the way that roles and relationships have been defined, unreasonable time constraints, unequal power or authority, unequal control of resources, or geographical or physical constraints. For example, disputes over contracts often occur when organizations define the relationship as a competitive situation in which each side tries to get the best of the deal. If everybody does the best possible job of trying to "protect" their organization they may create a situation where all the organizations suffer, yet individuals continue to be rewarded for their efforts to protect. Structural conflicts can be resolved by redefining roles or responsibilities, realigning rewards and punishments, or adjusting the distribution of power or control over resources.

INTEREST CONFLICT⁹

Interest-based conflicts occur over substantive issues (money, physical resources, time), procedural issues (the way the dispute is to be resolved), or psychological issues (perceptions of trust, fairness, desire for participation, respect). For an interest-based dispute to be resolved, all parties must have a significant number of their interests addressed and/or met by the proposed resolution in each of these three areas. Often it is necessary to address data conflict or relationship conflict before addressing interest conflict. But if there are conflicts over interests, the dispute will not be addressed to people's satisfaction, until their interests have been addressed.

"Satisfaction" Means Meeting a Mix of People's Substantive, Procedural, and Psychological Interests

Being "satisfied" by a proposed solution means that you are comfortable with the combination of substantive, procedural, or psychological needs that has been met. Substantive interests are your content needs: money, time, goods, or resources. Procedural interests have to do with your needs for specific types of behavior or the "way that something is done." Relationship or psychological interests refer to how one feels, how one is treated or conditions for an ongoing relationship. These interests are shown in Figure 11, the "satisfaction triangle."¹⁰

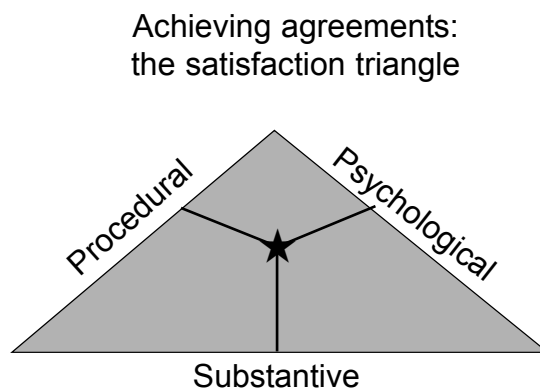


Figure 11. Achieving agreements: the satisfaction triangle

The message of the satisfaction triangle is that the three interests are interdependent. All three must be met – to a greater or lesser degree – for there to be "satisfaction." This is why people sometimes refuse solutions that appear to meet their substantive needs if the solution requires them to lose face, or if they have not been treated fairly. Or people may say that while they do not disagree with an action, they believe that the decision-making process was not good because certain expected procedures were not followed.

Because these three sets of needs are interdependent, there can be “trade-offs” made between them. For example, if someone has been excluded from decision making in the past, he/she may be satisfied at being included in future decision making (a procedural gain), even though that person will just be one of the parties at the table making decisions about the substantive outcome.

The bottom line is that unless people are satisfied that their needs have been met, the problem does not go away. Efforts to impose an outcome that does not meet these needs are usually unproductive or unstable. People just keep raising the dispute in different forms until their needs get addressed. Force or coercion must be used to impose resolution. This often breeds the use of counter-force or behaviors that undermine or subvert trust and cooperation.

If you walk away from a dispute with any person feeling he or she has “lost,” you probably do not have a resolution that will last. Either the relationship will be destroyed, or there will continue to be dysfunctional behavior. Thus the goal of conflict management and dispute management is to find solutions that address all parties’ needs. When all parties walk away satisfied with the outcome, they all have a stake in making the resolution work and last.

Consider a Wide Range of Alternatives

One of the crucial preconditions to finding a “win-win” solution is to jointly develop a wide range of alternatives. Otherwise, the first solutions people propose are likely to be thinly disguised positions. By getting all the parties to identify multiple alternatives, they are less likely to stake out and defend any particular solution.

Agree on Principles or Criteria by Which to Evaluate Alternatives

Once alternatives have been generated, getting agreement on a single solution often degenerates into a contest of wills. The insurance adjuster may offer you \$8,000 to replace your car (destroyed in an accident) and announce, “This is as high as we can go.” But there is no principle or criterion involved here, just a contest of your will versus that of the insurance company. It may or may not be a fair offer. Examples of possible principles or criteria include: the average price of cars of the same age and with the same equipment advertised in the newspaper, or the average of three estimates from used car dealers, or a retail secondhand car price guide. Each of these gives an objective basis against which both parties can evaluate the alternatives and decide whether a proposed agreement is “fair.” If both accept the same principle or criterion as fair, then both can see that the answer resulting from that principle is also fair.

Document the Agreement, to Reduce the Risk of Subsequent Misunderstanding

Verbal agreements run the risk of misinterpretation and there can be honest differences in how an agreement is remembered. However, the documentation should be tailored to the complexity of the situation. If you are resolving a contract dispute, the resolution and its justification need to be documented as carefully. If you are in a less formal situation, documentation might consist of recording all the key points on a flipchart, getting the flipchart sheets typed up, and distributing it for everybody’s review. If there’s a good level of trust between the parties, one person might agree to write up a summary of the agreement and distribute it for review. But when there is still mistrust, it is better to get agreement on the language while everyone is present. Otherwise, there is a danger that a legitimate misunderstanding may be interpreted as an effort to manipulate the process.

Agree on the Process by Which Agreements Can Be Revised

In some cases the resolution is a single, one-off action (for example, a payment is made to settle a contractual dispute over costs). However, conflict management is also used to create agreements that may guide actions for a period of years. If an agreement governs an ongoing relationship, it is important that one party does not unilaterally void an agreement, because when this occurs there are now two problems: the original problem, plus the mistrust and suspicion created when the agreement is broken.

Yet conditions may change in ways that require organizations to seek adjustments in agreements. Rather than create a situation where people feel the only way out of an agreement is to break it, it is better to include a mechanism for modifying the agreement within the agreement itself. This way, changes in the agreement do not threaten the ongoing relationship. Also, putting mechanisms for change in an agreement often makes it easier to reach the agreement in the first place. Parties who might be afraid of an agreement that locks them in permanently may accept an agreement that includes provisions for modification.

2.1.5. A Continuum of Conflict and Dispute Management Techniques: ADR Techniques

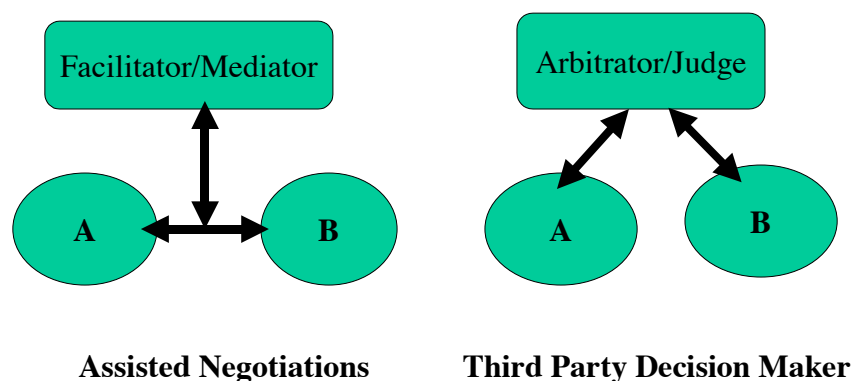


Figure 12. Contrast between types of interventions

Conflict management and dispute management (as well as other terms such as ADR) are umbrella terms that encompass a wide spectrum of techniques. The techniques vary amongst themselves based on the degree of structure/formality, the kind of involvement of interveners (such as facilitators or mediators), and the degree of direct involvement of the parties.

Figure 13 shows the range of dispute resolution techniques on a continuum from the "hot tub" to war. The point of the continuum is to display a number of possible techniques. From left to right the continuum covers unassisted to assisted to third-party techniques. Point C on the continuum is the point at which parties to a dispute turn over authority for making a decision to an outside party, like a judge or other such authority. The assisted techniques to the left of C use an outside party to help the parties themselves craft agreements through joint diagnosis, joint creation of options and joint implementation. Experience shows that often the reason parties move to the left of point C is that they feel little satisfaction or real fulfillment of needs in using techniques to the right of C (often even when called "winners" by the courts). It is often clear that parties can have control over outcomes but the price they must pay is to work with other interested stakeholders. Frequently this requires the help of outside parties. Figure 12 captures this crucial distinction. In assisted

negotiations the outside party works to establish a communication pattern or relationship where the parties are working with each other. In the third-party negotiations, the parties talk to the outside party but they may not talk with each other.

Looking at Figure 13, disputes may be resolved directly between the parties, without any outside assistance, through informed discussions or negotiation. These are the “unassisted procedures” on the continuum.

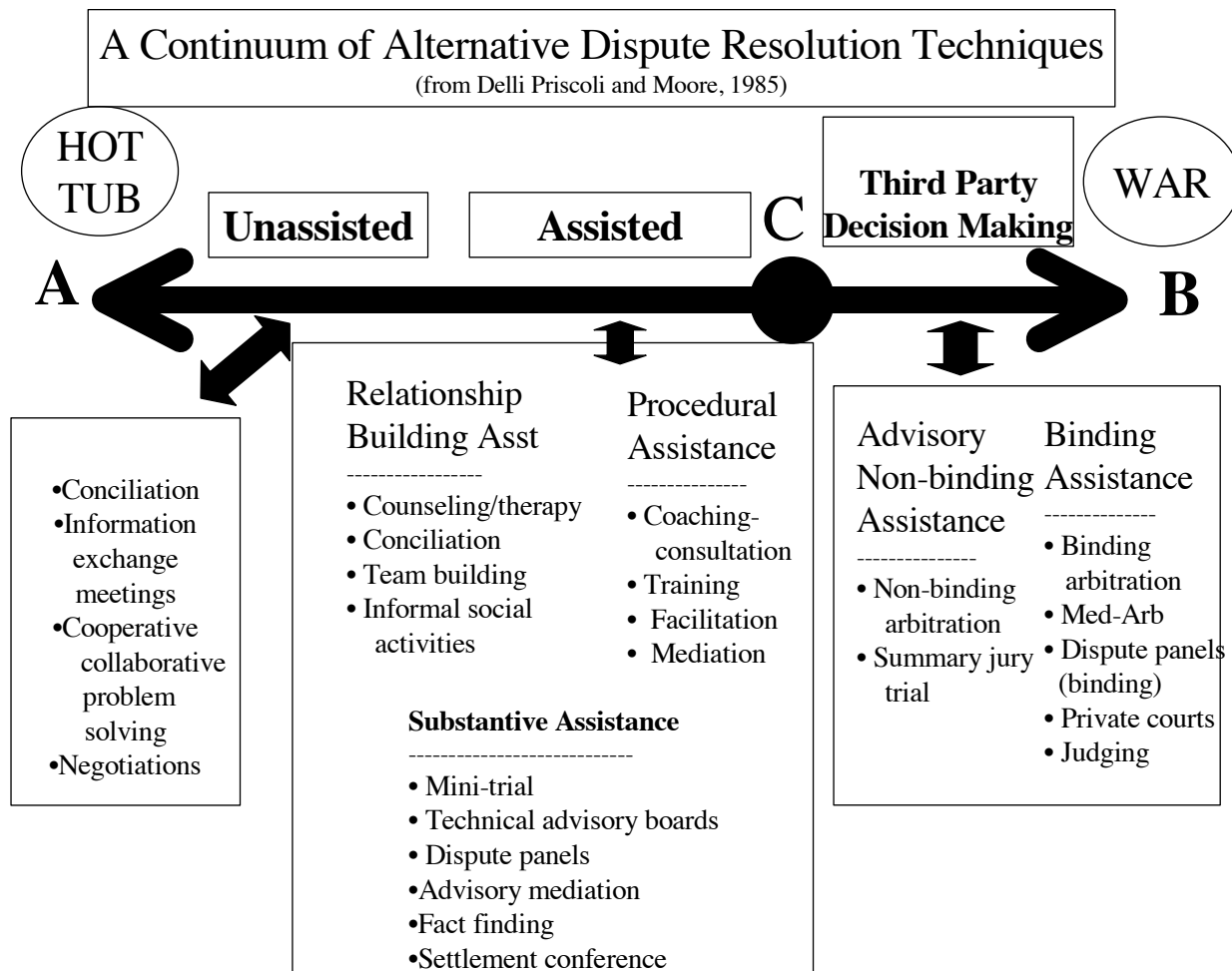


Figure 13. Dispute resolution techniques

When unassisted approaches no longer prove effective, then a third party may be called in to assist the parties in reaching agreement, that is, “third-party assisted” techniques. Some of these techniques involve assistance with the “process” – helping people communicate better, setting up a structure the parties perceive as fair, and suggesting procedures that might lead to resolution. Other techniques involve assistance in determining what would be an equitable settlement. All “third-party assisted” techniques leave the decision-making authority in the hands of the parties. Settlement is reached by mutual agreement. When settlement cannot be reached in this manner, then resolution can only occur through “third-party decision making,” for instance, in an administrative hearing or courtroom. Finally, some ADR techniques are designed to be “preventative,” by improving communication and providing mechanisms for discussing disagreements before they turn into full-blown disputes.

Except for binding arbitration, all the ADR processes utilize interest-based bargaining. This approach encourages parties to look for mutual gain whenever possible, and follows principles and procedures designed to achieve mutual agreements.

A more detailed discussion of individual ADR techniques is provided below.

Unassisted Procedures

In the vast majority of disputes, people work out a resolution without assistance. At the simplest level, two people get together, discuss the issue, and work out the problem.

But that does not always work. In fact, sometimes such discussions end up with both people polarized and convinced that the other person is unfair and unreasonable. At this point, something more structured may be needed. The two techniques used more frequently by water managers are "information exchange meetings" and "interest-based negotiation."

Information Exchange Meetings

Information exchange meetings are meetings in which parties share data and check out perceptions of each other's issues, interests, positions, and motivations in an effort to minimize unnecessary conflicts over the facts of the case. Typically these meetings are set up with the understanding that no formal effort will be made to reach an agreement during the meeting. This takes the pressure off people so they feel more open and comfortable. Information exchange meetings are often the first step toward productive problem solving or negotiations.

Interest-Based Negotiation

Although the principles of interest-based negotiation underlie all ADR techniques, interest-based negotiation is also a set of procedures that can be followed by parties to reach a mutual agreement. Although the procedures may be different from traditional positional bargaining, this is still a formal negotiation process between participants who have the authority to make commitments on behalf of their organizations.

Third-Party Assistance

Most conflict management techniques involve the assistance of a neutral third party, usually someone who is skilled in encouraging resolution of disputes. The third party might not be a technical expert in the subject matter of the dispute, but someone skilled in creating a process that contributes to resolution. Instead of influencing what the resolution will be, the third party concentrates on structuring how the parties work together, knowing that how people work together can significantly affect whether or not they reach an agreement. Other processes use third parties as technical experts, calling on them to provide neutral counsel to all parties on substantive issues. In other words, techniques range from those that provide process assistance to those that provide counsel on what constitutes an equitable substantive outcome. The major third-party assistance techniques are shown below, beginning with those that concentrate on process, then moving to those with increasing involvement of the third party in the substance of the decision.

Facilitation

Facilitation involves assistance in the design and conduct of problem-solving meetings by an individual who is impartial towards the issues or topics under discussion. A facilitated meeting has the feel and structure of a business meeting, working on an agenda that has been jointly created by the parties. A facilitator will make sure that all parties feel listened to, ensure that the meeting stays on track, and may suggest procedures that are helpful in arriving at a solution. Typically the facilitator is granted

considerable influence over how the meeting is run, but is not permitted to influence the substance of the decisions reached.

Mediation

Mediation can be described as an interest-based negotiation under the guidance of a third party. The parties choose an intervener to “guide” them in designing a process and reaching agreement on a mutually acceptable solution. Although the mediator makes recommendations about the process, the parties themselves make the important decisions about the problem-solving process and the outcome. The presence of the mediator creates a “safe” environment for the parties to share information, address underlying problems, and vent emotions. A successful mediation can give the parties the confidence in themselves, each other, and consensual processes, to negotiate without a third party in the future.

Fact-Finding

Fact-finding can be used in scientific, technical, or business disputes in which knowledge is highly specialized. A third-party expert in the relevant field is chosen by the parties to act as a fact-finder or independent investigator. The expert then submits a report or presents the findings at a mini-trial, arbitration proceeding, or whatever process has been designated. The emphasis is on determining the facts or legal issues pertinent to the dispute and is most often used in the early stages of a conflict. Fact-finding can, however, be implemented in a process whenever facts or points of law cannot be agreed upon. After the report or testimony, parties may negotiate, use further proceedings, or conduct more research.

Mini-Trial

The mini-trial is not really a trial. In fact, the mini-trial is a structured form of negotiated settlement. But a key element of the mini-trial, which is called the “mini-trial conference,” looks much like an abbreviated trial. Attorneys or other representatives for the two parties each have a specified period of time, ranging from a few hours to a day, to present their “case” in front of representatives of senior management CEOs or key decision makers from the parties to the dispute. Once the cases are presented, however, the management representatives, instead of trying to reach a judicial decision, negotiate a mutual agreement. The management representatives are assisted in their negotiating efforts by a “neutral advisor.” The parties’ representatives determine the exact role of the neutral advisor. The neutral advisor might simply act like a facilitator or might be a technical expert who can provide objective analysis of the technical or legal merits of the cases presented.

Disputes Review Board

This technique is particularly suitable for resolution of disputes in large construction projects. One of the barriers to resolving disputes is that the parties lose their objectivity about the merits of their position. The idea of a disputes review board is to provide the parties with an objective evaluation of the dispute by fully qualified technical experts. A disputes review board is established at the beginning of the contract. The parties and the contractor both appoint a qualified technical expert to sit on the board, and these two technical experts in turn select a third member of the board, acceptable to both parties. As disputes arise, they are presented to the board. The opinion of the board is advisory, with the parties negotiating a final resolution. Normally opinions of the disputes review board are extremely influential and helpful in resolving the dispute in a timely manner. There is some evidence that the mere forming of such boards or panels actually has the effect of encouraging more dialogs among partners and of reducing the likelihood that parties will actually conflict.

Non-Binding Arbitration

Here the parties present their sides of the dispute to a neutral arbitrator who recommends a basis for settlement. The parties are then free to accept or reject that recommendation. The arbitrator is often an attorney, a judge, or a technical expert in the subject matter of the dispute, selected by agreement of the parties because he/she is believed to be impartial, objective, or knowledgeable. Arbitration hearings differ in their degree of formality. Some are relatively informal, permitting interaction between the parties. Other hearings are quasi-judicial, with opportunities for cross-examination and closing statements. The arbitrator may also conduct additional research to validate the claims made.

In non-binding arbitration the arbitrator issues an opinion on the merits and appropriate forms of resolution, but this opinion is advisory. It is still up to the parties to negotiate an agreement. However, because the arbitrator is both neutral and qualified to review the technical merits of the case, the arbitrator's opinion is often extremely influential and can push the parties closer to an agreement.

Third-Party Decision Making

Conflict management techniques are primarily an alternative to third-party decision making. Of the three third-party decision-making processes shown in Figure 13 – binding arbitration, administrative hearings, and litigation – binding arbitration is the closest to the collaborative processes described above. By pre-agreement of all parties, the arbitrator renders a binding decision.

Dispute Prevention

Disputes are a bit like a grass fire: relatively easy to take care of while they are still small, very hard to put out when they have grown. As a result, the best approach is often prevention, rather than trying to achieve resolution once there is a full-blown dispute. Typically, dispute prevention involves improving communication, building stronger personal relationships with people with whom disputes could occur, and establishing procedures for addressing issues before they become disputes. Partnering in various forms has become a frequently used dispute prevention technique, especially in the construction industry.

Partnering

Partnering is a dispute prevention technique that has been used primarily during contract performance and often among agencies. Its primary goal is to change the traditional adversarial relationship to a more cooperative, team-based approach. The contract is awarded on the usual competitive basis, but after the contract is awarded the contractor is invited to participate in partnering. Once an agreement is reached, representatives of all the key parties to the contract go through a joint process to help define common goals, improve communication, and foster a problem-solving attitude among the people who must work together on the contract. Participants come to understand and appreciate the roles and responsibilities each will have in carrying out the project. Often the teams identify cost or quality goals and work together to achieve them, sharing in the benefits when they are accomplished. There may also be agreement on conflict management processes to be used when first-level managers cannot resolve issues.

Partnering usually involves a series of meetings, beginning with a session that lasts several days to a week, with regular quarterly "tune-up" meetings among the parties. It also normally involves the use of a facilitator or facilitator team.

A further comparison of the different processes and their potential applications is provided below.

Arbitration	Disputes review board (DRB)
<p><i>Definition</i> Third-party neutral or panel with expertise makes decision after hearing arguments and reviewing evidence.</p> <p><i>Characteristics</i> Can be binding or non-binding. Highly structured, but less formal than adjudication. Counsel for each party presents proofs and arguments. Parties select third parties and set rules. Parties can select norms to apply, that is, a particular body of law or regulation. For a small number of parties.</p> <p><i>Application</i> When prompt decision needed, can be used at various stages. Good for mixed questions of law and fact when decision based on a general standard is needed. Used when there is a high level of conflict and, often, when no future close relationship is foreseen.</p>	<p><i>Definition</i> Establishes forum that fosters cooperation between owner and contractor. Neutral experts offer informed findings for decision by the parties. Set in place at beginning of project before disputes arise.</p> <p><i>Characteristics</i> Neutrals form panel of three technical experts. Disputes, delays and resolution costs are minimized. Disputes addressed as they arise. Ongoing during life of project.</p> <p><i>Application</i> Good when there can be substantial money claims and for complex, ongoing projects. For disputes over technical data.</p>
Facilitation	Fact-finding
<p><i>Definition</i> Information exchange and generation of options with assistance of a third party skilled in meeting leadership. Low level to medium level of conflict.</p> <p><i>Characteristics</i> For three or more parties, who follow an agenda. Has the feel and structure of business meeting. Can be conducted by or without a neutral. Facilitator may not influence decision, but can have influence over how session is conducted.</p> <p><i>Application</i> For definition of problems and goals, and to identify personal and institutional support can be preliminary step to identify a dispute resolution process.</p>	<p><i>Definition</i> Third-party subject matter expert selected by parties to act as fact finder and independent investigator.</p> <p><i>Characteristics</i> Can identify areas for agreement or disagreement. After report, parties may negotiate, use further proceedings, or conduct more research. Expert submits report and can offer evaluation, if requested.</p> <p><i>Application</i> Can be used during dispute resolution process whenever necessary, although often in initial stage. For disputes where there is seemingly contradictory data or not enough data. For technical or factual disputes</p>

Mediation	Mini-trial
<p><i>Definition</i> Parties select third-party neutral to help them design and to guide them through a process to reach a mutually acceptable solution.</p> <p><i>Characteristics</i> Parties make decision. Parties share information and address underlying problems in presence of mediator. Allows parties to vent emotions. Can be basis for parties to negotiate in the future without a third party.</p> <p><i>Application</i> Especially good when parties will have ongoing relationship. Useful when negotiations have reached an impasse and one party feels injured or ignored.</p>	<p><i>Definition</i> Structured settlement process during which authorized representatives hear case and negotiate an agreement.</p> <p><i>Characteristics</i> Parties select neutral and make rules for procedure. Parties can present summary proofs and arguments. Neutral can advise, mediate or make advisory opinion. Party representatives (with authority to settle) negotiate after hearing the presentations. Can be used in various stages of dispute.</p> <p><i>Application</i> For use in disputes over technical data or for questions with a mixture of law and fact. For a small number of parties when prompt decision is needed.</p>
Negotiation	Partnering
<p><i>Definition</i> Parties attempt to resolve differences by compromise or using interest-based principles without a third party.</p> <p><i>Characteristics</i> Unstructured process without formal rules or agenda. For low-level conflict, more casual and informal than other processes. Can be in the home or office of one of parties.</p> <p><i>Application</i> Often the first step toward resolving a conflict. When issues are clearly defined and there are enough issues for give-and-take. For non-technical disputes when no question of law. When history of relationship among parties has been good or when a relationship is being created.</p>	<p><i>Definition</i> Two or more parties, engaged in enterprise requiring interdependence, work to create a working relationship conducive to trust, mutual understanding and the pursuit of mutually acceptable goals. Parties make agreement that in principle commits each to sharing risks involved in completing projects and promoting cooperation.</p> <p><i>Characteristics</i> Takes place before start of project. Voluntary, relationship-building experience focuses on interests. Seeks to address problems before they become disputes. Partnering agreement can stipulate an ADR process, often a DRB.</p> <p><i>Application</i> Initially used on heavy construction projects. Good for preventing conflicts. Good when there will be future relationship or for long, ongoing projects</p>

2.1.6. Choosing a Conflict Management and Dispute Management Technique

Deciding to use a technique is a two-step process. The first step is to decide if your situation is appropriate for alternative dispute resolution. The second step is to decide which process is most appropriate.

Is the Situation Appropriate? Is ADR a Good Choice?

Below are some questions designed to help you take into account the crucial factors in deciding if any of these processes are suitable for a particular dispute.

The weight given to each of the following questions will depend on the individual dispute and the decision makers. However, a negative response to the first five questions is critical because it indicates there could be a problem with enforcing an agreement worked out as the result of using a conflict management procedure.

- *Are there persons with authority available to represent your party?* There needs to be a person available with knowledge of the issues and with authority to effect a decision. It is sometimes difficult, especially in a public policy dispute, to identify the authoritative person. You may want to hold off on going ahead with a process until that person has been identified and available. The agreement will be ineffective if a person without authority signs an agreement. Or a potential resolution can fall apart if at the moment of agreement someone says, "I have to check with headquarters first."
- *Can this issue be resolved without involving other overarching disputes that could develop in the foreseeable future, nullifying any decision on this one?* Resolving a small issue that is dependent upon the outcome of an overarching one is no resolution at all. You must get to the root of the dispute or your efforts may have been in vain. For instance, a decision among the water agencies, local authorities, and state/province officials might be meaningless if there is a larger dispute between agencies that would not permit that decision to be implemented.
- *Can you resolve this dispute without the need to set a precedent, or do you want an "all or nothing" decision?* Sometimes, there are disputes where the agency would like to see a legal precedent established. If so, you need to have the decision made by a judge or other formal legal authority. In other cases, the law is well defined, and the dispute turns on questions of fact and interpretation. These are more appropriate for conflict and dispute management techniques.
- *Do you believe it will be possible to "enforce" the contract; that is, are the mechanisms in place to ensure that all parties will abide by the terms of the agreement?* A process that results in an unenforceable decision wastes time and money. A decision may be unenforceable because of legal considerations, financial considerations, or lack of real commitment.
- *Can the dispute be resolved without endangering the parties' need for confidentiality?* Since these processes are voluntary, there is no guarantee they will resolve the issue. People may be concerned that by engaging in conflict management they are making information available that could be used against them if the issue ultimately comes before a judge. Normally the participants in conflict management processes make an agreement to protect confidentiality in the event the process does not result in resolution.

While the five questions above raise issues that could prove to be "fatal flaws," there are other issues that are important to the success of conflict management and dispute management processes including:

- *Is there an imbalance of power? Can you overcome it?* Voluntary agreements are more likely to be reached when the power of the parties is approximately equal. Otherwise people fear they may be negotiating at a disadvantage, or will be unable to get the other party to comply with the terms of any agreement.
Sometimes the power of the parties is dissimilar but there is some external force – such as a judge, a powerful political figure, a coalition of interested parties, or even a circumstance – that serves to equalize the balance.
Power is relative, and there are many types of power. These include legal power, personal or party credibility, political power, resources, sanctions, nuisance power, or procedural power.¹¹ Can you balance the power of the other party? Be realistic, but don't let the obvious power of the other party intimidate you. Look carefully for hidden assets.
- *Do you need to maintain a long-term relationship with the other party or parties?* Judges often make decisions that resolve the issues but destroy the relationship between the parties. Because conflict management and dispute management result in agreements acceptable to both parties, they can contribute to maintaining an ongoing relationship with the other parties. If you do not care about any future relationship (and there are no other reasons for using these procedures) conflict management may not be applicable. However, in the water resources business, we are generally likely to be dealing tomorrow with those we are in dispute with today.
- *Are the other parties committed to using a consensual process?* Lack of firm commitment by one of the parties can keep an otherwise effective ADR process from working. People sense the lack of commitment, and this lowers trust and delays progress. Hardened positions can be a sign of resistance to a consensual process.
- *Is there a high level of trust and respect among the parties?* Mutual trust and respect among the parties enhances the chances of resolving the dispute using an ADR forum. If people trust each other, communication is more open and the chances of resolution are higher. Also, if there is trust, there is less need to find guarantees to ensure that the other person will keep the agreement.
- *Can you identify the major issues?* A dispute – particularly a public policy dispute – may not have matured or developed to the point where the issues are well defined. If this is true, the parties may not be ready to negotiate, or unrecognized issues can surface later, disrupting the process.
- *Is it important to act quickly to prevent escalation?* Sometimes, the longer an issue goes on, the more polarized it gets. It may be wise to intervene with a conflict management process as soon as possible. An adjudicative process usually takes longer to complete and can fuel the tension and lead to hardening of positions.
- *Are the issues politically sensitive or controversial?* Issues that are likely to be high profile or political hot potatoes need to be examined closely to determine whether conflict management is suitable for ADR. In such cases the "public's right to know" may be the strongest value. But this may be at odds with the privacy that is an important element in conflict management proceedings. For the public to be satisfied that no "secret deals" were cut, an adjudicative process may be necessary.
- *Will a consensual process have a positive effect on staff morale?* Sometimes staff feel that these processes result in a sell-out. For example, it is bad enough if a judge rules against them, but if the management voluntarily agrees that the other parties had some legitimacy to their complaints, it may be seen as undercutting staff. On the other hand, of course, the water agency's management has a responsibility to do what is good for the organization as a whole, even if some staff are offended. Balancing potential morale problems with the risks of

proceeding with litigation or being stuck in an impasse is always an individual decision, dependent on the circumstances of a particular dispute. Experience shows that education about conflict management and involving staff in the decision whether to use conflict management may be reassuring and result in staff support for a conflict management processes.

- *Is conflict management likely to be cost effective?* It is unlikely that you would use a conflict management technique if you were not satisfied that it was cheaper, or at least as cheap as, litigation or whatever other mechanisms exist for resolving the dispute. With litigation, for example, there are costs associated with lawyers, time delays, and so on. But there are still costs associated with these conflict management techniques (in both time and money), with some techniques being more expensive than others. So it is important to assess the relative costs of the conflict management techniques, and how these compare with your other options. Keep in mind, however, that even if the costs are nearly equal, conflict management processes may still do a better job of maintaining the relationship with the other party than “winner-takes-all” decisions. While it may not be possible to put a price on that relationship, it is still an important value to consider.
- *Are you willing to accept the level of liability or risk associated with litigation?* Unless you have an airtight case, litigation can be a high-stakes gamble when the level of liability is very great. An assessment has to be made whether the chance of winning 100 percent is worth the chance of losing 100 percent. There may be conditions under which this is the case. But often the outcome is not obvious or is problematic. In these cases, conflict management – because the issue is resolved only when the parties reach an agreement – gives you greater control over the outcome, and puts limits on the level of liability.
- *Is there organizational pressure to reach a settlement?* On some occasions there may be organizational pressure to resolve the dispute more rapidly than would be possible through litigation. Ordinarily, for conflict management to work, all parties must feel some urgency or desire to reach a timely settlement. Once the desire to reach a settlement is present, conflict management techniques permit you to establish a mutually acceptable timetable for settlement.

Which Technique Should I Use?

Selecting the right technique is hardly a science. In fact, you are encouraged to produce hybrids or variations on techniques if you are convinced they will do a better job of solving your problem. However, there are some basic considerations that help discriminate between techniques:

- *Are you trying to prevent disputes, or resolve a dispute that already exists?* If you are designing a preventative approach, you would want to consider facilitation or partnering or a disputes review panel. Partnering, described above, includes the use of a facilitator. A disputes review panel, also described above, involves the use of neutral subject matter experts.
- *Are key parties willing to meet?* If the key parties are willing to meet, you may be able to proceed with direct negotiations. If not, or if things are highly polarized, you probably need some form of third-party assistance.
- *Are the technical and legal resources of the parties balanced?* Negotiation works best when the technical and legal resources of the parties are balanced. If they are not balanced, you may need third-party assistance. A facilitator or mediator may create greater balance or a more level playing field between the parties, or know how to use the resources of the parties so they serve the whole process, not just the interests of one party.

- *Are there few or many parties or issues?* If there are a number of parties, or a number of issues, it gets harder to use either a mini-trial or non-binding arbitration. These processes can become cumbersome and time-consuming unless they are focused on a few issues. When there are numerous issues, or a lot of people involved with the issues, either facilitation or mediation may be helpful.
- *Are the key parties antagonistic?* If the key parties are antagonistic, then third-party assistance is virtually essential. If things are badly polarized, you may need a mediator to work with the parties individually before they ever come together.
- *Which is more important: timeliness and minimal cost, or control over the procedures and outcome?* If your priority is to get quick resolution at lowest cost, then either a mini-trial or non-binding arbitration may be your approach. With a mini-trial you still maintain control over the outcome and process, but there is certainly pressure to settle. In non-binding arbitration you are not required to accept the proposed settlement, but a climate may exist where it is hard for you to reject it.

Both facilitation and mediation are potentially more time consuming, but nobody feels that the process was imposed on them, or that they were pressured to reach a particular outcome.

- *Is the outcome of the dispute of great concern to senior managers/leaders?* Some techniques, such as a mini-trial, involve a considerable commitment of time from senior management. As a result, they are possible only if senior management is willing to commit the time to participate due to the salience of issues involved. The same point applies if you are going to involve senior managers in direct negotiation.

2.1.7. Conclusion

The conflict management and disputes management field is rapidly changing. It holds considerable promise for water managers and policy makers because it puts control of the process and timing of dispute resolution back in the hands of line managers, who possess greater flexibility in resolving disputes than exists in litigation. New techniques continue to be developed, and many variations in format are being tried for existing techniques.

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2.2. NEGOTIATION¹²

(Adapted from Christopher W. Moore, CDR Associates, Boulder, Colo., in: *Executive Seminar on Alternative Dispute Resolution (ADR)*, USACE, IWR, 1990)

2.2.1. Definition of Negotiation

Negotiation is one of the most common approaches used to make decisions and manage disputes. It is also the major building block for many other alternative dispute resolution procedures.

Negotiation occurs between spouses, parents and children, managers and staff, employers and employees, professionals and clients, within and between organizations, and between agencies and the public. Negotiation is a problem-solving process in which two or more people voluntarily discuss their differences and attempt to reach a joint decision on their common concerns. Negotiation requires participants to identify issues about which they differ, educate each other about their needs and interests, generate possible settlement options, and bargain over the terms of the final agreement. Successful negotiations generally result in some kind of exchange or promise being made by the negotiators to each other. The exchange may be tangible (such as money, a commitment of time, or a particular behavior) or intangible (such as an agreement to change an attitude or expectation, or make an apology).

Negotiation is the principal way that people redefine an old relationship that is not working to their satisfaction or establish a new relationship where none existed before. Because negotiation is such a common problem-solving process, it is in everyone's interest to become familiar with negotiating dynamics and skills. This section is designed to introduce basic concepts of negotiation and to present procedures and strategies that generally produce more efficient and productive problem solving.

2.2.2. Conditions for Negotiation

A variety of conditions can affect the success or failure of negotiations. The following conditions make success in negotiations more likely.

- *Identifiable parties who are willing to participate:* The people or groups who have a stake in the outcome must be identifiable and willing to sit down at the bargaining table if productive negotiations are to occur. If a critical party is either absent or is not willing to commit to good faith bargaining, the potential for agreement will decline.
- *Interdependence:* For productive negotiations to occur, the participants must be dependent upon each other to have their respective needs met or interests satisfied. The participants need either each other's assistance or restraint from negative action for their interests to be satisfied. If one party can get his/her needs met without the cooperation of the other, there will be little impetus to negotiate.
- *Readiness to negotiate:* People must be ready to negotiate for dialog to begin. When participants are not psychologically prepared to talk with the other parties, when adequate information is not available, or when a negotiation strategy has not been prepared, people may be reluctant to begin the process.
- *Means of influence or leverage:* For people to reach an agreement over issues about which they disagree, they must have some means to influence the attitudes and/or behavior of other negotiators. Often influence is seen as the power to threaten or inflict pain or undesirable costs, but this is only one way to encourage another to change. Asking thought-provoking questions, providing needed information, seeking the advice of experts, appealing to influential

associates of a party, exercising legitimate authority, or providing rewards are all means of exerting influence in negotiations.

- *Agreement on some issues and interests*: People must be able to agree upon some common issues and interests for progress to be made in negotiations. Generally, participants will have some issues and interests in common and others that are of concern to only one party. The number and importance of the common issues and interests influence whether negotiations occur and whether they terminate in agreement. Parties must have enough issues and interests in common to commit themselves to a joint decision-making process.
- *Will to settle*: For negotiations to succeed, participants have to want to settle. If continuing a conflict is more important than settlement, then negotiations are doomed to failure. Often parties want to keep conflicts going to preserve a relationship (a negative one may be better than no relationship at all), to mobilize public opinion or support in their favor, or because the conflict relationship gives meaning to their life. These factors promote continued division and work against settlement. The negative consequences of not settling must be more significant and greater than those of settling for an agreement to be reached.
- *Unpredictability of outcome*: People negotiate because they need something from another person. They also negotiate because the outcome of not negotiating is unpredictable. For example, if a person has a fifty-fifty chance of winning by going to court, s/he may decide to negotiate rather than take the risk of losing as a result of a judicial decision. Negotiation is more predictable than court action because if negotiation is successful, the party will at least win something. Chances for a decisive and one-sided victory need to be unpredictable for parties to enter into negotiations.
- *A sense of urgency and deadline*: Negotiations generally occur when there is pressure or it is urgent to reach a decision. Urgency may be imposed by either external or internal time constraints or by potential negative or positive consequences to a negotiation outcome. External constraints include: court dates, imminent executive or administrative decisions, or predictable changes in the environment. Internal constraints may be artificial deadlines selected by a negotiator to enhance the motivation of another to settle. For negotiations to be successful, the participants must jointly feel a sense of urgency and be aware that they are vulnerable to adverse action or loss of benefits if a timely decision is not reached. If procrastination is advantageous to one side, negotiations are less likely to occur, and, if they do, there is less impetus to settle.
- *No major psychological barriers to settlement*: Strong expressed or unexpressed feelings about another party can sharply affect the psychological readiness of a person to bargain. Psychological barriers to settlement must be lowered if successful negotiations are to occur.
- *Issues must be negotiable*: For successful negotiation to occur, negotiators must believe that there are acceptable settlement options that are possible as a result of participation in the process. If it appears that negotiations will have only "win-lose" settlement possibilities and that a party's needs will not be met as a result of participation, parties will be reluctant to enter into dialog.
- *The people must have the authority to decide*: For a successful outcome, participants must have the authority to make a decision. If they do not have a legitimate and recognized right to decide, or if a clear ratification process has not been established, negotiations will be limited to an information exchange between the parties. Not all negotiations require compromise. On occasion, an agreement can be reached that meets all the participants' needs and does not require a sacrifice on any party's part. However, in other disputes, compromise – willingness to have less than 100 percent of needs or interests satisfied – may be

necessary for the parties to reach a satisfactory conclusion. Where the physical division of assets, strong values, or principles preclude compromise, negotiations are not possible.

- *The agreement must be reasonable and capable of implementation:* Some settlements may be substantively acceptable but may be impossible to implement. Participants in negotiations must be able to establish a realistic and workable plan to carry out their agreement if the final settlement is to be acceptable and hold over time.
- *External factors favorable to settlement:* Often factors external to negotiations inhibit or encourage settlement. Views of associates or friends, the political climate of public opinion, or economic conditions may foster agreement or continued turmoil. Some external conditions can be managed by negotiators while others cannot. Favorable external conditions for settlement should be developed whenever possible.
- *Resources to negotiate:* Participants in negotiations must have the interpersonal skills necessary for bargaining and, where appropriate, the money and time to engage fully in dialog procedures. Inadequate or unequal resources may block the initiation of negotiations or hinder settlement.

2.2.3. Why Parties Choose to Negotiate

The list of reasons for choosing to negotiate is long. Some of the most common reasons are to:

- gain recognition of either issues or parties
- test the strength of other parties
- obtain information about issues, interests, and positions of other parties
- educate all sides about a particular view of an issue or concern
- ventilate emotions about issues or people
- change perceptions
- mobilize public support
- buy time
- bring about a desired change in a relationship
- develop new procedures for handling problems
- make substantive gains
- solve a problem.

2.2.4. Why Parties Refuse to Negotiate

Even when many of the preconditions for negotiation are present, parties often choose not to negotiate. Their reasons may include:

- Negotiating confers sense and legitimacy to an adversary, their goals and needs.
- Parties are fearful of being perceived as weak by a constituency, by their adversary, or by the public.
- Discussions are premature. There may be other alternatives available: informal communications, small private meetings, policy revision, decree, and elections.
- Meeting could provide false hope to an adversary or to one's own constituency.
- Meeting could increase the visibility of the dispute.
- Negotiating could intensify the dispute.
- Parties lack confidence in the process.
- There is a lack of jurisdictional authority.
- Authoritative powers are unavailable or reluctant to meet.
- Meeting is too time-consuming.
- Parties need additional time to prepare.

- Parties want to avoid locking themselves into a position; there is still time to escalate demands and to intensify conflict to their advantage.

2.2.5. Definitions

For negotiations to result in positive benefits for all sides, the negotiator must define what the problem is and what each party wants. In defining the goals of negotiation, it is important to distinguish between issues, positions, interests, and settlement options.

- An *issue* is a matter or question parties disagree about. Issues can usually be stated as problems. For example, "How can wetlands be preserved while allowing some industrial or residential development near a stream or marsh?" Issues may be substantive (related to money, time or compensation), procedural (concerning the way a dispute is handled), or psychological (related to the effect of a proposed action).
- *Positions* are statements by a party about how an issue can or should be handled or resolved, or a proposal for a particular solution. A disputant selects a position because it satisfies a particular interest or meets a set of needs.
- *Interests* are specific needs, conditions or gains that a party must have met in an agreement for it to be considered satisfactory. Interests may refer to content, to specific procedural considerations, or to psychological needs.
- *Settlement options* are possible solutions that address one or more party's interests. The presence of options implies there is more than one way to satisfy interests.

2.2.6. Selecting a General Negotiation Approach

The negotiator will need to select a general negotiation approach. There are many techniques, but the two most common approaches to negotiation are positional bargaining and interest-based bargaining.

2.2.7. Positional Bargaining

Positional bargaining is a negotiation strategy in which a series of positions – alternative solutions that meet particular interests or needs – are selected by a negotiator, ordered sequentially according to preferred outcomes, and presented to another party in an effort to reach agreement. The first or opening position represents that maximum gain hoped for or expected in the negotiations. Each subsequent position demands less of an opponent and results in fewer benefits for the person advocating it. Agreement is reached when the negotiators' positions converge and they reach an acceptable settlement range.

When is Positional Bargaining Often Used?

- When the resource being negotiated is limited (time, money, psychological benefits, and so on).
- When a party wants to maximize his/her share in a fixed sum pay off.
- When the interests of the parties are not interdependent, are contradictory, or are mutually exclusive.
- When current or future relationships have a lower priority than immediate substantive gains.

Attitudes of Positional Bargainers

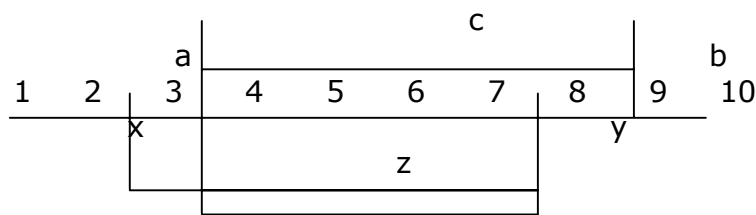
- Resource is limited.
- The other negotiator is an opponent; be hard on him/her.

- Win for one means a loss for the other.
- Goal is to win as much as possible.
- Concessions are a sign of weakness.
- There is a right solution – mine.
- Be on the offensive at all times.

How is Positional Bargaining Conducted?

1. *Set your target point:* solution that would meet all your interests and result in complete success for you. To set the target point, consider:
 - your highest estimate of what is needed (What are your interests?)
 - your most optimistic assumption of what is possible
 - your most favorable assessment of your bargaining skill.
2. *Make target point into opening position.*
3. *Set your bottom line or resistance point:* the solution that is the least you are willing to accept and still reach agreement. To identify your bottom line, consider:
 - your lowest estimate of what is needed and would still be acceptable to you
 - your least optimistic assumption of what is possible
 - your least favorable assessment of your bargaining skill relative to other negotiators
 - your *Best Alternative To a Negotiated Agreement (BATNA)*.
4. *Consider possible targets and bottom lines of other negotiators.*
 - Why do they set their targets and bottom lines at these points? What interests or needs do these positions satisfy?
 - Are your needs or interests and those of the other party mutually exclusive?
 - Will gains and losses have to be shared to reach agreement or can you settle with both receiving significant gains?
5. *Consider a range of positions* between your target point and bottom line.
 - Each subsequent position after the target point offers more concessions to the other negotiator(s), but is still satisfactory to you.
 - Consider having the following positions for each issue in dispute:
 - opening position.
 - secondary position
 - subsequent position
 - fallback position (yellow light that indicates you are close to bottom line; parties who want to mediate should stop here so that the intermediary has something to work with)
 - bottom line.
6. *Decide if any of your positions meets the interests or needs of the other negotiators.* How should your position be modified to do so?
7. *Decide when you will move from one position to another.*
8. *Order the issues to be negotiated* into a logical (and beneficial) sequence.
9. *Open with an easy issue.*
10. *Open with a position close to your target point.*
 - educate the other negotiator(s) why you need your solution and why your expectations are high
 - educate them as to why they must raise or lower their expectations.
11. *Allow other side to explain* their opening position.
12. *If appropriate, move to other positions* that offer other negotiator(s) more benefits.
13. *Look for a settlement or bargaining range:* spectrum of possible settlement alternatives any one of which is preferable to impasse or no settlement (Figure 14).
14. *Compromise* on benefits and losses where appropriate.

15. Look for how positions can be modified to meet all negotiators' interests.
16. Formalize agreements in writing.



Settlement range

- a = Party A's resistance point
- b = Party A's target
- c = Acceptable options for Party A
- x = Party B's target
- y = Party B's resistance point
- z = Acceptable options for Party B

Figure 14. Settlement range

Characteristic Behaviors of Positional Bargainers

- *Initial large demand*: High or large opening position used to educate other parties about what is desired or to identify how far they will have to move to reach an acceptable settlement range.
- *Low level of disclosure*: Secretive and non-trusting behavior to hide what the settlement range and bottom line are. Goal is to increase benefits at expense of other.
- *Bluffing*: Strategy used to make negotiator grant concessions based on misinformation about the desires, strengths, or costs of another.
- *Threats*: strategy used to increase costs to another if agreement is not reached.
- *Incremental concessions*: Small benefits awarded so as to gradually cause convergence between negotiators' positions.
- *Hard on people and problem*: Often other negotiator is degraded in the process of hard bargaining over substance. This is a common behavior that is not necessarily a quality of or desirable behavior in positional bargaining.

Costs and Benefits of Positional Bargaining

COSTS

- Often damages relationships; inherently polarizing (my way, your way).
- Cuts off option exploration. Often prevents tailor-made solutions.
- Promotes rigid adherence to positions.
- Obscures a focus on interests by premature commitment to specific solutions.
- Produces compromise when better solutions may be available.

BENEFITS

- May prevent premature concessions.
- Is useful in dividing or compromising on the distribution of fixed-sum resources.
- Does not require trust to work.
- Does not require full disclosure of privileged information.

2.2.8. Interest-Based Bargaining

Interest-based bargaining involves parties in a collaborative effort to jointly meet each other's needs and satisfy mutual interests. Rather than moving from positions to counter-positions to a compromise settlement, negotiators pursuing an interest-based

bargaining approach attempt to identify their interests or needs and those of other parties prior to developing specific solutions. After the interests are identified, the negotiators jointly search for a variety of settlement options that might satisfy all interests, rather than argue for any single position. The parties select a solution from these jointly generated options. This approach to negotiation is frequently called "integrated bargaining" because of its emphasis on cooperation, meeting mutual needs, and the efforts by the parties to expand the bargaining options so that a wiser decision, with more benefits to all, can be achieved.

When is Interest-Based Bargaining Used?

- When the interests of the negotiators are interdependent.
- When it is not clear whether the issue being negotiated is fixed-sum (even if the outcome is fixed-sum, the process can be used).
- When future relationships are a high priority.
- When negotiators want to establish cooperative problem solving rather than competitive procedures to resolve their differences.
- When negotiators want to tailor a solution to specific needs or interests.
- When a compromise of principles is unacceptable.

Attitudes of Interest-Based Bargainers

- Resource is seen as not limited.
- All negotiators interests must be addressed for an agreement to be reached.
- Focus on interests not positions.
- Parties look for objective or fair standards that all can agree to.
- Belief that there are probably multiple satisfactory solutions.
- Negotiators are cooperative problem solvers rather than opponents.
- People and issues are separate. Respect people, bargain hard on interests.
- Search for win-win solutions.

2.2.9. How to Do Interest-Based Bargaining

Interests are needs that a negotiator wants satisfied or met. There are three types of interests:

- *Substantive interests*: Content needs (money, time, goods, or resources, etc.)
 - *Procedural interests*: Needs for specific types of behavior or the "way that something is done."
 - *Relationship or psychological interests*: Needs that refer to how one feels, how one is treated, or conditions for ongoing relationship.
1. *Identify the substantive, procedural and relationship interest/needs that you expect to be satisfied as a result of negotiations. Be clear on:*
 - why the needs are important to you
 - how important the needs are to you.
 2. *Speculate on the substantive, procedural and relationship interests that might be important to the other negotiators. Assess:*
 - why the needs are important to them
 - how important the needs are to them.
 3. *Begin negotiations by educating each other about your respective interests.*
 - Be specific as to why interests are important.
 - If other negotiators present positions, translate them into terms of interest. Do not allow other negotiators to commit to a particular solution or position.

- Make sure all interests are understood.
4. *Frame the problem in a way that it is solvable by a win-win solution.*
 - Remove egocentricity by framing problem in a manner that all can accept.
 - Include basic interests of all parties.
 - Make the framing congruent with the size of the problem to be addressed.
 5. *Identify general criteria that must be present in an acceptable settlement.*
 - Look for general agreements in principle.
 - Identify acceptable objective criteria that will be used to reach more specific agreements.
 6. *Generate multiple options for settlement.*
 - Present multiple proposals.
 - Make frequent proposals.
 - Vary the content.
 - Make package proposals that link solutions to satisfy interests.
 - Make sure that more than two options are on the table at any given time.
 7. *Utilize integrative option generating techniques:*
 - Expand the pie: ways that more resources or options can be brought to bear on the problem.
 - Alternating satisfaction: each negotiator gets 100 percent of what s/he wants, but at different times.
 - Trade-offs: exchanges of concessions on issues of differing importance to the negotiators.
 - Consider two or more agenda items simultaneously.
 - Negotiators trade concessions on issues of higher or lower importance to each. Each negotiator gets his/her way on one issue.
 - Integrative solutions: look for solutions that involve maximum gains and few or no losses for both parties.
 - Set your sights high on finding a win-win solution.
 8. *Separate the option generation process from the evaluation process.*
 9. *Work toward agreement.*
 - Use the "agreement in principle" process (general level of agreements moving toward more specific agreements).
 - Fractionate (break into small pieces) the problem and use a "building-block" process (agreements on smaller issues that, when combined, form a general agreement). Reduce the threat level.
 - Educate and be educated about interests of all parties.
 - Assure that all interests will be respected and viewed as legitimate.
 - Show an interest in their needs.
 - Do not exploit another negotiator's weakness; demonstrate trust.
 - Put yourself in a "one down position" to other on issues where you risk a small, but symbolic loss.
 - Start with a problem-solving rather than competitive approach.
 - Provide benefits above and beyond the call of duty.
 - Listen and convey to other negotiators that they have been heard and understood.
 - Listen and restate content to demonstrate understanding.
 - Listen and restate feelings to demonstrate acceptance (not necessarily agreement) and understanding of intensity.

10. *Identify areas of agreement, restate them, and write them down.*

Costs and Benefits of Interest-Based Bargaining

COSTS

- requires some trust
- requires negotiators to disclose information and interests
- may uncover extremely divergent values or interests.

BENEFITS

- produces solutions that meet specific interests
- builds relationships
- promotes trust
- models cooperative behavior that may be valuable in future.

2.2.10. An Integrated Approach

Naturally, all negotiations involve some positional bargaining and some interest-based bargaining, but each session may be characterized by a predominance of one approach or the other. Negotiators who take a positional bargaining approach will generally use interest-based bargaining only during the final stages of negotiations. When interest-based bargaining is used throughout negotiations it often produces wiser decisions in a shorter amount of time with less incidence of adversarial behavior.

2.2.11. Dynamics of Negotiation

Examining the approaches to negotiation only gives us a static view of what is normally a dynamic process of change. Let us now look at the stages of negotiation most bargaining sessions follow.

Negotiators have developed many schemes to describe the sequential development of negotiations. Some of them are descriptive – detailing the progress made in each stage – while others are prescriptive – suggesting what a negotiator should do. We prefer a twelve-stage process that combines the two approaches.

Stages of Negotiation

STAGE 1: EVALUATE AND SELECT A STRATEGY TO GUIDE PROBLEM SOLVING

- Assess various approaches or procedures – negotiation, facilitation, mediation, arbitration, court, and so on – available for problem solving.
- Select an approach.

STAGE 2: MAKE CONTACT WITH OTHER PARTY OR PARTIES

- Make initial contact(s) in person, by telephone, or by mail.
- Explain your desire to negotiate and coordinate approaches.
- Build rapport and expand relationship.
- Build personal credibility or organization's credibility.
- Promote commitment to the procedure.
- Educate and obtain input from the parties about the process that is to be used.

STAGE 3: COLLECT AND ANALYZE BACKGROUND INFORMATION

- Collect and analyze relevant data about the people, dynamics, and substance involved in the problem.
- Verify accuracy of data.
- Minimize the impact of inaccurate or unavailable data.
- Identify all parties' substantive, procedural and psychological interests.

STAGE 4: DESIGN A DETAILED PLAN FOR NEGOTIATION

- Identify strategies and tactics that will enable the parties to move toward agreement.
- Identify tactics to respond to situations peculiar to the specific issues to be negotiated.

STAGE 5: BUILD TRUST AND COOPERATION

- Prepare psychologically to participate in negotiations on substantive issues. Develop a strategy to handle strong emotions.
- Check perceptions and minimize effects of stereotypes.
- Build recognition of the legitimacy of the parties and issues.
- Build trust.
- Clarify communications.

STAGE 6: BEGINNING THE NEGOTIATION SESSION

- Introduce all parties.
- Exchange statements which demonstrate willingness to listen, share ideas, show openness to reason, and demonstrate desire to bargain in good faith.
- Establish guidelines for behavior.
- State mutual expectations for the negotiations.
- Describe history of problem and explain why there is a need for change or agreement.
- Identify interests and/or positions.

STAGE 7: DEFINE ISSUES AND SET AN AGENDA

- Together, identify broad topic areas of concern to people.
- Identify specific issues to be discussed.
- Frame issues in a non-judgmental neutral manner.
- Obtain an agreement on issues to be discussed.
- Determine the sequence to discuss issues.
- Start with an issue in which there is high investment on the part of all participants, where there is no serious disagreement, and where there is a strong likelihood of agreement.
- Take turns describing how you see the situation. Participants should be encouraged to tell their story in enough detail that all people understand the viewpoint presented.
- Use active listening, open-ended questions, and focusing questions to gain additional information.

STAGE 8: UNCOVER HIDDEN INTERESTS

- Probe each issue either one at a time or together to identify interests, needs, and concerns of the principal participants in the dispute.
- Define and elaborate interests so that all participants understand the needs of others as well as their own.

STAGE 9: GENERATE OPTIONS FOR SETTLEMENT

- Develop awareness about the need for options from which to select or create the final settlement.
- Review needs of parties that relate to the issue.
- Generate criteria or objective standards that can guide settlement discussions.
- Look for agreements in principle.
- Consider breaking issue into smaller, more manageable issues and generating solutions for sub-issues.
- Generate options either individually or through joint discussions.

- Use one or more of the following procedures:
 - expand the pie so that benefits are increased for all parties
 - alternate satisfaction so that each party has his/her interests satisfied but at different times
 - trade items that are valued differently by parties
 - look for integrative or win-win options
 - brainstorm
 - use trial and error generation of multiple solutions
 - try silent generation in which each individual develops privately a list of options and then presents his/her ideas to other negotiators
 - use a caucus to develop options
 - conduct position/counter position option generation
 - separate generation of possible solutions from evaluation.

STAGE 10: ASSESS OPTIONS FOR SETTLEMENT

- Review the interests of the parties.
- Assess how interests can be met by available options.
- Assess the costs and benefits of selecting options.

STAGE 11: FINAL BARGAINING

Final problem solving occurs when:

- One of the alternatives is selected.
- Incremental concessions are made and parties move closer together.
- Alternatives are combined or tailored into a superior solution.
- Package settlements are developed.
- Parties establish a procedural means to reach a substantive agreement.

STAGE 12: ACHIEVING FORMAL SETTLEMENT

- Agreement may be a written memorandum of understanding or a legal contract. Detail how settlement is to be implemented – who, what, where, when, how – and write it into the agreement.
- Identify “what ifs” and conduct problem solving to overcome blocks.
- Establish an evaluation and monitoring procedure.
- Formalize the settlement and create enforcement and commitment mechanisms:
 - legal contract
 - performance bond
 - judicial review
 - administrative/executive approval.

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2.3. FACILITATION¹³

(Adapted from James L. Creighton, in: Delli Priscoli and Creighton, *Second Ten Year Reader*, Institute for Water Resources, USAEC, 2001.)

Whenever people work together, they communicate on at least two levels:

- *Content*: People communicate about the subject matter, the facts of the case, the information.
- *Relationship*: People also communicate how much they accept each other, care about each other's needs and problems, and how concerned they are about preserving the relationship.

In meetings, "relationship" is often not communicated directly, but is communicated indirectly by who gets to speak and for how long, whose needs take precedence, who gets to establish the agenda, who gets cut off or put down, and so on. In other words, how a meeting is run – the "process" – tells the participants how important they are, whether their opinions matter, and what their relative relationship is to each other.

2.3.1. The Need for Procedural Assistance

When there is a dispute, people often fight over the meeting format or procedures as a way of defining their relationship or gaining an advantage. The most famous such example was the fight over the shape of the table at the Vietnam Peace Talks. In that case, the debate dragged on for months, while people continued to be killed and maimed. Of course the shape of the table wasn't really what the dispute was about. The first issue was whether the sides really wanted to resolve things through negotiation. The second issue – which found expression in discussions about the shape of the table – was what the relationships would be between the parties.

Even when the dispute is less dramatic, people often fight for leadership of the meeting, disagree over how the meeting is to be run, fight over what should be included on the agenda, and strive for dominance during the meeting. All of which usually just makes things worse. The sides become more polarized. All their worse fears are confirmed.

The idea of "procedural assistance" is to remove process issues – such as how meetings are run – as a source of dispute by delegating them to a third party who is impartial about the substantive outcome and who will act on behalf of all the participants. This person is frequently called a "facilitator."

2.3.2. What is a Facilitator?

A facilitator is a trained specialist who helps people design effective meetings and problem-solving sessions, and then acts as the meeting leader on behalf of the group. A facilitator does not have the authority to make substantive decisions for the group, but will make some decisions about how the meeting is run, and will consult with the group about major process decisions, such as a significant change in agenda or meeting procedures. In those cases where the facilitator consults with the group, his or her job is to identify why a decision is needed, identify options for participants to consider, and, if appropriate, make a recommendation. But the ultimate decision-making authority, even for process issues, lies with the participants. It is just more efficient to leave all but the big process decisions in the hands of the facilitator.

2.3.3. When Would a Facilitator be Useful?

Here are a few circumstances where a facilitator might be useful:

- conducting public meetings, workshops, or hearings
- conducting an information-exchange meeting between parties to a dispute
- conducting a collaborative problem-solving session to resolve an issue or dispute
- conducting a team building or partnering session
- conducting inter-agency or multiple-party meetings where there is sensitivity about any one participant have more power than the others.

2.3.4. What Does a Facilitator Do?

Typically a facilitator uses a style of meeting leadership that is less directive than the kind of meeting leadership associated with “chairing” a meeting. Some people when chairing a meeting make rulings, determine procedures, rule people out of order, and so on. A facilitator proposes, suggests, invites and then consults with the participants to generate a consensus.

This is not because a facilitator is a “weak” leader. Facilitation often takes far more skill than being a traditional chair of a meeting, and a facilitator may exercise considerable influence over the meeting. The key point is that the facilitator is concerned that everybody feels included and accepted. If the meeting leadership is too heavy-handed or authoritarian, participants may become upset or resentful, or may conclude that the facilitator is biased against them. This will make it that much more difficult to achieve mutual agreement. The facilitator has the job of helping to create the climate of mutual respect and psychological safety that makes it possible for people to consider creative new solutions and move from preconceived positions.

Here are some of the things a facilitator does to help bring about an atmosphere conducive to collaborative problem solving:

- *Assist with designing the meeting:* Facilitators are often able to suggest meeting formats that avoid pitfalls or that have proven effective in addressing issues. For example, a facilitator may recognize when a meeting format is likely to push everybody into taking adversarial positions or start proposing solutions before there is agreement on the definition of the problem. The facilitator may then suggest an alternative format that addresses the same issues, but does so in a way that is less likely to be adversarial. Or he/she may suggest a meeting activity that is particularly efficient at identifying or evaluating options. The facilitator can also assist with deciding whom to involve in the meeting, what technical or backup information is needed to make the meeting effective, and defining the purpose of the meeting.
- *Help keep the meeting on track, focused on the topic:* Facilitators are skilled at pointing out when the discussion has drifted, or at restating the purpose of an activity. Facilitators also play the “traffic cop” role of regulating how long people speak, or putting limits on behavior such as accusations or emotional tirades. This is often achieved by working with the participants to establish ground rules that everybody feels are fair. That way, when a facilitator intervenes, everybody understands that the intervention is on behalf of an effective meeting, not because of prejudice or bias.
- *Clarify and accept communication:* It is one of the fundamentals of human nature that until we feel our concerns have been understood and accepted, even if people do not agree with them, we will keep saying them over and over again in new and different ways, often with an accelerating intensity that produces a counter-reaction. For this reason, one of a facilitator’s primary tasks is to be sure that everybody feels listened to and understood. The facilitator may do this by providing a verbal summary of what was said, by relating one participant’s ideas to another, by inviting expansion of a comment, or by asking clarifying questions. Sometimes a facilitator will write a summary of comments on a flipchart, or will be assisted by another staff person called a “recorder,” who will

keep a summary of comments on the flipchart. A facilitator might also point out when a participant's contribution was cut off and invite him or her to complete the idea.

- *Accept and acknowledge feelings:* During disputes, people are often upset or angry. Telling them not to feel that way simply makes those feelings stronger. In some disputes it's necessary to let everybody ventilate their feelings before it's possible to begin talking about solutions. The facilitator will structure a situation in which it is safe to express feelings, without those feelings causing a permanent breach in communication between the parties. Even in normal problem solving, strong feelings may emerge. The facilitator will make sure these feelings are acknowledged so that they do not continue to build in intensity.
- *State a problem in a constructive way:* Often problems are stated in such a way that they seem like efforts to fix blame or accuse the other parties of unacceptable, dishonest, or even illegal actions. This simply causes the other parties to counter with blame and accusation of their own, making the conflict escalate. A facilitator can help by restating comments so they do not blame any party, or so they define the problem without implying there is only one possible solution.
- *Suggest a procedure or problem-solving approach:* During a meeting a facilitator may suggest a procedure, such as brainstorming or a structured sequence of problem-solving steps, to help the group work more effectively. Or a facilitator may help break an impasse by suggesting alternative ways of addressing the issue, or even suggesting a break.
- *Summarize and clarify direction:* One of the functions of a facilitator is to help a group keep track of where it is in a sequence of steps, on the agenda, and so on. Often participants are so involved with the subject being discussed that they lose track of the overall picture. So a facilitator may restate the purpose of the meeting, or clarify its direction (for instance, "we've completed the first two issues, now we're ready to start talking about alternatives for . . .").
- *Consensus-testing:* One of the important responsibilities of a facilitator is to sense when participants are coming to agreement and verify that agreement has been reached by stating the potential basis for agreement and checking to see whether it has support from the participants. Since the facilitator does not make decisions for the group this takes the form of: "It sounds like you are in agreement that . . . Is that acceptable?" Such agreements are usually written on the flipchart by either the facilitator or recorder.

Because the facilitator needs to remain neutral on the outcome of the meeting, and wants to create a climate for collaborative problem solving, there are also certain behaviors a facilitator should avoid. These include:

- judging or criticizing the ideas of participants
- using the role of facilitator to push his or her own ideas
- making significant procedural decisions without consulting the participants
- taking up the group's time with lengthy comments.

2.3.5. Advantages of Facilitation

Facilitation can provide a range of advantages in a dispute situation:

- Decision makers can participate in the substance without having to worry about the process.
- There is increased confidence that meetings are being run for everybody's benefit.
- Process issues are removed as a likely source of disagreement.

- The facilitator will help create the climate for a collaborative problem-solving process, and will help frame the problem so it is solvable.
- The facilitator will suggest format or procedural options to help the group work more effectively.

There is also one unexpected side-benefit to facilitation: as participants watch a facilitator work they often become more observant about process issues, even to the point of letting the facilitator know when he or she has missed something or stepped out of role. Some work groups have improved their effectiveness by providing facilitation training for all group members, then rotating meeting leadership so that everybody keeps their skills honed. Because so much work in a large organization takes place in teams involving many parts of the organization, facilitation is a very useful skill internally, even when no external facilitator is retained.

2.3.6. Concerns and Problems with Facilitation

Some managers have concerns about using facilitation. Many of these concerns have proven to be more a result of anxiety and unfamiliarity with the process, rather than based in fact. Here are some of the concerns managers have expressed, and some of the actual experiences managers have had that address those concerns:

Will Using a Facilitator Mean a Loss of Control?

It is true that you will not be directly controlling the meeting. But in a dispute, where there are two or more parties, efforts by one party to control the meeting will usually be met by reciprocal efforts of the other party to control the meeting, and the situation will deteriorate. The situation itself demands joint control, so instead of fighting over it, you jointly delegate it to someone who is skilled at acting on behalf of the interests of all the parties.

In the final analysis, you do retain control. The facilitator does not make significant decisions, even procedural decisions, for the group, but consults with you on these decisions. You – and the other parties – retain ultimate control over decision making. The facilitator is a servant – a highly skilled and knowledgeable servant – of the participants.

Many managers who have used facilitation have found that being free of the obligation to lead the meeting actually frees them up to discuss matters of substance. Where before they had to be careful not to take sides too soon, or express their own feelings too strongly, as participants they can be strong actors in bringing about a solution to the problem or dispute. In return for giving up some direct control over meeting leadership, you may actually gain control over the substantive outcome.

Remember also that you – and the leaders from the other parties – have the right and the obligation to instruct the facilitator on your needs, and work with the facilitator to be satisfied that the meeting design will meet those needs. A good facilitator will let you know if he or she believes those instructions are not conducive to an atmosphere of collaborative problem solving, and you may then need to do some joint problem solving with the facilitator. But you cannot be forced to concur with anything that is unacceptable to you.

Will Using a Facilitator Undermine My Authority?

Typically a facilitator is used in a situation where you need or want a mutually acceptable decision. If there is a dispute, it will not be resolved by one person making a unilateral decision. If there is a problem involving several parts of the organization, you may get more commitment to implementation by jointly agreeing on a plan than by issuing an order, particularly if you do not have line command over all those different parts of the organization. If there are other agencies involved who get upset

if one major organization plays a leadership role, you may have more productive meetings if you are not fighting over how the meeting is run. Even if you will be making the final choice between alternatives, you may decide that you want participation from others in evaluating the situation, and identifying or evaluating the alternatives.

In these situations you are not abandoning your leadership functions by using a collaborative process, or using a facilitator. You are simply utilizing the most appropriate leadership approach to achieve your goals and fulfill your responsibilities. You (and other parties to the issue or dispute) make the decision to use a collaborative approach. You make the decision to use a facilitator. You work with the facilitator to define his or her role and the expectations for the meeting or process. Any decision made during the meeting or process needs your concurrence.

In addition to these “perceptual” concerns, there are some concrete issues that need to be addressed if you are going to use a facilitator.

Knowledge about the Subject Matter

It is helpful – but not mandatory – that the facilitator knows about the organizations involved, and about the subjects of discussion. As a minimum, the facilitator needs to know enough to be able to follow the discussion. Since agencies often use numerous acronyms and technical jargon, this can be an important issue. On the other hand, if the facilitator is too directly involved in the subject matter, he or she may have opinions about the issue that make it hard to remain neutral, or he or she may be seen by one of the parties as biased or partial towards a particular point of view or organization.

On some issues, it may be possible to use an internal facilitator. The two issues that have to be considered are the acceptability of the facilitator to all parties, and the skill level required for this particular meeting. An outside facilitator may be more acceptable in a dispute. Outside facilitators, because they spend their entire professional life doing facilitation, may – but do not always – have a higher skill level or base of experience.

2.3.7. The Role of the Recorder

In a small group the facilitator often keeps a summary or record of the group’s discussions on a flipchart. Included in this summary would be major points that were made, alternatives considered, and any agreements reached by the group.

In large groups or meetings a separate person – a recorder – who keeps a running summary on the flipchart usually plays this role. Typically the flipchart sheets are posted on the wall where everybody can see them. In small meetings the record can be referred to as a kind of “group memory.” In larger meetings people may be too far away from the wall to read all the material. In this case people are encouraged to check the flipchart sheets at an appropriate break, and may make corrections of summaries of their comments that may not be correct.

As a servant of the group it is the responsibility of the recorder to keep as accurate and unbiased a summary as possible. The recorder should not use “the power of the pen” to screen out ideas or comments with which he or she disagrees.

2.3.8. The Difference Between a Facilitator and a Mediator

If you were to observe a facilitator in action, and then a mediator, you might not be able to tell the difference. Or the differences you observe may have more to do with the personal styles of the facilitator or mediator than their roles. It is true that the roles overlap, and use many of the same skills, but there are some distinctions.

First, the venue is different. The facilitator is typically the leader of a meeting, workshop or collaborative problem-solving session. The mediator is the leader during

the negotiations. However, many of the best approaches to mediation are a form of collaborative problem solving.

A facilitator might come from one of the participating organizations, so long as everybody was comfortable that he or she was neutral on the issue. A mediator rarely has an ongoing relationship with any of the parties.

Facilitation is useful even if the parties are not well defined. In a public meeting, for example, people decide for themselves whether to attend. In mediation there are designated representatives of the various parties.

In facilitation the issues may also be less well defined. The outcome of a facilitated session may simply include sharing of feelings, team building, identifying options, or reaching agreement. The outcome of mediation is a decision by the parties.

The other place where there are differences is in what happens between meetings. Between meetings a facilitator would typically only meet with the parties to plan the next meeting. While a mediator might participate in a planning meeting, he or she might also meet with the parties individually to help them shape proposals that might be acceptable, or help them assess their position and interests. A mediator may also assume control over the schedule of meetings, timing them so they will be most productive and avoiding them when they could polarize the situation further. At some point in the process, a mediator might even develop a proposal, on behalf of the group, that might embody a number of reciprocal concessions that the groups are considering in private, but feel they cannot put forward themselves.

Both facilitation and mediation are valuable forms of assistance. They simply represent different levels of formality and structure in the kind of assistance that is given.

Chapter 4

Transboundary water cooperation in Central Asia with an emphasis on Uzbekistan

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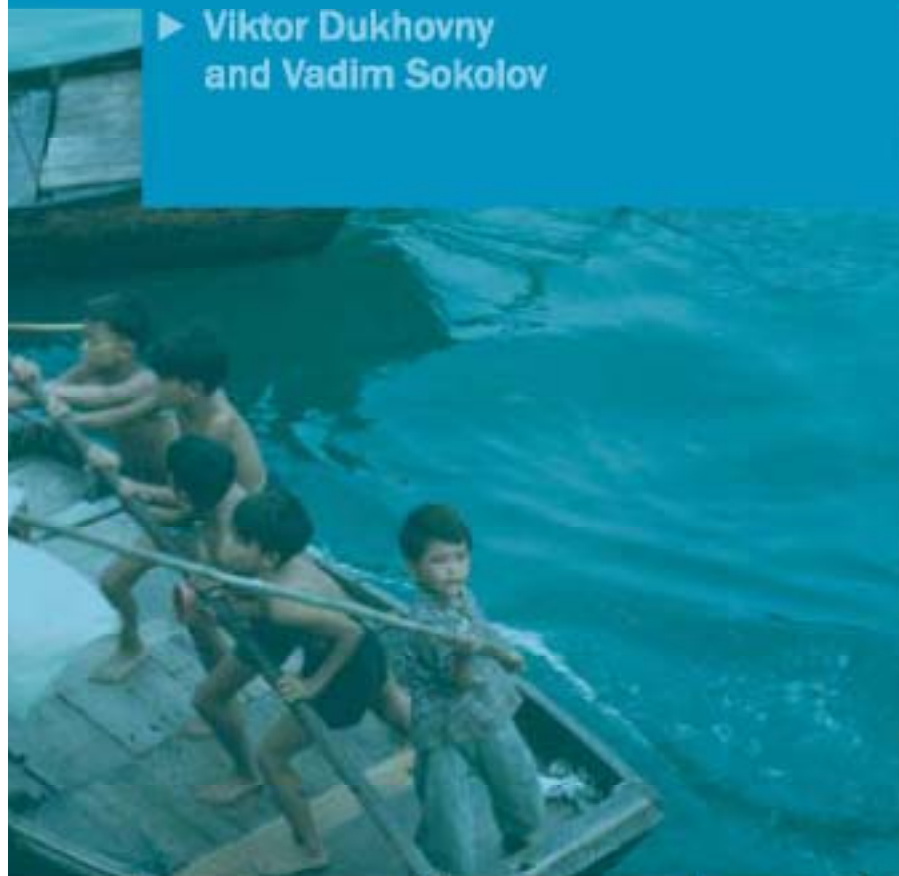
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Lessons on Cooperation Building to Manage Water Conflicts in the Aral Sea Basin

► Viktor Dukhovny
and Vadim Sokolov



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LESSONS ON COOPERATION BUILDING TO MANAGE WATER CONFLICTS IN THE ARAL SEA BASIN

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LESSONS ON COOPERATION BUILDING TO MANAGE WATER CONFLICTS IN THE ARAL SEA BASIN

The Aral Sea Basin became notorious as an example of the rapacious attitude to nature of the Soviet command system of water management. There are many similar examples in the "western world," even in such powerful countries as the United States, which cannot rehabilitate the deltas of the Colorado and San Khoakin rivers, or Lake Mono and others to restore them to their original natural condition.

During the past ten years Central Asia has established conditions for independent development on the basis of mutual respect, mutual cooperation, and the clear political will of the presidents and governments of the five states concerned to preserve and strengthen joint water management. The framework for this was based on earlier Soviet practice and principles, which should be transformed under new economic conditions. The water authorities of the five countries facilitate cooperation under the umbrella of the ICWC – Interstate Commission for Water Coordination – which celebrated its ten-year anniversary in February 2002. This cooperation is progressing in spite of complexities and differences in the social, political, and environmental conditions in the different states and their different levels of development. It carries the promise of future success, giving objective appraisal to achievements and setbacks as well as finding ways of survival.

These commitments have led to the belief, reflected in official documents of UNESCO, OSCE, and other international agencies, that the ICWC as a body of five states, even in such conditions, can find ways to develop well-controlled and progressive collaboration. This experiment is unique, because five states are not only working together in planning, but also in operating and managing transboundary rivers in real time. For these reasons the Aral Sea Basin has been selected as an acceptable case study for the PCCP program. The expected outcomes of the case study are the lessons to be learned from the difficult and complex conditions that followed the break-up of the Soviet Union. That collapse led to an intricate environmental problem, and the countries of the basin are working through cooperation to find an effective way to manage water resources.

1. GEOGRAPHY AND HISTORY OF THE ARAL SEA BASIN

The Aral Sea Basin is located in the heart of the Asian continent, and covers the whole territory of present Tajikistan, Turkmenistan, Uzbekistan, the southern part of the Kyrgyz Republic, and the southern part of Kazakhstan (see Figure 1). Some parts of the basin are located in the northern part of Afghanistan and Iran (about 8 percent), and some in China (less than 0.1 percent).



Figure 1. The Aral Sea Basin

1.1. Hydro-geographical Characteristics

The total area of the basin (within the boundaries of the former Soviet Republics; Afghanistan, Iran and China were not included in the recent case study) is about 158.5 million hectares (see Table 1). This territory extends between longitudes 56° and 78° east, and latitudes 33° and 52° north. The territory of the Basin has two main morphological zones: the Turan plain (central and western part) and mountain zone (to the east). The Kara Kum desert covers the western and the south-western parts of the Aral Sea Basin within the Turan plain, and the Kyzyl Kum desert the northern part. The mountain area includes the Tien Shan and Pamir ranges, with the highest peaks above 7000 meters. The remaining part of the basin is composed of various types of alluvial and inter-mountain valleys, dry and semi-dry steppe.

A specific feature of the region from a hydrological point of view is the division of its territory into three main zones of surface runoff: (a) the zone of flow formation (upper watersheds in the mountain areas to the south-east), (b) the zone of flow transit and its dissipation (central part), and (c) the delta zones (to the north-west).

The climate in the region is sharply continental, mostly arid and semi-arid. Average precipitation (concentrated in the spring and winter) is about 270 mm, varying between 600–800 mm in mountains zones and 80–150 mm in desert regions.

Table 1. Territory of the Aral Sea Basin in the newly independent states

<i>Country</i>	<i>Area of the country</i>
Kazakhstan*	34 440 000
Kyrgyz Republic*	12 490 000
Tajikistan	14 310 000
Turkmenistan	48 810 000
Uzbekistan	44 884 000
Afghanistan*	3 600 000
The Aral Sea Basin	158 534 000

* Only provinces within the Aral Sea Basin are included.

1.2. Water Resources

Two main rivers cross the Aral Sea Basin from the south-east to the north-west: the Amu-Darya and the Syr-Darya. They lead into the Aral Sea, which until 1960 was the world's fourth largest lake in area, but has since declined precipitously. The Amu-Darya is the biggest river in the region in terms of water availability, and the Syr-Darya is the longest. The Zerafshan river, once a tributary of the Amu-Darya, is located between them. The total available surface water resources in the basin are estimated as 116.5 km³ per year (see Table 2).

Table 2. Total natural river flow in the Aral Sea Basin (multiyear flow, km³/year)

<i>State</i>	<i>River basin</i>		<i>Aral Sea Basin</i>	
	<i>Syr-Darya</i>	<i>Amu-Darya</i>	<i>km³</i>	<i>%</i>
Kazakhstan	2.426	–	2.426	2.1
Kyrgyz Republic	26.850	1.604	28.454	24.4
Tajikistan	1.005	55.73	56.735	48.6
Turkmenistan	–	1.53	1.530	1.3
Uzbekistan	6.167	5.056	11.223	9.6
Afghanistan	–	14.50	14.500	12.4
Iran	–	0.86	0.860	0.9
China	0.755	–	0.755	0.7
Total Aral Sea Basin	37.203	79.280	116.483	100.0

It is important to emphasize that most of the former tributaries no longer flow into the main rivers (Amu-Darya and Syr-Darya). Among them are the Chu, Talas, Assa, Bugun, in the Syr-Darya basin, and the ab, Tedjen, Zerafshan, Kashkadarya in the Amu-Darya basin. The main transboundary rivers are the responsibility of the regional organizations. Tributaries and other small rivers are under national water authorities.

Renewable resources of groundwater are located in 339 aquifers with total reserves of 43.49 km³, of which 25.09 km³ are in the Amu-Darya basin and 18.4 km³ in the Darya basin. The actual (year 2000) water abstraction from aquifers is 11.04 km³/year, though in 1990 it exceeded 14.0 km³.

Recycled water is an additional source of water but, due to high mineralization, it is also a source of pollution. About 95 percent of this water comes from collector-drainage and the rest is municipal and industrial wastewater. The recycling rate increased with the development of irrigation and reached its peak between 1975 and 1990. Since then it has stabilized, and in the period 1990–9 it varied between 28.0 and 33.5 km³/year (13.5–15.5 km³ in the Syr-Darya basin and 16.0–19.0 km³ in the Amu-Darya basin). More than 51 percent of this water is released back to the rivers and 33

percent into natural depressions. Due to its polluted state, only 16 percent of this water is used for irrigation.

Hydrological data on the basin is made available to the basic users. Hydrometric monitoring, as well as meteorological data collection at basic weather stations, was organized at the beginning of twentieth century, and reached its most advanced level in the mid-1980s. However, in the 1990s, because of widespread economic destabilization, this system declined; there are now only 384 climatic stations and 273 hydrometric posts, whereas in 1985 there were more than 800 posts. The water quality is registered only at 154 points.

1.3. Land Use

The prosperity of Central Asia, an agrarian region since ancient times, has always been very closely interrelated with land use. The fertile soils were the basis of the prosperity of the rural population. Out of the total land resources of about 154.9 million hectares some 59.4 million hectares are considered to be cultivable, of which only about 10.1 million hectares (see Table 3) are actually used. Half of the actually cultivated lands are located in the oases (which are naturally drained, with fertile soils). The other half of the land requires a complicated and expensive set of reclamative measures, including not only drainage and leveling, but also improvement of soil structure. The total irrigated area is about 7.9 million hectares in former NIS states and close to 0.5 million hectares in the Afghan part of the Aral Sea Basin.

A peculiarity of land conditions of Central Asia is the salt effect caused by natural conditions (initial salinity) – inefficient natural drainage, pressure mineralized groundwater, high loss from evaporation, and the high capillary capacity of soils – and also by anthropogenic conditions (so-called “secondary salinity”), which have increased the amount of mineralized groundwater through irrigation and lack of drainage. From Table 3 it is clear that almost forty percent of irrigated lands are affected by salt. This feature has some important consequences: the yield of irrigated crops depends upon the degree of salinity and it is necessary to leach saline lands by additional water annually or periodically; in the long run artificial drainage systems are needed to guarantee the release of leaching water from irrigated lands.

Table 3. Land use in the Aral Sea Basin

<i>Country</i>	<i>Cultivable area (ha)</i>	<i>Cultivated area (ha)</i>	<i>Irrigated area (ha)</i>	<i>Salt affected lands (ha)</i>
Kazakhstan*	23 872 400	1 658 800	786 200	218 000
Kyrgyz Republic*	1 570 000	595 000	422 000	21 500
Tajikistan	1 571 000	874 000	719 000	118 000
Turkmenistan	7 013 000	1 805 300	1 735 000	674 500
Uzbekistan	25 447 700	5 207 800	4 233 400	2 149 500
The Aral Sea Basin	59 474 100	10 140 900	7 895 600	3 181 500

* Only provinces within the Aral Sea Basin are included

1.4. Ecosystem Dynamics

The large-scale development of water resources, mostly for irrigation, has changed the hydrological cycle in the region and caused serious environmental problems in the Aral Sea Basin. The most dramatic effect has been the shrinking of the Aral Sea and disruption of its ecosystem. Other impacts have included:

- losses of biological productivity, especially of fish species in the sea, due to increasing salinity and toxic contamination

- degradation of river deltas
- deforestation of tugay forests
- transfer of dust and salts from the dried-out seabed
- lowering of groundwater levels
- desertification of the Aral Sea shores.

In other parts of basin we can see: (1) soil degradation as a result of waterlogging and salinization of irrigated land in the catchment areas of the Aral Sea Basin; (2) crop diseases and insect infestation, due particularly to the cotton mono-culture agricultural development, (3) adverse health effects due to poor water quality and wind-blown chemicals from the exposed seabed, (4) erosion of land in the upper watershed, and (5) local climate changes. A detailed assessment of social, economic, and ecological consequences of the Aral Sea catastrophe has been published in the report of the INTAS RFBR # 1733 Project.

The riparian states have agreed that the Aral Sea coastal region (the deltas of the Amu-Darya and Syr-Darya) will be considered as an independent water user whose requirements will be specified jointly by all the states. These requirements are to be defined on the basis of an approved strategy to improve the environmental situation in the coastal region, taking into account the year-to-year variability of river flows. At the same time, all the riparian states recognize the importance of environmental water requirements concerning both water quality and the preservation of biodiversity and bio-productivity of natural rivers and reservoirs.

1.5. Demographic Characteristics

The total population within the Aral Sea Basin was 41.8 million in 2000, of which almost 63.6 percent was rural (see Table 4). Rapid population growth, especially in rural areas, together with the commitment of rural populations to remaining in their native homes, exacerbated the weakest aspect of the social life of the region: demographic pressure. This particularly affected the so-called "oases," such as the Fergana valley, Zerafshan valley, Khorezm, and Gissar valley, where the population densities exceed 300–500 people per square km. This has led to unemployment, declining standards of living, and social deprivation. During the last five years the average annual population growth has been 1.5 percent, ranging from 2.2 percent in Uzbekistan to 0.4 percent in Kazakhstan.

It should be noted that in the years after the Soviet Union collapsed the national structure in the countries changed considerably due to migration of the population. There has been a reduction of many non-native groups; for instance, in the Kyrgyz Republic the number of Russians decreased from 21.2 percent to 12.5 percent, Ukrainians from 2.5 percent to 1.0 percent, Tatars from 1.6 percent to 0.9 percent, Germans from 2 percent to 0.4 percent, and Jews from 0.1 percent to 0.03 percent. It should be noted that about 70 percent of the people leaving were skilled workers, and this had a negative effect on the regional economy.

1.6. Ethnicity, Languages, Religion

Taking into account the fact that administrative boundaries between the countries were mostly established artificially by the Soviet Government at the beginning of the Soviet era (1920s), the ethnic composition in the Aral Sea Basin is very heterogeneous.

Kazakhstan has a multi-ethnic population, being composed of 130 ethnic groups, with Kazakhs and Russians dominating. The official language, Kazakh, is spoken by over 40 percent of the population. Russian, the language of inter-ethnic

communication, is spoken by two-thirds of the population, and is used in everyday business and life.

In the *Kyrgyz Republic* the majority of the population belongs to the Kyrgyzes (64.9 percent); then come the Russians, Uzbeks, Ukrainians, and Tatars (12.5, 13.8, 1.0, and 0.9 percent respectively). The languages are Kyrgyz and Russian, which under the constitution are equal official languages.

In *Tajikistan* the majority are Tajiks (68 percent), one of the most ancient nations in Asia, followed by the Uzbeks (20 percent of the population). The other nations represent about 12 percent. The Uzbek part of the population is located mostly in the north-western part of the country. The Eastern Pamir is settled by Kyrgyzes. Some Kazakh and Turkmen groups are located in the southern and south-western parts of the country. Generally there are about 100 ethnic groups in the country. The official language is Tajik (Farsi), and Russian is the language of inter-ethnic communication.

In *Turkmenistan* the majority of the population belong to the Turkmens (89 percent); then come the Uzbeks, Russians, Armenians, and others. The official language is Turkmen, while Russian is again the language of inter-ethnic communication.

In *Uzbekistan* the majority of the population are Uzbeks and Karakalpaks, who together with Kazakhs, Kyrgyzes, Tadjiks, and Turkmens are the native population and constitute 84 percent of the total population. The largest non-native group is the Russians (8.3 percent); most of them live in Tashkent, in areas surrounding the capital and in provincial centers. Uzbek is the official language, and Russian the language of inter-ethnic communication.

Table 4. The basic parameters of water-land resources development in the Aral Sea Basin (on the territory of CIS)

<i>Indicator</i>	<i>Unit</i>	<i>1960</i>	<i>1970</i>	<i>1980</i>	<i>1990</i>	<i>2000</i>
Population	Million.	14.6	20.3	26.8	33.6	41.8
Irrigated area	1 000 ha	4 510	5 150	6 920	7 600	7 896
Irrigated area per capita	Ha	0.31	0.27	0.26	0.23	0.19
Total water diversion	Km ³ /year	60.61	94.56	120.69	116.27	105.0
Incl. irrigation	Km ³ /year	56.15	86.84	106.79	106.4	94.66
Specific diversion per ha	M ³ /ha	12 450	16 860	15 430	14 000	11 850
Specific diversion per capita	M ³ /capita	4 270	4 730	4 500	3 460	2 530
GNP	Bln.US\$	16.1	32.4	48.1	74.0	55.3
Including agricultural production	Bln.US\$	5.8	8.9	18.3	22.0	15.0

The Soviet era of national equity has left a problematic heritage, with enclaves of different nations separated from their native countries. Enclaves of Uzbeks inside Kyrgyz territory, or of Kyrgyzes and Tadjikes inside Uzbek territory, can lead to tension, bearing in mind the close national community ties.

Religion is separated from the State in all countries of the region, but most of the population belong to various religious groups: Moslems 77 percent, Orthodox and Catholic Christians 14 percent, Protestants 2 percent, and others 7 percent.

Fortunately in the last ten years ethnic and religious considerations have never affected water allocation and water operation in practice.

1.7. Economy of the Region

Use of water resources in Central Asia, mainly for irrigation, began more than 6,000 years ago. In pre-revolution times Turkestan, and in the Soviet era Central Asia, were developed mainly as sources of raw materials and as agricultural appendices of the federal state. This was reflected in low levels of processing industry in the region, and a concentration on industries to support agriculture, with a strong dependence on the metropolis. Intensive use of water resources started in the twentieth century, especially after 1960, driven by fast population growth and intensive development of industry and, in particular, irrigation. Such one-sided development, with no processing of agricultural production into final products taking place within the region, caused a rapid increase in water delivery from rivers total water diversion in the Aral Sea Basin in 1960 was 60.6 billion m³, and by 1990 it had risen to 116.271 million m³ (that is, by 1.8 times). Over the same period the population in the territory had grown by 2.7 times, the irrigation area had increased by 1.7 times, agricultural production by three times, and gross national product by almost six times (see Table 4). Understanding of the negative ecological consequences in the 1980s, together with the general economic depression that followed the disintegration of the Soviet Union in 1991, led to a fall in total use of water in the region. After 1994, as a result of the coordinated water saving policy accepted by Interstate Coordination Water Commission (ICWC) of the states of Central Asia, the target policy was to decrease the common water intake. In 2000 general water intake was 11.2 km³ less than in 1990 and stood at 105 km³.

During the last three decades of the Soviet era (1960–90), irrigated agriculture and the sectors of economy related to water management (preparation and initial processing of agricultural products, hydropower, construction and some others), contributed more than 50 percent to the GNP. The collapse of the former USSR and the unified currency (Russian Ruble) zone caused shocks to the economies of Central Asian countries as well as of all other NIS states. The severe disruption of production, trade and financial relations were the main reasons for the drop in general output, and agricultural output especially. Uzbekistan experienced the smallest output decline among the Central Asian countries, as well as the shortest period of contraction: five years, compared to six years in the Kyrgyz Republic, seven years in Tajikistan and Turkmenistan, and eight years in Kazakhstan in the ten years of market reforms that followed (1991–2001). During this period, Uzbekistan's GDP fell back to the level of the early 1980s, while in Tajikistan and Turkmenistan it slumped to that of the beginning of 1960s or even earlier, in Kazakhstan to the late 1960s, and in Kyrgyz Republic to levels seen at the beginning of the 1970s. Corresponding to the general decline, the overall contribution of agricultural production to the GDP now ranges between 10 percent (Kazakhstan) and 46 percent (the Kyrgyz Republic) (see Table 5).

It should be emphasized that in all countries agricultural output fell less than GDP and much less than industrial output. As a whole, in Central Asia, changes in agricultural production related to an increased share of food crop output (again, except in Kazakhstan). Further reforms, with more price incentives to the farmers and a better legal framework for land and water use, are important to promote labor productivity and better living standards for farmers and the rural population in general, who make up the majority of the population (63 percent) in all countries within the Aral Sea Basin. Despite the relative decline of agriculture's share, it still plays a significant role in the Aral Sea Basin, especially in the Kyrgyz Republic, Tajikistan, and Uzbekistan. It is also important in Turkmenistan (cotton and wheat) and Kazakhstan (grain). Independence after the Soviet Union's collapse (August–September 1991) was accompanied by a serious social threat to the majority of the population in the region. Thus, Central Asia, despite a high level of human development and social services, now has poverty levels comparable to some African countries and is on the same level as in Pakistan and India.

Table 5. Changes in the economic situation during the transition period

Country	GNP per capita (US\$)		By Sectors of Economy, %					
			Industry and construction		Agriculture, forestry and fishery		Service sector	
	1990	2000	1990	2000	1990	2000	1990	2000
Kazakhstan	2 310	1 493	36.1	34.2	28.0	21.3	35.9	44.5
Kyrgyz Republic	1 240	365	35.9	30.4	34.6	34.1	29.5	35.5
Tajikistan	910	321	33.7	27.9	27.1	23.8	39.2	48.3
Turkmenistan	1 490	820	33.6	35.1	28.6	17.9	37.8	47.0
Uzbekistan	1 700	985	32.5	19.9	31.3	34.0	36.2	46.1

Since the rural population was heavily dependent on irrigation, the water deficit had a severe impact on the social situation in some parts of the region. The last two years of water scarcity (2000–2001) caused social tensions and the migration of parts of the rural population from the lowlands of the Amu-Darya.

1.8. Some Historical Background to Current Challenges

Generations of peoples living for centuries and even millennia in the harsh arid and semi-arid climate across vast territories of the Turan lowlands, as well as in adjoining surrounding mountain and sub-mountain ranges, associated their existence, development, and welfare with water. The expression “Water means life” is more than just a slogan for the peoples of Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan, as well as Afghanistan, Sinthziang, and Iran. For them it is the reality that determines whether people can survive and prosper or are doomed to hunger and misery, or sometimes death. It is no accident that the development of irrigation in the region has been closely related to the progress of civilization, as this had been the case with ancient cultures that emerged at the same time (sixth to seventh millennia B.C.) in Egypt, China, Mesopotamia, India, and Central America. Central Asia was the motherland of many scientific discoveries connected with the need for water flow forecast, management, and use (algebra – Alkhorezmi; astronomy – Abu Ali ibn Sino, Ulugbek, and others). The relationships among Central Asian nations are rooted in deep traditions and a mutual, interrelated historical background that unites Central Asian nations into one family, heavily dependent on water use. Agriculture, for the most part irrigated, cattle breeding, fishery, household and industrial water use have always been crucial for the livelihood of the 70–80 percent of population who live in rural areas. From time immemorial, a way of life that was determined by the water factor stimulated the elaboration and strict observance of key principles of oriental and later Islamic water law (sharia) norms which reflected legal regulations of Zorostrism (the code of law known as *videvdat*) as well as centuries-old traditions and behavior patterns. This legal and customary framework included such provisions as communal ownership of irrigated land, and particularly of water; compensation for damage caused by water use or by actions affecting water; prohibitions on pollution of natural water sources; water law linked to irrigated lands; and common participation in all activities connected with maintenance of water systems, as well as flood control and managing other water-related disasters.

Before the nineteenth century this region saw the rise and fall of independent states such as Ariana, Bactria, Merv, Sogdiana, Bokhara, Khorezm and others, which never had problems relating to the allocation of water.

The colonization of Turkestan by Tsarist Russia left local water law unchanged, especially as it applied to communal participation in works related to the operation, maintenance, renovation, and rehabilitation of irrigation nets. The institution of “aryk aksakals” and “mirabs” – water managers elected by communities – was put on a sound basis.

Seventy years of Soviet power changed these principles by creating a strict and rigidly controlled system of centralized water management that worked in a top-down manner. Some of the systems that were managed accordingly to hydrographic boundaries included:

- water management of the Zarafshan river valley
- administration of the Amu-Darya downstream canals
- administration of the Kirov main canal.

This system made it possible to deliver and allocate water successfully by means of a huge water infrastructure with vast operational costs, covered at the expense of the federal government at inter-farm and up to on-farm levels, and which also included drainage. But this water system suffered from two immense shortcomings. First, the opinions of water users and consumers were not taken into consideration; as a result, the transition of agriculture and the Central Asian economy in general to market principles showed many water users to be insolvent and not self-sufficient. Second, environment considerations were largely ignored in favor of the needs of water users; hence ecological and sanitary requirements, along with the environmental needs of deltas, Priaralye, and the Aral Sea itself, were ignored and the scale of the problems was understated.

Some aspects of Soviet heritage, however, have had positive influences on current and future development of the region:

- In the period from 1960 to 1980 the so-called “integrated development of the Hunger Steppe deserted lands” was initiated, followed by other schemes, including the Karshy, Djizak, Syrkhan-Sherabad, Kyzylkum, and Yavan-obik projects, among others. These projects increased water demands enormously. Drainage systems were developed concurrently with irrigation; large numbers of settlements, productive enterprises, roads, and communication systems were constructed. Long before the worldwide campaign for integrated water resources management was launched, these works had given regional water specialists and economists the opportunity to understand the advantages of this advanced technology, and to gain experience in a type of operation and management that is nowadays spreading across the world.
- High levels of water education, science, and skills combined to provide a secure basis on which to develop significant potential among specialists engaged in water management.
- The teamwork of water specialists of the former Soviet Union republics – working under a single leadership in one system that followed similar standards, rules, methods, and approaches – created the right conditions for sustainable work by future generations: their aspiration has been to keep the coordinated approach that was formed in Soviet times.
- For six to eight years before the USSR’s collapse, the Soviet government paid more attention to plans for improving the situation in the Aral Sea Basin, and this led to approval of the “State Program on Priaralye” in 1986, the creation of Basin Water Organizations (BWOs), and allocation of huge investments into various projects, particularly into water supply and social improvements (see Figure 2). These provisions had an immense inertial effect, ensuring smooth operation and transition of water management from the former political formation to a different

one – from imperfect socialism to other forms of primary accumulation of capital with various degrees of transition accomplished in different countries.

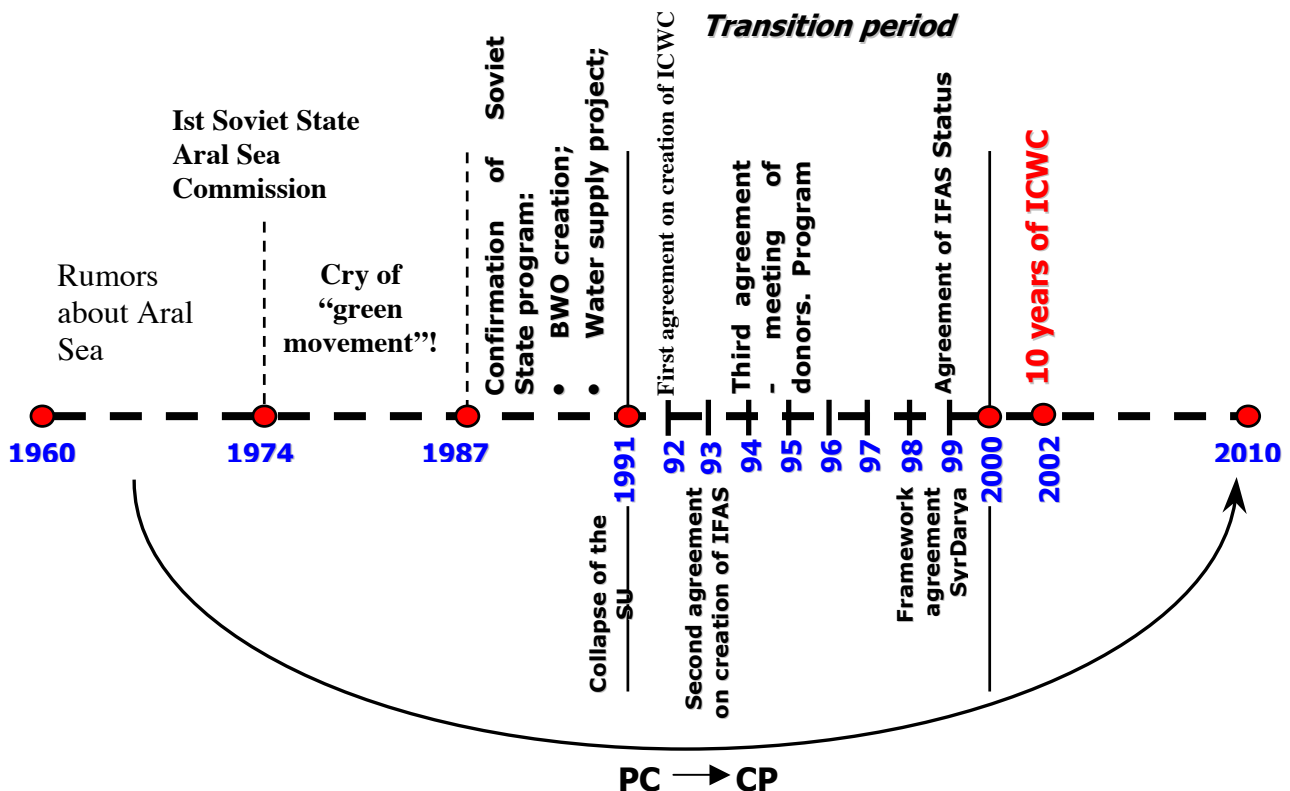


Figure 2. Chronology of the Aral Sea Basin events

2. ANALYSIS OF PRESENT SITUATION

2.1. Scenarios of National Development

Natural, historical, and geographic conditions should be analyzed to show clearly the unequal distribution of natural resources between the new independent States. The principal inequities are the following: the states of the upper watershed are wealthy in water resources per capita; the states in the lower and middle part of the basin are rich in land and mineral resources, which are lacking in the upper watershed states.

Agreements among the Heads of state (of March 26 1993 and of January 11 1994) defined major milestone provisions for cooperation on transboundary waters; however there is clearly no way to preserve the desired status quo of former water allocation and use because of emerging geopolitical and economic differences in development among Central Asian countries.

The disruption of economic ties at the time of independence immediately revealed the various advantages and disadvantages of the five countries in terms of natural resources and geographic location. There are large deposits of mineral – especially fuel – resources in Kazakhstan, Turkmenistan, and Uzbekistan; these countries also enjoy sufficient land resources per capita (excluding densely populated zones in Uzbekistan). The Kyrgyz Republic and Tajikistan in particular have few mineral and land resources, but at the same time water resource formation zones are concentrated here, and these countries have powerful hydro-energy capacities. The Central Asian countries, apart from Kazakhstan and Turkmenistan, are geographically constricted with no outlet to the sea; communications are complicated, overstretched,

and expensive, thus hindering access to international food and other commodity markets. During the Soviet period their economies had been focused along raw material (agrarian) lines, and they still depend heavily on Russia for all kinds of industrial products.

Trends in economic development have also differed drastically from country to country. Kazakhstan, for example, has moved towards complete freedom of market relations, with very little interference by the state, and little state support for various branches; the great majority of the economy, including land, has been privatized and self-financing principles have been introduced into all sectors (the water sector included). In Uzbekistan and Turkmenistan, in contrast, there has been very strong regulation by the state of all such relations and only a gradual transition to purely capitalistic approaches. The Kyrgyz Republic and Tajikistan have adopted intermediate positions.

All these factors resulted in the transformation of previous policies and agreements, which had to be adapted to the real dynamics of the states' formation in a new economic and geopolitical situation. They led to various deviations from approaches and management principles that existed in Soviet times:

- The Kyrgyz Republic, due to its lack of fuel resources, started to use the Naryn cascade, part of the infrastructure created in the Soviet times, in order to gradually replace expensive organic fuel by cheap electric energy. With this objective they changed the mode of the Naryn's regulation from an irrigational (accumulating water in winter and releasing it in summer) to a hydro-energy function (accumulating water in summer and releasing it in winter). To ensure continuation of the former fuel provision system from its neighbors, Kyrgyz Republic offered rather crushing sale terms for summer electric energy in return for barter gas and coal supplies from Kazakhstan and Uzbekistan at dumping prices. In the 1998 Agreement between Kazakhstan, the Kyrgyz Republic, and Uzbekistan these new "rules of the game" were accepted but, due to conflicts of interests between energy and fuel suppliers, this agreement has been difficult to fulfill. This is because each of players is trying to make profit at the expense of the others and refusing to accept parity. Thus, the Naryn-Syr-Darya power stations cascade is a "prisoner" of this agreement.
- Irrigated agriculture, for centuries a priority in socioeconomic development of the region and still the basis of life support and employment for 60–70 percent of its fast growing rural population, has lost its apparent great profitability to a significant extent due to a variety of external and internal reasons. A significant factor affecting the regional water sector is the sharp fall in world prices for irrigated agriculture produce that has occurred during the last ten years: rice has fallen by 50 percent (from \$300 to 150 per tonne); wheat by 40 percent (from \$200 to 120 per tonne); cotton by more than 50 percent (from \$1,760 to 800 per tonne). This makes irrigation unprofitable, and farmers cannot actively participate in supporting the water sector while earning incomes of \$100–200 per hectare instead of the \$500–1,600 they made in the past. At the same time the social value of irrigation, which together with other related sectors provides employment for 40 percent of the (mostly rural) population, remains important. Any disturbances to the sustainability of water supplies, caused by deviation from agreed schedules of water delivery, lead to immense social damage, almost to the point of disaster, as we have been witnessing for the last two years in downstream portions of the rivers. The current "order" of water-energy exchange seems unsustainable, not only because of the lack of assurances on the part of the states that they will observe the order of water distribution, but also because of artificial terms for water releases from reservoirs, which are unacceptable to the majority, combined with evident speculative prices.

- Economic weakness of economies and significant (though varying in extent) decreases in national income per capita in all countries of the region have led to a sharp reduction in subsidies and support for agriculture and the water sector, and reduced provision to agriculture of tractors, machinery, fertilizers, and chemicals. The infrastructures of agriculture and water management have deteriorated, especially at the on-farm level, and as a result water supply and reclamation of irrigated lands has sharply declined; this cannot but affect crop yields.
- The introduction of market mechanisms into agriculture (privatization, breaking up large state and collective farm into hundreds and thousands of small farms) was not combined with the establishment of proper infrastructures for commodity production and water distribution and use. As a result vast complications emerged in providing the new private farmers with corresponding services, as well as with seed, technologies, extension services and water. An almost twofold decrease in general incomes across the region, together with a reduction of profitability by several times, led to immense impoverishment of the rural population, while at the same making it impossible for agricultural producers to protect their interests through their own strengths, as has been done by energy and fuel producers emerging on the free market. Comparison of land productivity data shows that the average for Central Asia was 1,140 rubles or over US\$2,000 per hectare of arable land in 1980; this has now fallen to nearly US\$700 per hectare!
- The challenges of the new situation brought new young leaders to the fore in local authorities, and these young managers are not sufficiently experienced in using real instruments for creating, managing and improving land productivity. In the past, more than half the district and province senior managers were agricultural and water specialists, but at present most local managers do not clearly realize that water is useful only then when it is within the limits of demands. All these elements, combined with inadequate ecological education, pave the way for parochial aspirations on the part of local authorities to interfere in water allocation and distribution. This hinders equitable and reasonable water allocation and causes damage to naturally complex demands for water, which become more acute during years when water is scarce.
- Shortages of funds have affected the conditions of hydromet and meteorological nets, and thus the quality of water and weather forecasts. This in turn has a clear impact on planning and regional water resources operative management. Though some donors provide support along these lines, the activities are not target oriented; they are fragmented and not always effective.

2.2. Institutions

The need to integrate water resources management at the basin level was fully understood in the period before independence. Although the centralized water allocation system of the Federal Government (the former Ministry of Water Resources of the USSR) consulted with the governments of five republics, analysis of water shortages in 1974–1975, and especially in 1982, indicated that environmentally sound and quantitatively strict water supply along a river was impossible without a single water management organization for the whole basin. Such a basin-wide organization could manage water in the rivers in accordance with the rules and schedule agreed among the republics and approved by the ministry. The framework for this organization was approved in 1987, and as a result two Basin Water Organizations were established: BWO “Amu-Darya” with headquarter in Urgench, and BWO “Syr-Darya” in Tashkent. By State Decree No. 1110 (adopted in 1987) all headworks with

water discharge of more than 10 m³/s on both rivers were transferred to the BWOs' operation and maintenance.

It is necessary to underline some disadvantages of the above-mentioned schemes. First, there was no agreed order of allocation and use of undergroundwaters that have transboundary locations. Second, there was no agreed order or limits for return flow utilization and water quality management.

The funding for the BWOs was provided by the Ministry of Water Resources from the federal budget for operations, maintenance, rehabilitation, and development. BWO activity was organized as follows. On the basis of forecasts prepared by the Central Asian Hydromet Services, the BWO presented to the Ministry an annual plan twice a year (in March for the vegetation period and in September for the non-vegetation period). These plans had been agreed with the republics, and covered water releases from the reservoirs and water delivery to each water management region within the basin. The water share for each republic was established in accordance with water allocations, which were approved by the Federal State Planning Committee on the base of "master plans" for both rivers.

2.2.1. The New Period of Interrelations after Independence

Concerns to create a mechanism for regional collaboration in organizing and financing water resources management have arisen since independence. The Interstate Commission for Water Coordination (ICWC) was established in accordance with the "Agreement on collaboration in the sphere of joint water resources management within interstate water sources" dated February 18 1992, and approved by the heads of state on March 23 1993. The ICWC is a collective body that manages transboundary rivers and is responsible for: water allocation among countries; monitoring; and preparing preliminary assessments of proposals on institutional, ecological, technical, and financial approaches, based on decisions mutually agreed by all sides. The two BWOs (Amu-Darya and Syr-Darya), the Scientific-Information Center, and ICWC Secretariat are executive bodies of this Commission.

The ICWC took over responsibilities for water management in both basins directly from the former Soviet Ministry of Water Resources, but with appropriate changes reflecting the creation of five new independent states:

- The commission has five members appointed by the governments. They are equal in rights and obligations. They meet once a quarter to decide on all issues related to their activities and responsibilities. The decisions are reached only on a consensus basis.
- Two BWOs were transformed into the executive bodies of ICWC; in a similar way a part of the Central Asian Scientific Institute for Irrigation (SANIIRI) was transformed into the Scientific-Information Center (SIC) of ICWC to act as a think-tank for the commission.
- All issues for the ICWC meetings, in accordance with their agenda, should be prepared by the executive bodies and disseminated among the members twenty days before each meeting; this allows for preparation of comments and opinions by each country.
- The principles of water allocation that existed in Soviet times have been retained for the purpose of annual planning until new regional and national water management strategies can be developed and adopted.

The mandate of ICWC defines its main functions as follows:

- Development and implementation of annual consumption limits for each state, and operation regimes for large water reservoirs; water allocation control, taking into account actual water availability and the water-economic situation; setting

an annual water supply volume in the river deltas and the Aral Sea as well as sanitary releases on rivers and canals; operation, support and maintenance of headworks on the rivers, which are under the supervision of the BWO.

- Definition of common water management policy, and development of its main directions with regard to the interests of the population and the economies of the state-founders; rational water use, conservation, and programs for increasing water availability within the basin.
- Drawing up recommendations to the governments on the development of common price policy and compensation for possible losses connected with joint water resources use, as well as on the legal basis of water use.
- Coordination of large project implementation and joint use of existing water potential.
- Creation of a single database on water resources use, monitoring of irrigated lands, and provision of general environmental monitoring.
- Coordination of joint research to support decisions on regional water-related problems and preparation of master plans.
- Facilitating cooperation in introducing water-saving technologies, as well as irrigation methods and techniques providing improvement of irrigation systems and water use.
- Development of joint programs to increase awareness and prevent emergencies and natural catastrophes.

The mandate of the BWOs includes:

- Ensuring a timely and guaranteed water supply to water users in accordance with ICWC-established limits for water intakes from transboundary water sources. Control over releases to the deltas and the Aral Sea according to established volumes, as well as operative control over limits, interstate reservoir operation, and water quality.
- Development of plans for water diversions by main water intakes, reservoirs, and cascade operation regimes; preparation and coordination with ICWC of water limits for all water consumers in the Amu-Darya and Syr-Darya basins.
- Creation of automatic control systems for water resources management in the Amu-Darya and Syr-Darya basins; organization of measurements of the main water intakes, and provision of the required devices.
- Performance and monitoring, together with Hydromet services, of measurements on border points to ensure accurate accounting of transboundary river flow for the purpose of balancing allocations.
- Implementation of complex reconstruction and technical operation of hydro-structures, head water intakes, inter-republic canals, and automatic control systems.
- Research, design, and construction of new water structures, and reconstruction of existing structures, which are under the BWOs' administration.

The SIC of the ICWC is responsible for preparing all the technical, institutional, financial, and legal proposals in close cooperation with ministries and members of the ICWC. Those proposals should address the improvement of general activities in terms of water use and environmental sustainability, and should then be approved at ICWC meetings and submitted to IFAS.

In addition, the SIC provides the ICWC's organizations with information, maintains international exchanges, prepares and implements technical and scientific programs of regional importance, handles and updates the regional database, issues bulletins and ICWC publications, and supports the ICWC Training Center. The SIC is responsible for preparations for ICWC meetings.

The 1992 agreement provided that water allocations should be based on "existing uses of water resources" and that the two river basin agencies (BWOs) should continue to perform basin management functions subject to control by the ICWC. Subsequently, the ICWC agreed that the 1992 agreement should remain in force until a *Regional Water Management Strategy* had been formulated that responded to new realities and which outlined more objective mechanisms and principles for water allocation and rational use.

Later (in 1993), with the Aral Sea Basin Program extension, two new organizations were established. Those were: the Interstate Council for the Aral Sea (ICAS), set up for program coordination; and the International Fund for Saving the Aral Sea (IFAS), which had the purpose of raising and controlling funds. Later these two bodies were merged into one. In 1997 the following restructuring of existing interstate organizations was done:

- ICAS and IFAS were combined and re-established into the new IFAS under the chairmanship of the president of one of five states, who is replaced every two years.
- The executive committee of IFAS (EC IFAS) was established with responsibility for providing general coordination for the Aral Sea Program.

The main objectives of the IFAS Executive Committee are:

- to ensure practical implementation of the decisions of the heads of state
- to implement appropriate projects and programs on the Aral Sea Basin
- to coordinate the activities of branches located on the territories of the state-founders
- to facilitate ICWC activities
- to expand interactions with international organizations, donor countries, and ecological and other funds to enhance solutions of environmental problems
- to raise and allocate funds
- to prepare documents and IFAS Board meetings, as well as conferences and meetings of the heads of state on the Aral Sea problems.

The political level of decision in this hierarchy belongs only to the Board of IFAS. The most important issues can be decided only at the meeting of the heads of state followed by their recommendation/approval for IFAS.

In January 1994, the presidents of the five Central Asian countries met in Nukus (Karakalpakstan) and approved a Program of Concrete Action to improve the environmental situation in the Aral Sea Basin and the region's social and economic development generally. The Aral Sea Basin Program (ASBP) included eight thematic sub-programs, the first of which addressed formulation of a general strategy for water distribution, rational use, and protection of water resources. The first stage of this work was completed in 1997 by the presentation of the fundamental provisions of the water resources management strategy. As a further step, a new Global Environment Facility (GEF) Project with five components started in 1998. Component A-1 addressed the finalization of the water and salt management strategy for the Aral Sea Basin, and its activity continues today.

Finally the existing structure of the interstate organizations responsible for water resources management evolved over a considerable period (1991–1999), and the division of their responsibilities was confirmed by the heads of state in an agreement dated April 9 1999, signed in Ashgabad (Turkmenistan). These are described below (see also Figure 3, page 19).

2.2.1.1. International Fund for Saving the Aral Sea (IFAS)

The board members are the deputy prime ministers of five states. This is the highest political level of decision-making before approval by the heads of state (if appropriate).

2.2.1.2. IFAS Executive Committee

This is a permanent body that includes two representatives from each state and implements the IFAS Board decisions through the IFAS National Branches. In addition, the executive committee of IFAS, on behalf of the Board, can establish agencies for various regional projects and programs implementation. (See Figure 3.)

2.2.2. Institutional Management at the National Level

Though all the countries began from the same level in 1991, developmental trends, rates of economic transformation, and transition from the command system to a market economy have differed widely.

2.2.2.1. Kazakhstan

Kazakhstan has been a pioneer in the application of market principles to all economic sectors, including water management. Water regulation, management, and operation have already been privatized at all hierarchical levels. The whole institutional framework from the bottom to the top is self-financing, excluding the State Committee for Water Resources. Representation of the water sector in the government via the Ministry for Natural Resources, without delegation of economic and financial functions to the committee, is inadequate. Evidently, the status of the committee will be strengthened in the near future.

A big step forward will be to decrease the influence of managerial control and reinforce organizations within the eight basin water administrations covering the main basins. These organizations distribute water among water users, grant water licenses, set water supply limits and reservoir operating regimes, keep water accounts, and so on. Provinces have also Republican State Enterprises for water management (RSE) and municipal sanitation services (MSS) reporting, first, to the Committee for Water Resources and, second, directly to the Provincial Akimiyats (local governments). Both the RSEs and the MSSs use *rayon* (district) water organizations as their branches and are based on self-financing and administrative management.

Charges have been introduced for water as a resource and for organization and management of water systems, networks and structures. State budget support is provided only for works connected with water cadastre and potable water quality. Financing, both in municipal services through public associations and water users cooperatives and in irrigated agriculture through Water Users Associations, is insufficient for sustainable support of all activities, particularly drainage and water supply works. As a result a large portion of the capital stock is out of operation (almost 1,200 km of rural watercourses, a million hectares of irrigated land, and several hundred vertical drainage wells).

Although the government has proclaimed that water is public property, the privatization of some major hydroelectric power stations (HEPS) has caused problems for effective water management (Chardara dam HEPS, etc.). This situation can be fundamentally improved through partial government support of water users' associations, especially assistance for vertical drainage and rural watercourses by municipal and government shares in joint-stock companies and cooperative household and irrigation organizations. The first steps in this direction have been taken by governments through some loans from the International Bank for Restructuring and Development (IBRD) and the Asian Development Bank (ADB) for rehabilitation of

drainage and irrigation systems with proper government guarantees and participation in cost sharing (in the Mahtaaral and Turkestan region). In the future coverage of costs by water users can be increased, while government subsidies can be decreased as agricultural profits and personal incomes increase.

2.2.2.2. *The Kyrgyz Republic*

The Kyrgyz Republic has adopted a more moderate development of water management: the transition to market rules is accompanied by government support for water networks' operation and rehabilitation, particularly at inter-*rayon* and inter-provincial levels. The former Ministry for Water Resources has been amalgamated with the Ministry for Agriculture to form the Ministry for Agriculture, Water Resources and Processing Industry. This state structure provides water governance through a self-supporting Department for Water Resources under the leadership of a deputy minister. This department directly controls irrigated agriculture, and this creates certain sectoral contradictions in water use. Other state structures are the Ministry for Nature Conservation, Glavgidromet (the main hydrometeorological service), the joint-stock company Kyrgyzenergo, and others.¹ Restructuring to combine state, municipal, and business property was conducted at lower managerial levels. Though the Ministry for Agriculture and Water Resources established basin organizations, their managerial functions are still based on the provincial level. The government plans to assert its right of ownership and control over various strategic structures, such as dams, reservoirs, HEPS, and main canals. At the same time it is expected to privatize water management and irrigation systems and gradually reduce the state share by establishing joint stock companies. Hydroelectric power production has not been privatized yet. However, the government are planning approaches to privatization that involve shared ownership of both large and small HEPS; at the same time, Kyrgyzstan is developing and constructing new reservoirs with HEPS, such as Kambarata-1 and Kambarata-2, using private capital and loans, including foreign investors and stockholders. Urban water supply and sanitation are also tending towards privatization and cooperative forms, with priority given to transferring operation and maintenance of these systems to private ownership.

In effect, all water management on the level of former kolkhozes and sovhozes has been transferred to water users through the creation of a network of water-user associations (WUAs). The accepted legal basis for WUAs makes it possible to transfer responsibilities from the next level (*rayon* and even inter-*rayon*) to the WUAs Federation.

A considerable shortcoming is that the Zjogorku Kenesh (Parliament of Kyrgyz Republic) has jurisdiction over price policy regulation and water tariff setting. This has politicized the economic mechanisms for water management, which are insufficiently flexible and incapable of maintaining water and irrigation systems at an appropriate level. Though state legislation has solved most legal issues concerning WUAs in advance, a range of issues on their establishment and functioning has not been settled in legal or institutional terms.

2.2.2.3. *Tajikistan*

Tajikistan manages the water sector through the Ministry for Water Resources. The country has been slow to adopt privatization due to four years of war, but at present is developing in the same way as the Kyrgyz Republic. The principal difference is in irrigated agriculture since the government canceled its financial support and is now trying to keep collective farms as a basis for the cooperative development of private initiatives and for support of irrigation systems. Although a new code adopted in 2000 declared renovation of capital stock in the water sector as one of the main areas for improvement, much remains to be done here. First, while seeking ways to restructure

agriculture, one should take into account the shortage of irrigated lands (only 0.10–0.12 ha per capita). Under such conditions privatization of the water sector and agriculture must meet principles of social equality. Particular features of Tajikistan's policy are licensed water use on a chargeable basis, and rights granted on a tender basis to manage waterworks within irrigated area through contracts between *khukumat* (local administrations) and water users. There is also a need for a transition to water management on a hydrographic basis in view of intersectoral interests and possible privatization of other water-using sectors, such as hydropower engineering, communal services, and recreation. The country has major interests in the privatization of the biggest HEPS, among them the Ragun and Dasht & Djun .

2.2.2.4. *Turkmenistan*

Turkmenistan has a specific approach to water as a public social resource. This is reflected in management structures. The main water-related managerial organ is the Ministry for Water Resources. The government has retained direct control of water management in all sectors, including irrigation, water supply, and hydropower. Water, electricity, and gas are free of charge for the population. Consumers only pay if they exceed the established limit, in the form of a fine for irrational use of natural resources. There are some options for privatization in irrigated agriculture. This can be done in the form of concessions that ensure fulfillment of a government requirement for certain crops; any produce beyond the required level can be sold at market prices. Private water supply and sanitation services are also possible in the water supply sector, while in hydropower privatization of small hydroelectric stations is allowed.

2.2.2.5. *Uzbekistan*

Uzbekistan is gradually moving to a market economy in the water sector, as well as in other economic sectors. At the same time it keeps substantial budget subsidies to ensure the sustainability and maintenance of the huge capital stock created previously. However, the situations in water supply, irrigation, and hydropower are different. In the water supply sector, the trend has been towards transfer of services to cooperative organizations and joint-stock companies. The government controls the hydropower sector, apart from small hydroelectric power stations. The government proposes to privatize the latter on a small to medium scale, and to construct new HEPS through public investment. It will enable the private sector to develop micro and small HEPS. It has now been decided to reform the power engineering sector by separating power generation from power transportation.

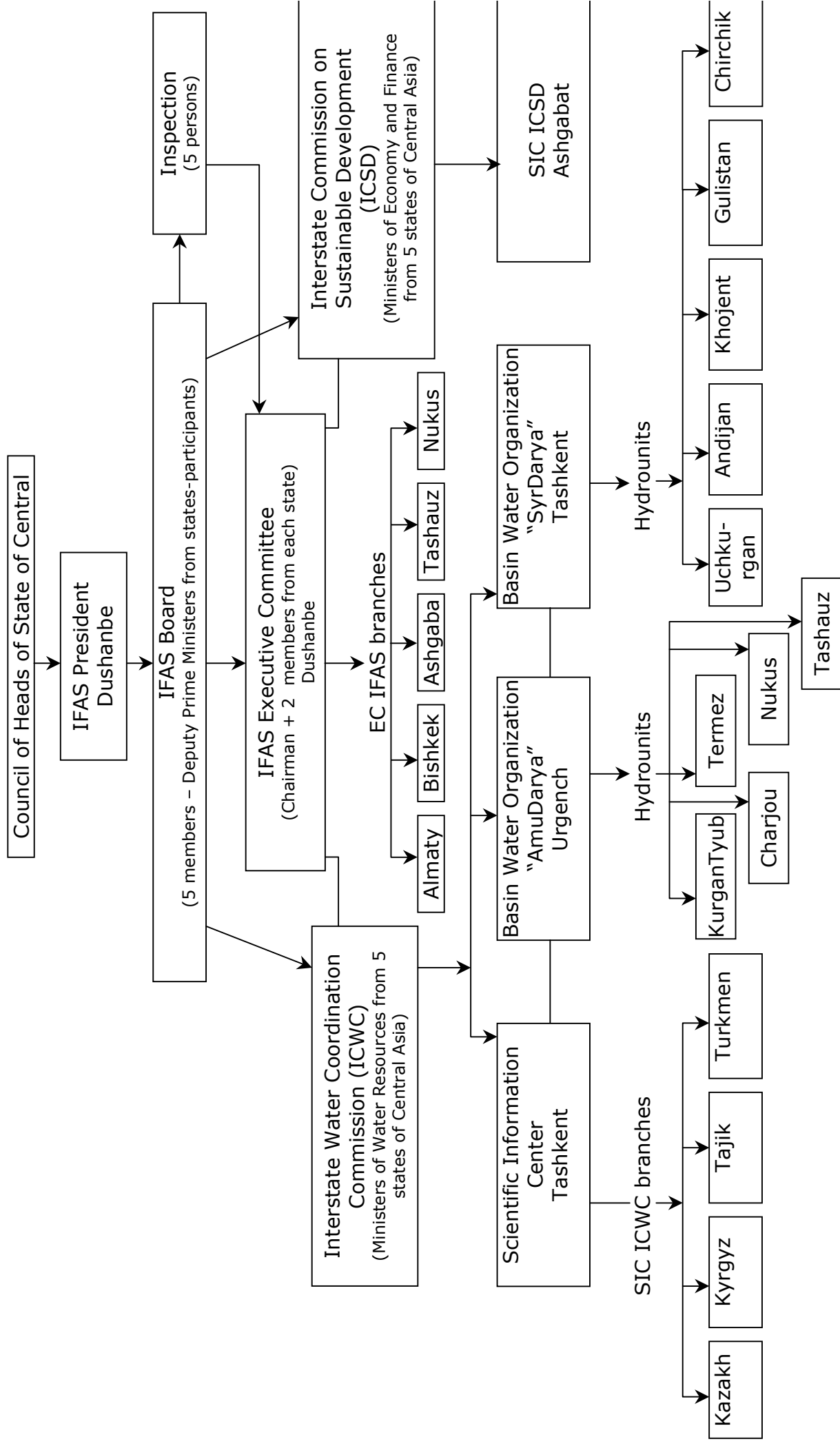
Irrigated agriculture presents a more complicated problem. The government plans to change the water governance system from one defined by administrative boundaries to one respecting hydrographic ones. In these conditions the water user associations organized at the lower level of hierarchy (former collective farm) should be responsible for water delivery, operations, and maintenance of irrigation and drainage systems. In some cases amalgamation of their responsibilities is possible during privatization of *rayon* water organizations. Transfer of irrigated lands to private companies through concessionary contracts also takes place as in Turkmenistan.

Priority is given to the future transition to basin and system water management subordinated directly to the national level, to the involvement of water users, and to the introduction of integrated management principles similar to French and Spanish models.

The organizational chart illustrates the structure of the Interstate Water Coordination Commission (ICWC) and its various branches. At the top is the Council of Heads of State of Central Asia, which oversees the IFAS President in Dushanbe. The IFAS President oversees the IFAS Board (5 members - Deputy Prime Ministers from states-participants). The IFAS Board oversees the Interstate Water Coordination Commission (ICWC) (Ministers of Water Resources from 5 states of Central Asia), the IFAS Executive Committee (Chairman + 2 members from each state) in Dushanbe, and the Inspection (5 persons). The ICWC oversees the Interstate Commission on Sustainable Development (ICSD) (Ministers of Economy and Finance from 5 states of Central Asia) and the Scientific Information Center in Tashkent. The ICSD oversees the SIC ICSD in Ashgabat. The Scientific Information Center oversees the SIC ICWC branches, which include Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Tashkent. The IFAS Executive Committee oversees the EC IFAS branches, which include Almaty, Bishkek, Ashgaba, Tashauz, and Nukus. The EC IFAS branches oversee the Basin Water Organization "AmuDarya" in Urgench and the Basin Water Organization "SyrDarya" in Tashkent. The Basin Water Organization "AmuDarya" oversees Hydrounits, which include KurganTyub, Termez, Charjou, and Nukus. The Basin Water Organization "SyrDarya" oversees Hydrounits, which include Uchkurrgan, Andijan, Khojent, Gulistan, and Chirchik.

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graph TD
    Council[Council of Heads of State of Central Asia] --> IFAS_President[IFAS President  
Dushanbe]
    IFAS_President --> IFAS_Board[IFAS Board  
(5 members - Deputy Prime Ministers from states-participants)]
    IFAS_President --> ICWC[Interstate Water Coordination Commission (ICWC)  
(Ministers of Water Resources from 5 states of Central Asia)]
    IFAS_President --> ICSD[Interstate Commission on Sustainable Development (ICSD)  
(Ministers of Economy and Finance from 5 states of Central Asia)]
    IFAS_President --> Inspection[Inspection  
(5 persons)]
    IFAS_Board --> ICWC
    IFAS_Board --> ICSD
    IFAS_Board --> Inspection
    IFAS_Board --> IFAS_Exec[IFAS Executive Committee  
(Chairman + 2 members from each state)  
Dushanbe]
    IFAS_Exec --> ICWC
    IFAS_Exec --> ICSD
    IFAS_Exec --> EC_Branches[EC IFAS branches  
Almaty Bishkek Ashgaba Tashauz Nukus]
    EC_Branches --> Basin_AmuDarya[Basin Water Organization "AmuDarya"  
Urgench]
    EC_Branches --> Basin_SyrDarya[Basin Water Organization "SyrDarya"  
Tashkent]
    Basin_AmuDarya --> Hydrounits_AmuDarya[Hydrounits  
KurganTyub Termez Charjou Nukus]
    Basin_SyrDarya --> Hydrounits_SyrDarya[Hydrounits  
Uchkurrgan Andijan Khojent Gulistan Chirchik]
    ICWC --> SIC_ICWC[Scientific Information Center  
Tashkent]
    SIC_ICWC --> SIC_ICWC_Branches[SIC ICWC branches  
Kazakh Kyrgyz Tajik Turkmen Tashkent]
    ICSD --> SIC_ICSD[SIC ICSD  
Ashgabat]
  
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Some significant questions of institutional importance that need to be explored in more detail relate to public participation, public awareness, and the influence of local (administrative and municipal) bodies on water allocations. Although in the Soviet era the water management organizations were mostly closed to public participation, the situation has since changed to a considerable extent, but not to the same degree in all states. More broad, open public awareness of water and land issues has been found in Kazakhstan and the Kyrgyz Republic, less in the other three states.

At the transboundary level, much information can be discovered in the interstate newspaper the *Times of Central Asia* (published with the assistance and leadership of the Italian Government in Bishkek). The ICWC publishes a quarterly *Bulletin of the ICWC* with information about ICWC activity in Russian and English, which is available in paper form or by e-mail, while the IFAS puts out a fortnightly bulletin by e-mail, mostly at the national level and to NGOs who are registered to receive IFAS or ICWC communications.

Some NGOs disseminate this information among their local recipients on a lower level. Around the region, more than 160 NGOs are registered as recipients of ICWC. Unfortunately, with some exceptions, information related to water and other natural resources does not have a high profile at national, provincial or even local levels.

Public participation has, strictly speaking, only taken place at the lowest level: that of WUAs. This is the case in Kazakhstan and the Kyrgyz Republic, while some preliminary steps have also been taken in Uzbekistan and Tajikistan, but not in Turkmenistan. The strategy prepared by the ICWC envisages public participation developing from the basin level through the medium of basin committees, which should bring together representatives of different provinces, economic sectors (especially hydropower, ecology, agriculture, and water supply), along with government bodies and NGOs. Some proposals in the form of the interstate agreements were suggested by IFAS and ICWC.

2.3. Legal Basis

Water relations need a new interstate and national legal basis, because the rivers in the region are now transboundary resources. Independence and the transition to a market economy also require new juridical regulations. The Central Asian states responded quickly to the need for a new legal basis for water allocation and management. On September 12 1991, the water ministers of five countries declared that joint water resources management would be established on the basis of equity and mutual benefit. To overcome the inherited inter-regional water problems and minimize ethnic tensions, the five Central Asian countries signed an interstate water agreement on February 18 1992. Under the terms of this agreement about water resources management in the Aral Sea Basin, water allocation was to be based on the existing use of water resources, and the two river basin authorities should continue to perform basin management under the control of the Interstate Commission for Water Coordination. All the water resources of the region (surface, underground, and drainage) are classified into either transboundary (interstate) resources, which are located on the territory of two or more countries, or national ones, located on the territory of one country and not interacting with transboundary water courses.

Each state has the right to manage the national resources on its own territory and also part of the transboundary water (within limits agreed with other countries) providing it does not damage the resource. The Aral Sea and its deltas have been defined as an independent water consumer that has its own water quota. Transboundary water is in the common ownership of all the countries and its development, protection, and use are to be carried out on the basis of interstate agreements by the inter-regional bodies, in response to national requirements and regional interests.

Existing documents do not ensure proper water use and control. This is due to the fact that the existing framework agreements do not cover all the issues of joint transboundary water management in Central Asia. Water flows to the Aral Sea are not secured, emergency conditions are created, and water use is still inefficient. Therefore, legal protocols should be developed to improve joint water use in the Aral Sea Basin.

Specific issues are related to national water laws. The original water law of the five countries was based on the principles of Soviet water law, but national legal regulations have developed in steadily different ways and directions. The most market-oriented legislation is found in the Kyrgyz Republic and Kazakhstan. They separated issues related to WUAs from water law, while Turkmenistan and Uzbekistan have preserved state regulations that create many obstacles to the implementation of market mechanisms. Discrepancies in national legislation create various conflicts with international water regulations at the interstate level. For example, a special law of the Kyrgyz Republic requires other countries to pay for water that the republic exports to them.

2.3.1. Correlation with Principal International Water Laws

Unfortunately, international water law cannot serve as a good guide for the definition and elaboration of new legal regulations in the Aral Sea Basin; in the most important aspects, the interested states have been unable to find clear recommendations in the main documents relating to water law. Two conventions (the ECE/UN Convention of 1992 and the UN Convention of 1997), which contrast with the Helsinki Rules of 1966, cause confusion in understanding particular principles for specialists from the region. The following questions remain unanswered:

- What is the subject of joint actions of the riparian countries: a watershed (as in the Helsinki Rules), transboundary water resources, or an international watercourse? From the hydrological viewpoint, the notion of a "watershed" conforms to the principles of integrated water resources management (IWRM). It requires common basin (not river) management. The notion of "transboundary water resources" (Convention ECE/UN 1992) is more narrow, and the notion of an "international watercourse" (Convention UN 1997) is incomprehensible and is complicated from the hydrological point of view.
- What are the criteria for "equitable and reasonable" water use, which should make it possible to formulate principles of water allocation among countries?
- The conventions do not preserve the principal provision of international law: "not to cause harm." Also neither convention contains "previous water use" as a factor of water use, which was presented in the Helsinki Rules.
- What are the rights of present water users if limited development or degradation of rivers, deltas, and water bodies has previously damaged them?
- Why do these documents shift their terms from *any* damage to *sensible* damage and then to *significant* damage? The parameters of *sensibility* or *significance* are not defined. What should be agreed if the damage has been already caused by previous activities?

Those points could be given as recommendations to states about how they should approach principle of water allocation by taking into account equity, parity, "do no harm," and so on.

2.3.2. Legal Doctrines

Joint activities within a framework of legal documents and regional cooperation face a range of problems in representing different views that create obstacles to successful development of such activities:

- Upstream countries insist on revising former interstate water quotas in view of the restrictions imposed on their development, while downstream countries try to keep the status quo.
- Upstream countries are particularly interested in increasing use of water for hydroelectric purposes, and insist on schedules of releases from main reservoirs that are favorable to themselves, or demand compensation from downstream countries.
- Downstream countries do not cover the costs of stream-flow regulation, since in their opinion this regulation does not meet their interests.
- All the countries have declared in their laws a right of sovereignty over their water resources, forgetting that most (or a substantial share) of these waters relate to transboundary rivers or international waterways and are subject to special considerations.
- The countries, particularly upstream ones, do not want to recognize rules of the international water code such as "do not harm" and "polluter pays."
- All the countries in practice ignore environmental problems, including in-stream requirements.

In the meantime it is necessary to shift from clearly opposed positions to a search for mutual compromises and to the creation of a legal basis that takes account of the states' concept of "absolute territorial integrity." There is no other way for Central Asian countries.

2.4. Financial Aspects of the Water Sector

Water management activity in the Central Asian states is funded by state budgets and by payments for water services. In different countries the state contribution to water management varies between 40 and 100 percent. Actual costs for operation in all countries of the region are not more than 50 percent of the amount needed for proper maintenance (see Table 6).

Water charges could be conditionally divided into three elements:

- payment for water as a resource
- payment for services on water delivery to farm boundaries
- payment for services connected with the operation and maintenance of irrigation and drainage networks.

The amount charged varies in different countries, depending on government policy and state participation in water management sector support and development, water resources conservation, pricing policy for agricultural production, and so on. All kinds of water users except agricultural ones pay for water as a resource. The payment, as a rule, is symbolic. Water users who pay for water are industrial enterprises, power stations, material enterprises, and the like. These enterprises pay in accordance with the established rate for the current year, which depends on user category and water source (surface or underground). Water services for irrigation water are payable in Kazakhstan, the Kyrgyz Republic, and Tajikistan. In Uzbekistan and Turkmenistan irrigation consumers pay only for excessive water use beyond a set limit.

Table 6. Actual operational costs of water management in Central Asian countries and their conformity with demand

Indicators	Kazakh- stan (south)	Kyrgyz Republic	Tajik- istan	Turkmen- istan	Uzbek- istan
Needed operational costs	32.0	115.50	117.0	2 139.0	575.0
Actual operational costs, including: budget financing	1.6	5.28	9.75	39.8	392.0
water users' fee	0.32	3.40	7.10	39.8	392.0
	1.28	1.88	2.56	–	–
Actual operational costs as % of demand	5.0	4.60	8.30	18.8	68.1
Specific needed costs, \$ per ha	111.3	108.90	162.00	127.9	137.0
Specific actual costs, \$ per ha	5.6	5.00	13.50	24.0	93.3

Note: All figures in million \$US.

Services for maintenance and repair of the on-farm irrigation and collector-drainage network could be provided by state water divisions or by associations of water users (WUA). In all cases the water users pay for these services.

In Soviet times capital investments in the water sector, including water resource conservation and land reclamation, were funded by the federal government as well as republican budgets. The current financial status of the Central Asian states has led to a reduction of investment in the water sector. It is worth noting that investment rates differ sharply for different countries depending on government commitment and financial status.

The agricultural sector in all of the countries needs state support or subsidies. This can be justified in cases where the state regulates the price of the main agricultural products such as cotton and grain, which are sold to the state for fixed prices which are lower than world market ones. All the Central Asian states recognize the need to charge for water. Payments for water use not only solve the economic problems of water organizations, but facilitate better management, rational water use, and water saving in all branches of the economy.

All the states need to decide on legally enforceable charges for pollution. The level of pollutants released in water sources needs to be determined by interstate agreements with sanctions applied to particular states when these limits are exceeded. Provisions for payment for pollution, release of substances at higher than permitted concentrations, excessive water use, restrictions on water transfer, and similar regulations should be coordinated by interstate agreements that set criteria for water allocation and use, and are based on the following well-known principles:

- the previous user presumption
- the "do no harm" rule
- equitable and reasonable water use.

At the national level it is proposed to establish charges for waste produced by non-irrigation consumers related to pollutant concentration. Using funds raised by fines for

release of pollutants to the rivers and tributaries in excess of permitted limits, or for exceeding the permitted concentration of toxic elements, it is hoped to create national ecological water funds to finance “clean technologies” and improve the ecological state of rivers and water bodies.

Water users who have licenses for guaranteed quantities of water could transfer (sell) any surplus part of their quotas, or the entire quota, to other users in mutually beneficial transactions. The main factor that could make this possible could be the use of water-saving technology. This method could be especially effective at WUA level. In the Kyrgyz Republic, in particular, official government policy predicates that, where use of irrigation water is reduced by using up-to-date technologies, the WUA has a right to sell the saved water at market prices. Trade rights should be provided to water-related organizations that invest in water-saving measures and additional water resources involvement. Other prospects for promoting water saving at the WMO level entail bonus payments to staff of the organization related to permanent expenses per cubic meter of water delivery cost.

Contrary to the provisions of existing law, which ignores public participation, new laws should initiate the creation of public bodies of stakeholders for the institutional and financial framework of water management.

Common tasks for developing economic mechanisms for the water sector and for implementing them at the interstate level are as follows:

- to provide sustainable mechanisms for financing and maintaining interstate water resource management systems and interstate bodies
- to create incentives for all states and water users to conserve water and to ensure it is available to meet environmental needs
- to apply the “polluter pays” principle in practice
- to create a mechanism to balance benefits and costs at the level of interstate water distribution and use.

There are no strict financial obligations on states to engage in joint water management and development. Although the operational budget is confirmed each year by a decision of the ICWC before the beginning of the fiscal year, only Turkmenistan and Uzbekistan have fully met their obligations to pay for operational requirements and repair work. As for research work, only Uzbekistan has fully met its obligations, with very small contributions from the other states. Attempts to facilitate the financing of reconstruction and development have met opposition from all the states’ financing bodies. As a result only a small part of the required reconstruction works for hydrometeorological services on transboundary rivers and for one headwork in BWO has been done.

Some new financial measures for interstate relations are now being considered or are in their preparatory phase. One of these is a proposal to share water and power supplies on the Syr-Darya river by implementing charges for the volume of water to be delivered to lowland states as a result of water regulation; the charges might be seasonal or multiyear. The amount charged per unit of water to water users below reservoirs must cover the running expenses for collecting and conserving this volume. The charge must also compensate for the “lost benefit” of water release through dams, which might otherwise have been used for energy generation. Of course, prices charged under seasonal regulation are often less than prices under multiyear regulation.

Another of these measures relates to negotiations about the creation of a “Water–Power Consortium,” as a financial body that will determine more efficient options for power exchanges and allocation among users, bearing in mind the best interests of local authorities.

A third measure is to divide funding responsibilities for hydrometeorological, geological, and other facilities among water users in proportion to the volumes consumed.

2.5. Technical Aspects of Water Management Improvement on the Interstate, System and Inter-farm Levels

The main technical directions for improving WM and WO relate to low-cost measures to increase the accuracy of water measuring, forecast of water flow, and implementation of set models. These will reduce operational losses and deviations from fair proportional water allocation, and also increase trust, transparency, and mutual understanding among all water management organizations and stakeholders. Measures to strengthen capacity building for those goals include those discussed below.

2.5.1. Improving the Accuracy of Water Measurement and Forecasts of Water Resources

As was mentioned earlier, the number of measuring points on the rivers – and of those monitoring snow melting and ice melting contributions to flow – has fallen drastically. Even such important observation points as monitoring stations on the Fedchenko and Abramov glaciers, which had existed since 1911, went out of operation. The rehabilitation of thirty old stations and the creation of nine new ones by the GEF Project are very important, and mark the first step towards improvement.

The big advantage of the new project is the delivery of automatic stations for measuring water quality. These will make possible not only temporary but also permanent recording of water quality in six components. A further requirement is to install equipment that has direct connections between measuring points, hydromet centers, and BWOs. To rehabilitate existing monitoring points in mountains, the SIC ICWC propose to install between five and ten remote-controlled automatic meteorological stations at such important forecast points as the Abramov glacier and Fedchenko glacier. Some progress has been supported by USAID and SDC. The required investments amount to US\$7.5 million in addition to GEF Project Component "D." This work also includes snowmelt and icemelt forecast of flow formation in the upper watershed of rivers.

2.5.2. Implementation of SCADA System for BWO Structures

The lack of renovation and modernization of structures operated by BWOs over the last ten years has created a major problem for improving of the accuracy of water delivery to each state and each irrigation system. The SIC ICWC, BWOs "Syr-Darya" and "Amu-Darya," with assistance from the CIDA, prepared a feasibility study entitled "Water Resources Management and Control Systems for the Amu-Darya and Syr-Darya Basins." In the future the proposed system will help to provide the region's countries with water in accordance with quotas established by ICWC, and to develop plans for water reservoirs and water intake operation, developing systems of management, communication, and information.

For these objectives to be realized it is necessary to equip the BWOs with updated means to control and manage water systems, communications, and information transfer. As a first stage of the Dustlik canal project, headwork automatization was performed using the SCADA system, which provides automatic regulation of water level and discharge in water systems.

The system has been in operation since the beginning of 1999 and enabled annual savings of 95 million m³ of water. With finance provided to IFAS by local governments, a similar pilot scheme was installed in 1999 on the headwork of the

South Golodnosteppe canal at the base of a former Soviet "Sigma" system. The cost of this equipment was five times less than that installed by the "Modicon" company in the Dustlik canal. Similar projects are now being supported by USAID (the Pakhtaabad canal and structures on the Chirchik river) and SDC (Uchkurgan structure on the Naryn river). To complete this project the required cost is close to US\$15 million, to be financed from a range of sources, including investment from IFAS.

2.5.3. Information System

Extensive work done under the supervision of the EU in the WARMAP Program made it possible to create an information system, though only at the regional level. This includes the WARMIS database combined with Geographic Information Systems (GIS) and remote sensing data. Information systems for land and water are to be completed, tested, and prepared for use by the ICWC, IFAS, BWOs, and all water related organizations (mostly on the national and provincial levels). This work is important for socioeconomic and ecological development, more detailed development of water and land use, and analysis of river water losses. GIS has been developed by the SIC of the ICWC and Hydromet Services, but has not been made available for general use by BWOs and national organizations.

At the moment, the major task is information service creation and development at the provincial, irrigation system, and WUA levels on principles similar to the regional system, which will form a common database based on the pyramid principle with "information grids." Such development has now started for the Fergana valley, with financial support from the SDC. We expect the participation of other donors in this direction, which should increase regional collaboration.

2.5.4. The Base of Knowledge

The base of knowledge includes databases in combination with the tools for experience dissemination through the International Network of Research in Irrigation and Drainage (IPTRID) and INFO-net (the informational network of the Global Water partnership) as well as periodic publications, bulletins, press-releases, and scientific research collections. A knowledge network and information exchange system already functions within the region among the five states, and between the region and various world information centers including ILRI, USBR, Cemagref, Wallingford, ICID, and FAO. Various bulletins and periodical collections are issued to help water specialists acquaint themselves with modern worldwide methods of water resource and irrigation management.

Actual knowledge dissemination is inadequate. The focus should be put upon knowledge and information network development at the level of province, system, and WUA. A systematic base of knowledge creation is being started by the SIC of the ICWC, UNESCO's Scientific advisory group for the Aral Sea Basin (SABAS), and other organizations, national experts, and commissions on irrigation and drainage involvement. This will make it possible to create a practical knowledge base in the short term. This should lay the foundation for extension services, whose success depends on communication.

2.5.5. Analytical Tools

The program for developing model systems was elaborated by the SIC of the ICWC. This program consists of a set of models:

- river basin models
- models of a planning zone, typically adopted in each planning zone of the Aral Sea Basin

- models for national water policy that satisfy the water demands of each sState and relate to their socioeconomic development.

This set of models can be adapted to assist in the creation of a methodology and data on an interconnected base, which will support the next phase of modeling:

- for future development at the regional level as a tool in the preparation of regional water strategy
- for future development at the national level as a tool in the preparation of national water strategy
- for multiyear flow regulation by the ICWC and for BWO multiyear planning
- for annual planning of water allocation, and correction of this planning in the interests of the BWOs
- for operational tasks of water management by each BWO.

During the WARMAP-2 Project, the SIC of the ICWC together with the Water Management Authorities of all states began the elaboration of basin modeling for future development at the regional level, and modeling of planning zone and operation work for the BWOs. In addition, modeling of the basin for annual planning purposes was carried out by the SIC, BWOs, national teams, and the Energy Dispatch Center in the USAID/EPIC Program. National and regional planning models for water development in each state were worked out by a team at the SIC using the "Globsight" methodology (Prof. Messarovich) with modifications. On the basis of this, forecasts of different options for regional development for the "World Water Vision 21 Century" were prepared. The completion of this work will permit the organization of effectively controlled water management and operations in real time as tools for the SIC and BWOs and, in the future, for defining priorities of national planning for water resources development. The required investment is estimated as about US\$1.2 million. A detailed description of the proposed approach to analytical tool development is presented in the Annex.

2.5.6. Elaboration of Joint Interstate Projects

Starting from 1993, the ICWC together with representatives of IBRD prepared a set of programs (seven in all), which comprised nineteen different projects. This range of immediate projects was approved by the heads of state (decision of January 11 1994) and introduced to the first meeting of donors in Paris on June 1994. Although the meeting approved this "Program of Concrete Actions," which had a total cost of US\$41 million, its implementation began with just the EU "WARMAP" project and the World Bank's "Principal Provisions of Water Strategy of the Aral Sea Basin."

These two projects, which were chiefly organized by local specialists in collaboration with foreign consultants, enabled the technical staff of the WMOs from the five states to organize exchanges of opinion at roundtables and to prepare reports for development of new technology, which combined local and western approaches to water management. The most important parts of these projects were the information system (WARMIS), field survey and demonstration plots (WUFMAS), and "principal provisions of regional water strategy." It became possible to introduce an effective collaborative style of work and create the framework for future development.

Similar mutual, but less effective, projects were implemented by USAID (EPT project, EPIC project) in the fields of modeling, water-power relations, and so. The low efficiency of those projects stemmed from the low involvement of local initiatives and knowledge, and from lack of orientation towards practical results.

A number of other projects were implemented that were significantly smaller than those of USAID in financial terms (\approx \$US0.2–1.5 thousand). These were generally organized on the basis of programs and contents decided by local specialists

(the SIC and BWOs), with the assistance of sponsors: CIDA, SDC, NATO, INCO-Copernicus, and others. The advantages of this kind of approach are the following:

- direct connections with the implementing agency, which participates in preparation of projects
- high efficiency of investments thanks to the low labor cost of local staff
- ability to use western "knowledge" not in theory but to assist the real work of local specialists
- orientation of the project to a principal goal that is of interest to the region
- different states working on one project develop shared viewpoints and mutual commitment to the project.

2.5.7. Water Saving: Main Direction for Regional Survival

From ancient times, water use in the region has been based on using it for the benefit of the whole of society. Historically water use was based on water saving and the prevention of pollution. Unfortunately, the traditions and customs of water allocation, use, and conservation have been partially lost. In practice, strict controls need to be established to ensure equal access to water for everybody, along with proper operation and maintenance of the water delivery infrastructure, mostly in irrigated agriculture.

Water use in the region could be improved through analysis of the best methods of water use and management under similar conditions around the world (Israel, Jordan, western states of the United States, Spain, and similar cases). The analysis of water allocation and water losses with different levels of management shows that it is possible to set a strict limit on water use for all the countries and different zones in accordance with the "criterion level of best water use." This level is very stringent, but it is necessary for the benefit of future generations.

Water conservation for all water uses and levels (user/farm-system-basin) should be based on the principle of maximum water efficiency. At the first stage this could be achieved by reducing unproductive water losses, which are estimated to amount to 20 percent of the total diverted water. Later, when the financial capacities of water users and the governments increase, more expensive methods of water conservation could be implemented. A significant factor affecting regional water and agricultural sectors is the sharp reduction in world prices for irrigated crops in the past ten years: rice two times, wheat 1.5 times, cotton more than two times. This makes irrigation unprofitable and prevents farmers from supporting the water sector. In these circumstances specific actions need to be taken on a low-cost basis (supervision of the activity of all water users, strict limits on water use, water measurement, establishment of Water Users Associations, reclamation activities on irrigated lands, better crop patterns, and similar measures). See details in Annex.

2.6. Technical Aspects of Future Development

Technical aspects of future water development relate to two major aspects. The first is the creation of ecological sustainable and economically sound systems in the deltas of the two rivers and the remaining body of the Aral Sea. The aim should be to stop environmental degradation, compensate for the damage to natural productivity caused by the artificially created system on the Aral Sea coast, and prevent social and environmental losses that affect the population living near the Aral Sea coast. The second concern is to increase of regulation of the flow of both rivers so as to improve WM and WO capacities in the interest of irrigation, power production, and the environment.

The unexpected rate at which the Aral Sea shrunk meant the loss of the water it had produced and required the governments of five NIS to decide starkly and frankly:

What is the future of the lake? "The Concept of Social and Environment Development of ASB," accepted by the heads of the states in 1994, announced openly that it was impossible to protect the Aral Sea itself, but aimed to create a set of water resources and wetlands along the populated part of the Aral Sea shore, which would make it possible to protect nature and stabilize the socio-ecological situation in the deltas. Now this task focuses on two zones. In North Priaralye the decision, financed by IBRD's so-called "North Sea" plan, is to create reservoirs in the area of the Small Aral Sea in the north with a capacity of 25 km³ of water; there will also be stabilizing measures in the Syr-Darya wetlands and deltas. The southern parts of Priaralye should improve their profile with the creation of wetlands and lakes; the most important of these are Mejdurechye and Sudochie, and for these two projects NATO and GEF are to organize protection and partial rehabilitation of the Amu-Darya delta.

2.7. Training Systems

The involvement of NGO stakeholders in developing training systems for water specialists is one of the most important cooperative programs of the ICWC. Following an ICWC decision, and supported financially by CIDA, a regional Training Center was established in Tashkent in 2000 in collaboration with McGill University (Montreal, Canada). The main task of this center is to improve skills and, simultaneously, to bring together the views of specialists from different countries. Monthly courses are organized as round table discussions. Last year more than 350 specialists from five states attended three courses on:

- problems of integrated water resources management based on hydrographic principles
- regional collaboration on transboundary watercourses
- international water law.

A new course on "Innovative practice in irrigated agriculture" started at the beginning of 2002 and is expected to continue for the next six to eight months. In future it is planned to prepare a set of new courses covering:

- environmental protection issues
- problems of drinking water supply and sanitation
- problems of sustainable development of the power sector in the region
- modeling in water management and irrigation.

To improve integration and involve more participants, there are plans to organize training activities in four sub-regional centers: Dushanbe (Tajikistan) on the problem of intermountain plains and upper watersheds (supported by the World Bank); Osh (Kyrgyz Republic) on water problems in the densely populated Ferghana valley (supported by Swiss SDC and IWMI); Kyzyl-Orda (Kazakhstan) on the problems of downstream waters and rice cultivation; Tashauz (Turkmenistan) on the problems of downstream waters and Priaralye. It is planned to use these centers in combination with demonstrations in the field in water conservation and WUA development.

The Training Center (TC) is one of the fora for presenting the common opinions of interested parties on different questions of water management. When developing the TC we initiated a "round table" approach with representation (equal in status and numbers) of different states, to whom TC moderators presented different aspects, in the form of lectures and PowerPoint presentations, as subjects for discussion. During the exchange of opinions at TC sessions, the participants can express their opinions freely and they need have no fears about speaking frankly. The popularity of the TC among water-related specialists from different sectors showed that it is an appropriate

forum, which we want to develop with more branches. The participation of official diplomatic representatives from the foreign affairs ministries of five states in two such events was a very positive experience in the work of the TC on round table scheme. We hope to develop such workshops with more broad involvement of stakeholders. The creation of negotiation procedures was part of the process of social mobilization in the project "IWRM in the Fergana valley," initiated by us together with IWMI and supported by SDC. We hope to develop similar mechanisms in other regions of the basin.

Such training networks of the ICWC involve not only training but also a "round table" system that promotes the broad involvement of different stakeholders in the most important water matters, and also makes it possible to create new frameworks for educational improvement in universities, colleges, schools, and other institutions.

3. CONCLUSION

The Aral Sea Basin is unique. Here the world can see the combined effects of specific historical and national characteristics, past and present influences, particular political and economic factors, and varying natural conditions. With all these aspects, it can be seen most importantly as an environment where five countries are trying to collaborate over water. This is one of the reasons why the Aral Sea Basin was selected for PCCP Program as a case study. The other reasons are as follows:

- the advantages and strengths conferred by the past ten years of regional collaboration
- a clear understanding of potential points of conflict in the water sector can be drawn from the lessons of experience
- a vision of future courses of action in the form of recommendations on strengthening of collaboration.

In addition, one principal reason for selecting the Aral Sea Basin as a case study for the PCCP program was the difference in understanding of the term "conflict" in local and western practice.

In local usage the word "conflict" has a different meaning from that in western understanding. We use the word "conflict" only in a situation which can be assessed as a threshold of real struggle, real destruction, or a deviation from agreed or routine patterns of actions, activity, or decisions that is unacceptable to other parties concerned and has caused real damage or harm to other participants in the process.

In the western concept "conflict" implies a "clash of interests." Such an understanding is not appropriate for water practice. Anyone who in the real world is involved in water operation and management, dealing with problems that are well known to water specialists, has to decide every day, sometimes many time in a single day, how to combine the interests of many water users located on one canal, one system, one river and so on. Changes in the hydrological situation, especially in conditions of water scarcity, require water specialists to deal with them immediately, reallocating water so as to cause the minimum constraint while being equitable and reasonable to each stakeholder in water allocation. None of us assessed such situations as conflicts; it is routine work, in which each water operator has to take the right decisions. In such work conflicts in water management within the Aral Sea Basin can be seen as disagreements of interests, ideas, and principles, which can harm attempts to provide regular satisfaction of water requirement users and to protect nature.

3.1. Strengths and Weaknesses of the Existing System

As it is clear from all the above, water resources in the region must be managed in complex conditions, which originated from two opposite challenges. In terms of the first, there is a range of factors:

- There are common ethnic, religious and customary frameworks in all states and nations in Central Asia. Communal activity in the Soviet period stimulated water saving, cooperative water use, and conservation of water, and inculcated the understanding that we can survive in these problematic conditions only through collaboration and cooperation.² A deep respect for water and a view of water as the framework of life (as in the old proverb "water means life") promote improvement of water resources and their quality.
- There is the political will to follow the course indicated by these views.
- The close collaboration of water professionals within the ICWC has produced a proper "Aral Sea spirit," which is sometimes lacking in many water related organizations, water users and individuals. Such a spirit has promoted friendship and respect, and led to understanding of the need for mutual solutions.

Those three factors have enabled the water management bodies of the five countries not only to execute properly their obligations (water regulation, delivery, allocation, and operations), but also to create an institutional platform for collaboration in the form of the ICWC and its executive bodies (BWOs, SIC, and Training Center). This platform allows capacity building and the involvement of a great many water specialists in negotiations about future development. The achievement is that the whole course of the actions of the Soviet Government during the last ten years of its existence, together with the past ten years of independence, have made it possible to organize a smooth transition from the command style of water management to new and more democratic water collaboration on a regional basis (see Figure 2 above). The results of this work were demonstrated at the Jubilee Conference of the ICWC in Almaty (February 2002), which underlined the following principal results of the Commission activity:

- Conflicts in water management, operation, and allocation among the countries of the region have been avoided.
- Thirty-two meetings of the Commission have been held, and have determined all activities undertaken by the ICWC and its bodies.
- A range of important legal, financial, and institutional proposals have been prepared and submitted for consideration by governments of the states, defining the principles of interaction on water issues. Two of these have been signed by the heads of state as international agreements.
- The volume of water used in the region has been reduced from 110 to 103 km³ annually.

In terms of the second, contrasting challenge, three weaknesses should be taken into account:

- Population growth and adverse economic conditions are the two principal destabilizing factors that have made it difficult to improve the water situation, and simultaneously make it necessary to solve the problems with low cost (mostly organizing and economic) methods.
- Water, land, and mineral resources are distributed inequitably among the states. On the one hand this initiated a tendency to "hydroegoism," while on the other it was argued that there was only one way to guarantee survival and future development: close cooperation, collaboration, and the creation of a cooperative

Central Asian market for food and agricultural production (perhaps together with Russia).

- Some local and sectoral interests, aspiring to be the “nouveau riche” in the new economic market (sometimes a very erratic market), have speculated in water as they have in oil, gas, and fuel. This has created problems and put obstacles in the path of collaboration, but society needs to make such economic activity unviable.

As a whole the ICWC has managed all the complex situations of water supply and provision even during dry years without conflicts; however, in view of probable restrictions on options for the future, management procedures are not properly adequate or all-embracing. Let us list some of the obstacles to the functioning of ICWC executive organizations, particularly the BWOs:

- Several headworks have not been transferred to the BWOs’ authority. This complicates water allocation. Moreover, the ICWC’s decisions on water allocation are not always carried out everywhere.
- Major hydrosystems with power stations and reservoirs are under the jurisdiction of the basin states, and the latter quite often plan the operation of reservoirs without considering the ICWC operating regimes for cascades.
- There is poor coordination between hydrometeorological services and BWOs regarding the accuracy of flow forecasts and water accounting. The lack of calibration for structures and gauging stations decreases the accuracy of water accounting.
- The Syr-Darya and Amu-Darya river beds are the property of the basin states. Thus the BWOs’ claims to be responsible for monitoring river water quality have remained idle and unrealizable declarations.
- The historically created command area of BWO “Syr-Darya” (up to the Chardara reservoir) does not allow it to organize rational water use in the zone from Chardara to the Aral Sea; moreover, it is difficult to obtain reliable information about the use of Syr-Darya water within this zone. In practice the BWO is unable to supply the Aral Sea and its coastal zone, which are more than 1,000 km from the boundaries of its command area, with the quantities of water stipulated by the ICWC.
- The ICWC does not control schedules and amounts of groundwater extraction, or of recycled water disposal. Similarly, it has no control over the quality of natural surface, recycled, and groundwater resources.
- The protected zones of transboundary rivers have not been specified or officially transferred to BWO authority.

Though there are slightly different views on the actual situation and suggested national management approaches, everyone can see common shortcomings in the former and current institutional structure of the water economy and irrigated agriculture under transition to the market economy. Those are as follows:

- The water sector at the national level in its present form chiefly represents the interests of agriculture. National water organization needs to represent equally the interests of irrigation and (particularly) hydropower, and set priorities for water supply, water storage, and similar measures.
- The administrative principle in the water sector and irrigation creates local pressures from provincial and district administrations for the principle of equal water supply to all water consumers.
- From the initiation of water management and irrigation projects up to their implementation, relevant decisions are made only by state agencies with no

input from current or future water users. As a result, we have a situation where the costs of irrigation systems and water structures, which are transferred to the responsibility (full or partial) of water users, cannot be recovered during their operation. Such situations are found in the cases both of salinized lands and of large water lift systems, where the costs of drainage, maintenance, and water lift cannot be covered by income from irrigated agriculture.

- The policy of transferring all operation and maintenance costs to water users depresses the maintenance system and simultaneously complicates issues related to the development, rehabilitation, and upgrading of irrigation systems. The previously most advanced systems (lined canals, flumes, subsurface and vertical drains) are now past the normal limits of their working life. However, their renovation under current conditions is an issue that falls between two stools: the water users, who do not feel they should be responsible for it, and state agencies, which do not address it pleading a lack of finances.
- In legislative and financial respects, issues concerning the distribution of responsibilities between water users and state budgets in all countries are vague and unclear. A common belief prevails that the governments should not shoulder an increasing share of the financial burden, but this neglects the fact that the decline in irrigation and water saving efficiency can cause productivity losses and a serious decline in the combined efforts of agricultural producers, as well as social harm. These facts pose a grave danger to the states, and even raise the possibility of social disruption, in view of the resulting decreases in national income and tax returns.

3.2. Lessons Learnt

Taking into account our definition of conflict as representing an extraordinary destruction of proper systems for sustainable water use and water protection, the most important lessons could be learned on the basis of analysis that would predict the likelihood of such conflict situations. The conflicting issues in the integrated water resources management process could be listed in terms of social, economic, legal, and prospective variables as discussed below.

3.2.1. Socio-ecological Conflicts over Water Use

Water has been perceived primarily in the context of social and ecological values and interaction between human beings and nature. Unfortunately, in the region until now, priority has been given to the basic needs of human beings for water and satisfaction of economic needs. As a result we can see the disaster of the Aral Sea and its coast: the lake has lost about 70 percent of its volume and 60 percent of its surface area, while water salinity has risen from 8 percent to 60 percent since 1960. There has been massive desertification (over an area of 1.6 million hectares). There have been heavy losses of biodiversity: more than eighty common species have disappeared from the water fauna and flora.

The second problem is salinization and waterlogging on the irrigated area (approximately 5 million hectares require artificial drainage). Irrigation creates a return flow, which is a source of environment threats. This polluted water constitutes more than 30 percent of total available water resources in the region. As a result there is growth of river water salinization, sometimes up to 1.5–2.5 g/L. A worsening of groundwater quality, especially through the actions of the chemical industry, has also occurred in the region. All these factors have resulted in the proliferation of various diseases and an increased mortality rate in downstream reaches of the Syr-Darya and Amu-Darya rivers, along with losses of natural productivity.

3.2.2. Economic Conflicts over Water Use

Competition for limited water resources occurs between agricultural, rural, urban, industrial, and environmental users in the region. On the one hand, irrigated agriculture is a major source for food security and simultaneously the biggest water consumer (about 90 percent of total water resources used for irrigation). On the other hand, there are growing ecological, industrial, and municipal needs.

Water allocation approaches inherited from the Soviet Era do not take into account possible changes in the priorities of the former republics, which are now independent states. They all have distinctive water and land reserves and demands, sharply differentiated due to current – and especially future – issues related to securing per capita indices. The view of the Kyrgyz Republic and Tajikistan is that they were held back in Soviet times in developing irrigation, and that they need to reassess their future water share. Downstream countries wish to take into account environmental constraints, particularly water quality in the middle and lower reaches. In addition to this there is the possibility that growing water demands from Afghanistan (after stabilization of the situation in that country) could cause new requests for reallocation.

From this point of view there are a number of fields of potential conflict over water management in the region. Among countries these relate to water sharing issues: quantity, delivery schedules, and shares of expenses to cover water management costs within the basin, including upstream and downstream relations. Among sectors (irrigation, power generation and environment) there are concerns over water allocation, use of water reservoirs, and water sharing for the Aral Sea coastal zone and the rivers themselves (sanitary and ecological flows).

In order to avoid these conflicts, it is necessary to create an efficient framework for the use of water, including a legal and institutional basis for the fair and equitable sharing of the beneficial water, with equally strict regulations for all WMOs in their activity: operation, management, and maintenance.

3.2.3. Water Conflicts in Perspective

Water is already a limiting factor (not only in terms of volume, but also in terms of quality) for some zones in the Aral Sea Basin today. This means that future sustainable development is under some stress. Also there is uncertainty about the possible impact of global climate change on water resources in the region. Over the last thirty-five years, the average temperature has increased by 1 °C and the size of glaciers in the Pamiro-Alay system has been reduced by 22 percent. Different scenarios predict a greater water deficit by the year 2020 as result of evaporation increase and a decrease of water resources of between 6 and 20 km³ annually (or 5–15 percent of total water resources). In this context, conflicts in water management could arise as the result of different national approaches to the planning of national development scenarios. It is desirable to establish proper interstate cooperation to promote unanimity in the conduct of the planning process.

3.2.4. Prospect of Increased Water Use by Non-members of ICWC

A specific field of potential conflict is the prospect of increase water consumption by two states that are not presently members of the ICWC: Afghanistan, which different assessment indicate is the source of from 9.5 up to 13.4 km³ of water resources connected with principal rivers, and China (Tsincjen), within which about 0.8 km³ of water originates in the upper watershed of the Karadarya river. These aspects require future negotiations between members of the ICWC and the two states. There are strong arguments for involving Afghanistan in the activities of the ICWC.

Of, course, it is beyond the scope of this report to attempt to define the scale of such diversions from rivers, because no agreements between the former Soviet Union states and Afghanistan or China cover such problems. In our view, this potential problem may become reality in ten or twenty years time, when the economic situation in Afghanistan has stabilized. China is not so important in this aspect, taking into account the small amount of water that originates in its territory.

It should be noted that there are factors that obstruct conflict resolution in the region. Among them are the lack of information transparency and lack of proper communication systems among different levels of water related players:

- on the inter-sector level in each country and in region
- on the interstate level between water specialists and water users
- between water organizations and NGOs.

To establish proper mechanisms for conflict prevention and resolution it is necessary to concentrate activities on the following areas: (a) institutional strengthening at the national and regional levels; (b) creation of a legal framework; (c) establishment of the proper financial mechanisms; (d) technical perfection and capacity building. The following sections of the paper will discuss these issues.

4. SUMMARY OF THE RECOMMENDATIONS

Existing shortcomings in water management can be eliminated and effective water use can be achieved via real regional partnership and integration of efforts in the following six directions:

- Integration of the countries' efforts in water basin management and conservation through partnership at interstate (regional) level.
- Integration of economic and environmental interests through inter-sector partnerships in each state that take account of environmental requirements.
- Integration of water management system hierarchic levels through vertical partnership in the chain: country, to system (scheme), to administrative unit, to water user.
- Integration of water users and water management organizations through the involvement of water users at all levels of the water management hierarchy, as well as partnerships between governmental and non-governmental bodies.
- Integration of knowledge and practice through a partnership of science with water users and water organizations (using such tools as the base of knowledge described earlier).
- Integration of international donors and regional bodies through coordination and partnership of international financial organizations and the region's countries.

For regional partnership coordination, the establishment of an "Aral Sea Basin Water Council" is envisaged under IFAS leadership with ICWC and CSD participation and the participation of energy, ecological centers, and NGOs. The recommended scheme of partnership is shown in Figure 4. It is necessary to agree the ASB Water Council's status and powers of regulation among all parties concerned.

Under the aegis of the ASB Water Council, it will be expedient to organize thematic groups (including leading specialists of the region) to seek agreed decisions about integrated water resource management and use. Taking into account the existing regional problems, it is proposed to create four thematic groups relevant to ICWC working groups.

- technical aspects
- legal questions
- institutional issues for the creation of a water partnership
- financial aspects.

According to this proposal, each thematic group would assess a problem and work out an action plan and develop general recommendations to decision makers for its realization. Their proposals would be widely disseminated to the general public. It is expected that the ASB Water Council will include democratically elected leaders of thematic groups and that stakeholders at all levels, including those providing funds, will be represented.

The regional and national water strategy and its monitoring can be successfully developed and coordinated with existing scientific potential. This work is to be done, and the necessary scientific and public expertise provided, by the ICWC, CSD and SABAS group supported by UNESCO. Special attention should be paid to these programs' financing and coordination, as well as to organization of seminars and conferences for the free exchange of opinions and achieving of consensus. Science in turn, together with public awareness and participation, should promote rational water use and management.

An IT-based communication system among all participants of the regional partnership is a necessary precondition for successful activity. Connecting ministries and national centers, province and system organizations, major NGOs and then WUAs through communication technology will enable a free opinion exchange through "electronic conferences," to inform regularly the 200 to 250 organizations concerned. This will encourage trust among the partnership participants.

Thus, the problems of Aral Sea Basin cannot be easily explained in any reports. Many books, investigations, and surveys have tried to do that. Our aim here has been to summarize it from a point of view that emphasizes the viability of peaceful processes and collaboration on matters concerning water, with mutual respect for the rights of every state and every person in the region to food, water, and a decent environment.

Our conclusions about the first urgent measures for such survival are summarized below. Successful development of the region should be supported by appropriate institutional, legal, and financial provisions, both at the level of interstate relations and at the level of national policy. (See Figure 4, page 39.)

4.1. At the National Level

- Reversion to powerful inter-sectoral structures of water management at the state level, responsible for strict enforcement of the water protection and water use policy of the state.
- Extensive and all-round implementation of integrated water resource management, free from the administrative influence of local authorities, in which all interested provinces and districts will be represented and enjoy equal rights to participate in basin, sub-basin, and system organizations of water management.
- Participation of water users, alongside the state, in management and funding of operational activity (as land profitability increases, the state share is to be reduced).
- Facilitating the establishment of WUAs in agriculture and WUOs in other branches of economy.
- Establishment of consultancy services in water management and agriculture, with a network of training centers and field demonstrations as a major tool for water saving and conservation.

- Introduction of water use charges in accordance with *increasing block rate tariffs*: minimum payment for water use within the limits of crop biological water demand (technological demands of production), which increases within the limit and multiplies iteratively in the event of overuse.
- Payment for pollution of water sources.
- Implementation of mandatory water accounting at all levels of the water hierarchy.
- Mandatory introduction of water recycling.
- Development of legislation that promotes water conservation and environmental protection.
- Establishment of extensive transparent information practices and access to information systems, databases and the knowledge base.

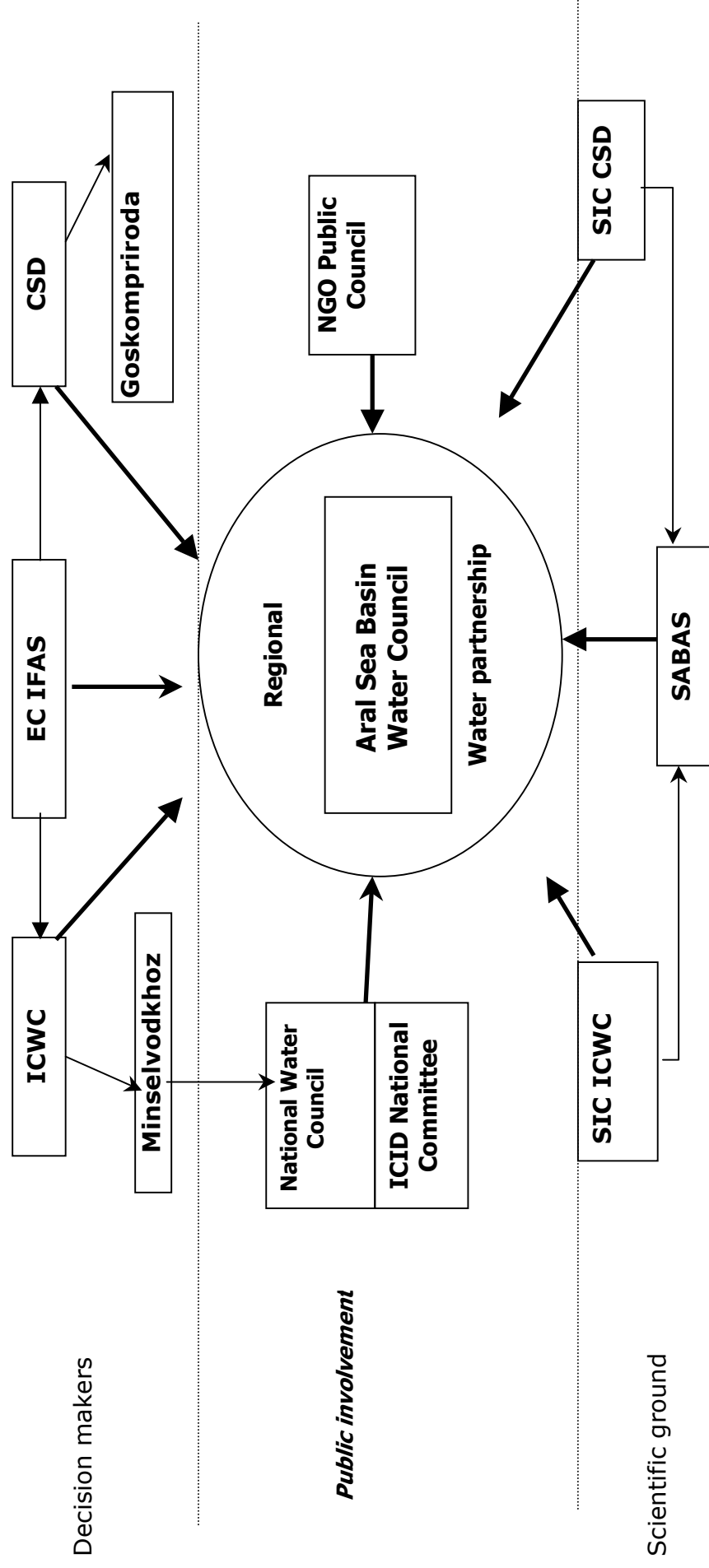
4.2. At the Interstate Level

- Assume the “common use” doctrine as a basis for inter-sectoral water relations.
- Strengthen regional bodies of the ICWC along the lines of enhancing their rights, authority, and responsibilities. There should be mandatory provisions to include in these organizations not only representatives of water management from the countries of the region, but also hydro-energy and water-delivery specialists, ecologists, and others. They should be granted diplomatic status and freed from requirements to follow decisions taken by the country they are staying in.
- Reliable financial support by the states for all water management agencies, hydrometeorological services, and nature conservancy authorities in flow formation and delta zones.
- As a substitution for fuel/energy–water exchange, implement payments for flow regulation in reservoirs (over an annual, seasonal, or other period) with participation by all countries of the Aral Sea Basin in covering expenses for flow formation, as well as protection of the deltas.
- Set well-defined limits on water withdrawal from the basins, taking into account ecologically viable volumes of water in the rivers, and allocate them among the countries in an equitable and reasonable manner.
- On the basis of these limits, implement payments for exceeding the set levels of water withdrawal at a rate that reflects the price for water as a resource, and utilize this money for development of joint water saving activities in the basin.
- Conclude a set of agreements that strictly regulate procedures and interactions among the countries as to water resources management, use, and protection (unfortunately, this process has been delayed for several years).
- Establish well-defined regulations for operating regional organizations under various conditions and in different situations (water scarcity, floods, etc.); make these activities equitable, multinational, and transparent.
- Equip all headworks of BWOs with automatic control and management systems (SCADA), preventing any possibility of uncontrolled water withdrawal from the river.
- Lay down regulations for joint design, construction, and operation of multi-objective works (similar to Kambarata, Ragun, etc.), which will ensure that these complex hydro-structures will not be used in the interests of only one country.
- Develop systems of education, professional improvement and training, and the like.
- Work out regulations for management of transboundary waters returned to the rivers.

Countries of the region have acquired broad experience of mutual interaction and understanding of their responsibilities, combined with political will. The abandonment of individual state claims could allow the region not just to survive, but to become an example to the world of rational water resource use in a large-scale transboundary basin.

Detailed recommendations on some specific issues are presented in the Annex below.

Figure 4. Scheme of Water Partnership in Central Asia



ANNEX: DETAILED RECOMMENDATIONS

Addendum to Section 2.1

It is desirable to avoid administrative pressure on water distribution and allocation, which is now creating some problems in the day-to-day activities of WMOs. This can be achieved by implementing integrated water management (IWRM) principles. This idea was first implemented in the project "IWRM in Fergana valley," which aimed to solve problems to do with:

- water management within the hydrographic boundaries
- fair water allocation among all water users
- public participation
- creation of informed public opinion and public awareness
- promotion of water saving practice.

The ICWC is now seeking potential donors who can help implement the IWRM approach in similar pilot areas, for example in the lowlands of the Amu-Darya river and the Zerafshan basin. In terms of the IWRM, the single most important element to impress upon the minds of water users is the rehabilitation of old traditions in respect to water: that is, is to equate and guarantee rights for water use to each person, each village, each city, each unit.

Addendum to Section 2.3.1

The SIC of the ICWC has prepared some principal positions which, if accepted, can be used as a guiding "compass" in a legal framework:

1. Water and associated land and other natural resources within the geographic watershed should be considered as a *subject of joint water resources use, management, conservation, and development* according to IWRM principles. Responsibilities and commitments should be distributed among all water users in such a way that water consumption can provide sustainable conservation or development of natural capacities, and prevent their reduction. From this point of view, all water resources in the basin should be considered in terms of their interaction with human activities, paying proper attention to water, land, and other elements of the environment, introducing necessary restrictions and undertaking remedial measures for the benefit of further sustainability.
2. Requirements for the management of natural resource use should be based on *the ecologically permitted water withdrawal* (EPWW). This should be defined and strictly established for the benefit of the economy and society, to reduce the possibilities of irreversible overconsumption. In cases where this amount is exceeded (as it has been, especially in the past), the consumer countries should make a contribution to the international fund of the basin in payment for such excessive use, to finance and enable compensatory measures. For the Aral Sea Basin, the sustainable level of water extraction is estimated as 78 km³ per annum, whereas the existing rate is 106 km³ and it was formerly 126 km³ per annum!
3. To preserve rivers and water bodies as natural bodies, releases from reservoirs and river flows *should not be less in summer or more in winter* than the average levels in those seasons that are shown by long-term observations. Observance of these rules would prevent the danger of turning a river into a sewage ditch. The water demand of natural bodies in deltas, as well as estuaries in open and closed water bodies, should be established on the basis of amount and time, with

regard to the regimes of bio-productivity and environmental support, and on the basis of monitoring, together with the demands of water-using countries.

4. It is proposed that all water resources in the basin should be divided into two categories: water resources of common use (transboundary or international), including surface, ground and return water resources, and national water resources.
5. Common available water resources of all types (excluding EPWW) should be considered as the objects of joint water use. For "equitable and reasonable" distribution of this amount either of the following options is possible:
 - Proportionally to historical use; if the level of development of countries and their economic possibilities are similar.
 - Proportionally to the water volume necessary to cover minimum population needs (1,000–1,500 m³ per year per capita for arid zones) minus national water resources that could be used without damage to the environment; the population is calculated on the basis of trends for the last twenty or twenty-five years.

To assist with the planning, budgeting, and monitoring of the basin organization activity, a special board or committee should be established by each basin organization to represent governments of all countries concerned, all interested stakeholders, and user groups. Participation should be based on principles of parity. The staff will be guided only by the basin organization regulations and are not accountable to any government. The committee is responsible only to a common body for the conformance of its activity to the above regulations.

Basin countries are responsible for political and financial support of the basin organization, as well as for taking measures on their territory aimed at sustainable water provision at present and in the future. If any country undertakes long-term or seasonal regulation for the benefit of other countries, then all basin countries should contribute to the financing of these activities. Basin countries have a right to assign a part of their water shares, free of charge or for an agreed payment, and to enter into bilateral relations so long as these do not affect the interests of other basin countries.

Addendum to Section 2.3.2

Regulation of water relations in the region requires agreement of the following unresolved matters:

- the status of organizations within the International Fund for Saving the Aral Sea
- institutional strengthening of ICWC organizations
- formation of regional, national, and basin information systems and exchange of information
- water use from transboundary rivers
- planning of mutual actions on the transboundary rivers
- water quality and the creation of ecological sustainability in the rivers.

The status of organizations was agreed by the Board of IFAS in 1997 and confirmed by the heads of state on April 9 1999. Two subsequent agreements have gone through a long process of negotiations. The final draft of an agreement on information exchange was approved at the thirtieth ICWC meeting in 2001 and submitted to IFAS for consideration. After long discussion of an agreement on water use (the fifth version prepared and discussed between states) it was decided to prepare separate

agreements for each basin: a draft on the Syr-Darya river has been already prepared, while the one for the Amu-Darya river is only at a preliminary stage.

Basin countries need to arrange common and separate hydrometeorological and hydrogeological services to ensure water monitoring and forecasting, as well as free access to this information in real time. The costs of supporting and developing such a network can be distributed between countries in proportion to the water volume used or the ecological impact of their use of water.

Achieving a consensus among the states in the creation of a strong regional legal framework is a long-term process and requires the full involvement of national representatives, designated by the respective governments, and the participation of NGOs in preparation, negotiation, and submissions to decision makers. To achieve this goal the ICWC at its twenty-ninth and thirtieth meetings in 2001 organized working groups, empowered by the countries to develop the above-mentioned agreements, while the IFAS Executive Committee is to approve a list of national experts appointed by respective governments to work on legal documents. This working group, with the participation of a foreign expert, will be responsible for preparation of a legal framework and further improvement of existing texts. The order of work is as follows:

- Once a draft has been prepared, it should be disseminated between states and become a subject of discussion at the national level.
- In each state the government appoints a national coordinator as well as a national negotiation team that includes representatives from each national body interested in water management, use, and protection. The national coordinator is responsible for collecting various opinions and preparing a single national opinion, which must then be approved by the Deputy Prime Minister who is a member of the IFAS Board.
- Presentations collected from each state are assessed by a regional group, and then the IFAS executive committee and the SIC of the ICWC organize the next meeting of states' representatives.
- The next revision of the document should be directed towards achieving consensus among the members of the interstate group, and the revised text is then returned to the states for their approval.

The working group charged with setting up a legal framework would be responsible for clarifying the implications for national laws that affect interstate relations in terms of water and the development of the IWRM. Such a process may continue for a long time until full approval is given by the different organizations. Unfortunately, the negotiation process has no official status or schedule, although the routine processes of negotiations between members of the ICWC have regularly reached final decisions. In these negotiations, the leaders of BWOs and the SIC of the ICWC, like the invited experts, have the right to express their opinions but not to participate in the vote: the final decisions are to be made on the base of consensus only among members of ICWC. We hope that the world community can identify donors to support the ICWC and IFAS in this creative activity.

Addendum to Sections 2.4 and 2.5.7

The following measures could be implemented to improve the financial situation:

- a gradual reduction of state subsidies to agricultural producers and other users for water delivery
- the transfer of all categories of water users from a fixed tariff to one related to the volume of water used (rising block tariff system)

- a competition system to show who can save more water without heavy investments.

The GEF Project (Component A-2) implementation is an interesting example of a competitive water saving program based on bonus payments. It was very important that this competition was conducted at the following levels (results are presented in Table A.1):

- small farms
- collective farms (associations of farmers)
- associations of water users
- district water management organizations
- incentives for farmers saving water through tax privileges.

Table A.1. Volume of water saved in comparison with withdrawal quotas as a result of GEF Project Component A-2

Province	Year	Irrigated area ¹	Water quota ²	Water limit per hectare ³	Total water delivered ²	Water per hectare ³	Water saving ²	Water saving per hectare ²
Kyzyl-Orda	1999	68 717	1 811.2	26.36	1 688.4	24.57	122.8	1.79
	2000	132 016	3 379.1	25.60	2 717.9	20.59	661.2	5.01
South Kazakhstan	1999	184 878	2 499.1	13.52	1 793.3	9.70	705.8	3.82
	2000	203 527	1 861.0	9.14	1 068.0	5.25	793.0	3.90
Djalalabad	1999	47 223	451.2	9.55	354.2	7.50	97.0	2.05
	2000	86 587	775.8	8.96	617.5	7.13	158.3	1.83
Osh	1999	91 497	994.6	10.87	764.0	8.35	230.6	2.52
	2000	83 022	918.6	11.06	753.0	9.07	165.6	1.99
Sogd	1999	39 851	757.8	19.02	559.1	14.03	198.7	4.99
	2000	69 949	1 460.4	20.88	1 057.1	15.11	403.2	5.76
Halton	1999	49 802	769.5	15.45	737.1	14.80	32.4	0.65
	2000	79 870	1 461.9	18.30	1 337.6	16.75	124.3	1.56
Fergana	1999	85 454	594.6	6.96	621.3	7.27	-26.6	-0.31
	2000	79 144	501.0	6.33	504.2	6.37	-3.2	-0.04
Kashkadarya	1999	111 478	679.5	6.10	684.5	6.14	-4.9	-0.04
	2000	106 030	8 53.0	8.04	558.9	5.27	294.1	2.77
Total	1999	678 900	8 557.5	12.60	7201.8	10.61	1355.7	2.00
	2000	840 145	11 210.7	13.34	8614.3	10.25	2596.4	3.09

Notes:

1. Hectares.

2. Million m³.

3. Thousand m³.

Water Saving and Rationalization of Water Distribution and Use: The "Archimedean" Lever for Survival and Progress

It is obvious that without modification of current habits and defects there can be no improvement. A rational joint search for routes to survival and development is needed. The SIC of the ICWC has implemented, within the framework of various programs, a simulation of different future perspectives, including a "zero" scenario (that is, preservation of all tendencies and trends as they are at present, but with greater coordination), an optimistic one, an intermediate possibility, and ones founded on national egoism: "each country on its own."

It is noteworthy that in the last scenario, where "everyone grabs," each country tries to snatch as much as possible and as a result experiences a water deficit of 35–40 km³ annually, even without taking into account water needed for the conservation of the natural environment. The demands of the region can only be met in the optimistic scenario or in the intermediate variant, which is oriented towards:

- Cooperation and collaboration of all countries in achieving food self-sufficiency, not for each country separately but for the whole region on an interrelated and rational basis by way of produce division, specialization, and mutual supplies.
- Rational interrelated water resources management, based on integrated management according to hydrographic principles with broad participation by water users at every level of the hierarchy, inter-sectoral coordination, and elimination of the administrative framework.
- Partnership between the state and water users in joint management; both parties must actively obtain funds to cover the expenses of water management development.

The main aspect of both the viable scenarios is their orientation towards achieving "land and water potential productivity (WPP)."

During the past five years, very promising results have been achieved, first by the WUFMAS Program (supported by the European Union), then by Component A-2 of GEF, and finally by the "Best practice in water use" (IWMI–ICWC) program. Over very wide areas in various field demonstrations and farms, these programs have shown that it is possible to achieve and even surpass the necessary water potential productivity (WPP) (see Table A.2). The question arises: If all countries of the region try to achieve this level, how much water will be required to meet the demands of Central Asia, which together with northern Afghanistan will have about 70 million people in 2005? In order to produce 21 million tons of cereal, 6 million tons of cotton, and 10 million tons of other agricultural produce, 47–50 km³ of water will be required according to water potential productivity. If the efficiency of supply systems is 0.68–0.7, then gross water demand will be 70–73 km³ for irrigation and 7 km³ for drinking water, municipal, and industrial needs. On this basis, there is no need at all to develop new lands: at present the development cost per hectare can amount to 6–7,000 US\$/ha, and the same amount of agricultural produce can be obtained much more economically by increasing the productivity of existing land. "Water saving" programs should be of an across-the-board nature at all levels of the water hierarchy. In the first place, this relates to detailed analysis of reserves over all irrigation systems at inter-farm and farm levels, and at the former collective farm levels.

At the system level, water losses in inter-farm and main networks from water intake to farms inside their former boundaries vary between 10 and 12 percent, and in some areas are as high as 26 percent (Andijan province, Uzbekistan). Generally, this indicator over a range of provinces is more or less equal to 20±3 percent. At the

level of former on-farm systems, the average loss is 20±5 percent. The following measures are of importance here:

- assessment of reasons for technical losses
- maximum reduction of organizational losses, mainly through establishing and developing water users' associations; introduction of strict water rotation methods such as "warabandi" or "sheihjeili"
- water accounting in the headwork of all farms.

The main precondition for land and water productivity in irrigation is the use of water and other technological elements in the field and in farms and other units. But if a farmer increases the yield, this is achieved through the support of many participants in the process of creating a more productive area. Under market conditions, such improvement is determined by:

- organization of the environment and infrastructure that help guide farmers through the complexities of the system and marketing
- knowledge level and its update; assistance in introducing effective methods and technology
- information: access to it and opportunity to use it.

Table A.2. Water application for irrigation and harvesting crops (WUFMAS – 99)

Farm	Crop	Harvesting				Water application			
		Type of field		Difference	Increase	Type of field		Difference	Reduction
		Dem. field	Control field			Dem. field	Control field		
		(t/ha)	(t/ha)	(t/ha)	(%)	(th.m ³ /t)	(th.m ³ /t)	(th.m ³ /t)	(%)
3 Kaz	cotton	2.92	1.38	1.54	111.6	1.22	2.17	0.95	43.8
9 Kirg	cotton	2.48	2.21	0.27	12.2	2.41	2.75	0.34	12.4
14 Taj	cotton	3.23	1.87	1.36	72.7	6.17	13.98	7.81	55.9
18 Tur	cotton	3.39	1.07	2.32	216.8	2.37	6.76	4.39	64.9
22 Uz	cotton	4.41	2.28	2.13	93.4	1.84	5.89	4.05	68.7
34 Uz	cotton	4.43	2.73	1.70	62.3	0.76	2.94	2.18	74.3
35 Uz	cotton	4.52	3.32	1.20	36.1	1.45	2.52	1.06	42.3
Average		3.63	2.12	1.50	86.5	2.32	5.29	2.97	51.7

Organization of an appropriate environment for agricultural producers depends on establishing a good mutual relationship between the state and the farmer. The state, relying on the activity of agricultural producers, tackles the most important task: providing the population with food. In countries that are not self-sufficient, huge amounts are spent from the budget to support food prices and make food available to all population strata, including the poorest. In the Central Asian states, where average income per capita is US\$30–80 monthly (\$1–2.5 per day), governments need to help farmers grow agricultural crops in sufficient amounts to make them available for the population.

One of the most important measures to be undertaken by the state is the creation of extension services for training farmers. As a result of the restructuring of agriculture, a large number of agricultural producers, particularly private owners and leaseholders, have been deprived of agronomic and reclamation services that used to exist in former collective and state farms. New private farmers badly need these services, as well as the state seed growing service and other support measures. They

need advice on irrigation periods and norms, cropping pattern choice for specific soils, cost reduction measures and, finally, agricultural technology. Farmers need help to recognize the particular characteristics of their land, the problems these may cause, and the reasons for crop growth and yield irregularity.

All this can be achieved through organizing extension services funded by the state (at the first stage, until a certain level of productivity is reached) and then by the farmers themselves making payments to the "Advisory Agro-technical and Water System." Such services exist in all developed countries. Attempts to create similar services were made in our republics during the period of reconstruction.

Work done in the second half of the 1980s on 150,000 hectares in several provinces of Uzbekistan revealed certain peculiarities in irrigated lands and irrigation water productivity. On most irrigated land, low yield is caused by:

- Field irregularity and variations in soil texture.
- Untimely irrigation, negative impact of over-irrigation and under-irrigation.
- Poor implementation of obligatory agro-technical operations and works, inadequate counter-weed/vermin measures, unbalanced use of fertilizers, and the like.
- Lack of skill in yield management.
- Low quality of seeds.

While the problem of seed quality needs to be addressed by the state, the lack of skill can be solved by training and education. The first three factors in the list are critical shortcomings, and elimination of these defects is very important for increasing the productivity of land.

Special research has shown that most widespread type of field irregularity in terms of productivity is the following: in a field with an average cotton yield of 2.5 t/ha, 30 percent of the area will yield of 3.0–3.5 t/ha, while 20–25 percent will yield 1.5–2.0 t/ha, and 10 percent will be below 1.5 t/ha. Thus, average yield is achieved or surpassed on only 30 percent of field area. If yield capacity on low fertility soils could be increased by up to 30–35 percent of average, then average field productivity would increase by up to 3.0 t/ha. The main reasons for these irregularities are as follows:

- Uneven surfaces of irrigated plots, which can cause parts to be boggy and others to be under-irrigated. This can be improved relatively cheaply by laser leveling.
- Different degrees of salinity and water-logging, which can be avoided by reclamation measures.
- Soil variations in terms of texture, that can be improved by the addition of sand or, for the opposite effect, by clay grouting.
- Lack of humus in some areas of fields.

Certification of lands (producing a "passport" for each field specifying its condition), which was done fifteen years ago, proved effective and increased understanding on the part of collective and state farms. Remote sensing technology, computerization, and informatics can now make this even more effective. It seems to be expedient to organize such a service within the project framework on experimental farms and then in WUA; in this will it will be possible to:

- Carry out certification of all fields and provide farmers with field passports indicating all necessary agro-technical measures to be undertaken.
- Certification will be based on the results of remote sensing, which during the first year specifies the degree of yield irregularity and through land observations identifies the reasons for this and methods of eliminating them. Then a

technological map, a plan of water use for the farmer, and a minimum cost map will be developed.

- Give recommendations on irrigation schemes and techniques, furrow length, and other elements.
- Create during the first year, using experience of the fields gained by adjacent projects organized by Copernicus, USAID, and the FAO (in the Kyrgyz Republic), field demonstrations for the purpose of training the first groups of farmers so that two or three years later they can organize these demonstrations directly on selected farms.
- Organize training of WUA members and owners of selected farms in water saving methods (following the principles of the "best practice" project), irrigation terms, furrow length, and other elements of irrigation techniques, as well as methods of achieving the highest potential land productivity.

The foundation for this system of training will be "IWRM training centers," which are now being established as branches of ICWC Training Center, and their network of field demonstrations, where existing projects' pilot sites will be used and private farms organized.

Along with these measures, modernization of irrigation equipment on private and leased farms should also be encouraged. A system to provide credit to private farmers for the purchase of modern irrigation equipment, especially for expensive drip irrigation systems, must be established. Preference in updating existing irrigation equipment should be given to areas with chronically low water supply, tracts of land whose irrigation requires costly pumping, and irrigated territories with highly water permeable soils and difficult terrain.

Of course, the technical and technological capacities of states differ in many ways from the productive structures that previously existed in Central Asia, but collaborative and market approaches can help smooth these out. The biggest obstacles to implementing new patterns of negotiation and water use are created by the lack of financial resources of states, farmers, and water users.

Addendum to Section 2.5.6

A comprehensive analysis of sustainability in regard to a country, society, or system should be based on development trends, the dynamics of external and internal factors, and estimates (or forecasts) as to how they will affect the object under consideration. On the other hand, it is important to examine – bearing in mind the extent to which it is possible to develop available reserves of capacity in the country, region, or system – reserves of capacity that could be called upon in order to overcome expected negative tendencies.

The SIC of the ICWC has attempted to define its conception of sustainability (of the region, countries, and systems) as being dependent on impacts exerted by such external factors as: climatic changes (precipitation, runoff, evaporation); fluctuation of water reserves accumulated in glaciers; increased demands for water in neighboring countries; changing prices for agricultural produce and inputs (fertilizers, chemicals, materials); energy and fuel balance changes; and world market changes. On the other hand, there is a whole series of internal factors and components in water consumption (production growth or decline, its specification, population growth, brain drain, environment deterioration), and the state and maintenance of water and agricultural infrastructure. All these trends may (or may not) be compensated depending on the availability of five internal components: productive, natural (including raw materials), social, financial, and human (educational) potentials. The combination of these factors and potentials as a whole determines the sustainability of the goal and development in general. In order to foresee possible threats to this sustainability, it is necessary to:

- Analyze factors and links relating to sustainable development, both external and internal, and create a database of them.
- Define the direction of change in trends and their possible combinations, and their consequences for sustainability of the goal.
- Analyze these links and create forecasting models that include the development rates of negative processes and the damage that these may cause.
- Decide on measures to counteract or compensate negative processes, and assess their cost and effectiveness on the basis of utilizing available potentials.
- Prepare an action plan and measures for its implementation.
- Evaluate for how long available potential can ensure sustainable development and, finally, what other temporal trends may emerge that would improve or hinder sustainability in the future.

Thus, if we want to ground really sustainable development or sustainable activity in the field of water economy, it is necessary to work out and accept a mechanism that will allow us, both visually and quantitatively, to analyze and predict all these perspectives. Such a mechanism can only be composed through system analysis and a set of models describing the behavior of these complex systems. Naturally, it is not simple to create such a mechanism, termed a "decision support system (DSS)." It involves not only a huge set of models that can adequately describe processes of water use, water development, and water funding, but also a database (or even an information system) as well as a knowledge base and a forecast system, a set of criteria, constraints, and links.

Creation of such systems is absolutely necessary for developing an integrated water resource management (IWRM) system that provides for integration (within the single management scheme framework) of different administrative sites, various sectors of the economy, the hierarchy levels of diverse territorial units, ecological concerns, and social interests. It must also allow for different timescales: from operational decisions and monitoring, up to perspective boundaries. Integrated management does not mean that one body will manage, plan, and control this complex. Rather it implies that such a system of bodies, interrelations, links, obligations, rules, responsibilities, rights, and actions has been created, which maintains successful operation of this complex. It is also very important that the system ensures preparedness and ability to respond not only to main trends and tendencies, but to unexpected (extreme) situations, by mobilizing its own potentials and reserves, or initiating restrictions (within acceptable limits) on water, energy, and resource consumption and other measures. Applying "system analysis" in the form of DSS requires proper development of a detailed "tree" depicting objectives and links, which will be complemented afterwards by a database, knowledge base, and a set of models.

In the Central Asian region a set of models has been in the course of development for long time, which includes:

- perspective planning of the water-economic complex in the Amu-Darya and Syr-Darya basin
- annual planning of the water-economic complex under scarce water resources (ASBMM)
- multi-year regulation of both rivers' flow to satisfy needs of the water-economic complex during hydrological cycles
- operative correction of water resources management processes in the basin
- consequence forecasts of water breakthrough in reservoirs and lakes formed by landslides
- assessment of water system manageability under different combinations of natural and technological conditions.

This program aims, within the PCCP program, to demonstrate the potential of system analysis and mathematical modeling of complicated water-economic complexes, including interstate water management in the Aral Sea Basin, where the interests of all countries are closely interconnected.

Re-orientation of the model complex to water resource allocation strategy that meets state priorities calls for modification of the models themselves as well as water-economic complexes in the river basins amplification (see Figure A.1):

- Coordination of tasks and models of water resource management at the territorial level (river network, planning zone, and state) and in terms of timescales (annual and long-term management).
- Strengthening “power aspects” (production, distribution, regional exchange) in proposed approaches and methodology. Introduction of power aspects does not reflect the priorities of the Kyrgyz Republic and Tajikistan priorities but rather a refinement of objectives and approaches and their re-orientation towards integrated and compromise management.
- Strengthening ecological aspects: modeling how the Aral Sea water ecosystems (the Arnasay and lakes in the Aral Sea coastal zone) are bound up with the river and collector flows by their constituents: water, salinity, and sediments.
- Strengthening managerial aspects, as applied to the formation and assessment of criteria (both those in current use and those now being developed) for water resources distribution from the angle of both annual and perennial aspects.
- Strengthening planning aspects in developing water-economic complexes: development of indicators and criteria for choice and validation of where to locate water-economic objects.
- Strengthening emergency management, in terms both of reliable forecasts of possible accidents and catastrophes that may occur, and of making optimal choices for protection and prevention.
- Accounting for hydrological peculiarities of river flow formation and transformation in time and over basins, improving the accuracy of forecasts about water resources, improving management (channel design to reduce losses, filtration inflow to channels, etc.) and specific features of flow regulation by reservoirs at present and in the future (developing new regulation capacities).
- Interface creation to combine models with databases in a single information-program complex with elements relevant to the system. One of the necessary interface functions is data import-export and information processing through special program-translators.
- The interface should make it possible to select the task, object, level, and criteria, provide for numerical experiments using sets of models and iteration links, and show results of calculations.
- Users should have access to information through the interface, allowing analysis of the water-economic situation in the region as a whole, in separate basins, states, and planning zones, and for economic branches and objects like rivers, reservoirs, lakes, and power plants. Socioeconomic and ecological information should be shown at the regional, basin, and national levels.

To cover all the key aspects, a set of annual and prospective models is needed, combining simulation and optimization procedures and working at the levels of *river networks, planning zones, and states*, and at the boundaries of branch interests (drinking water supply, irrigation, power engineering, industry, and the environment), with managerial variable elements such as “water,” “salt,” and “energy.” The set should allow us to make water-salt balance, power, and economic calculations (effects, damages, and compensation), assess electric energy flows and fuel delivery

between the states, make effective decisions on water resources management, and predict conflict situations and interstate agreement violations among the states.

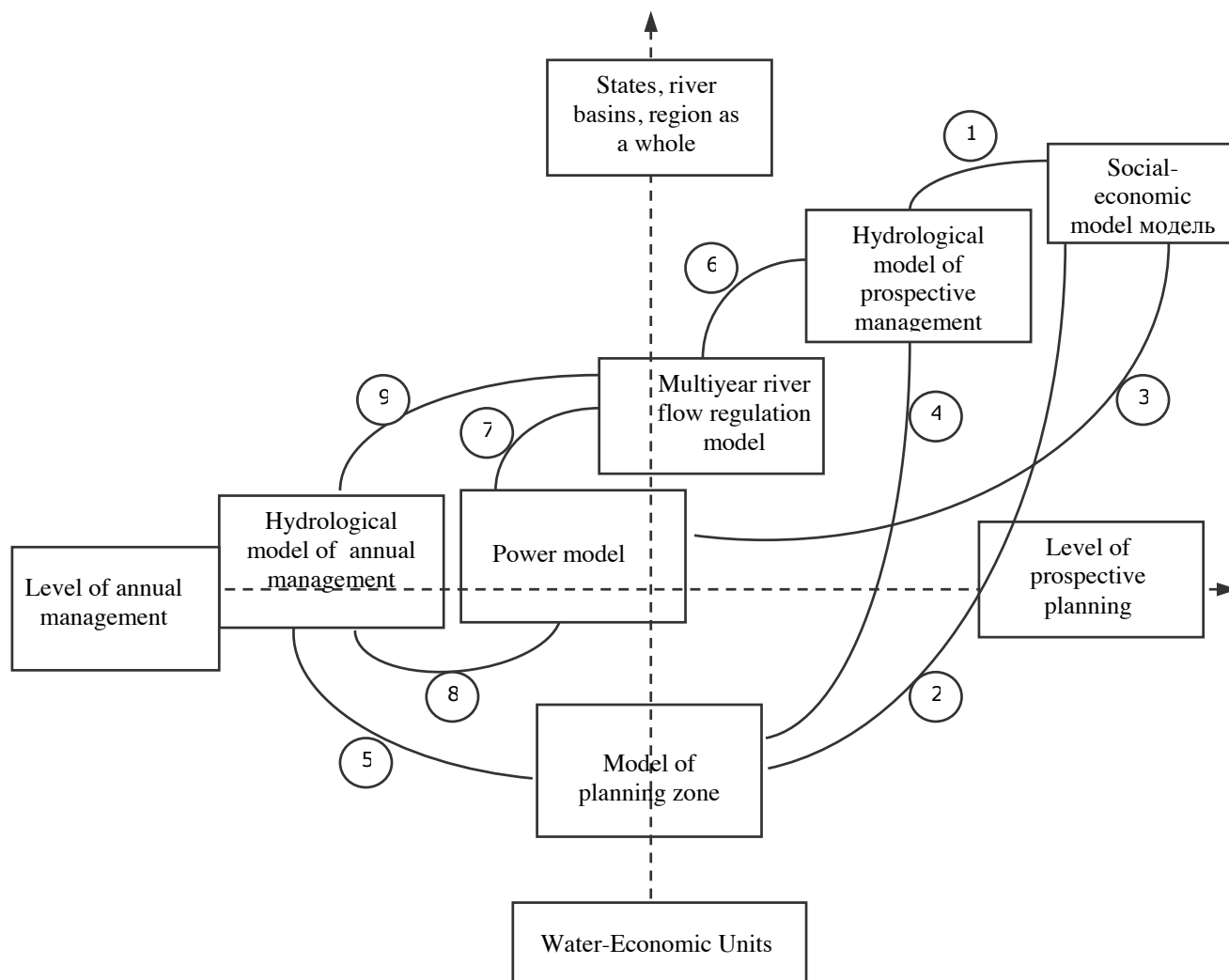


Figure A.1. Management levels and logical links within a set of models

Note. Logical links between the models on the scheme are:

1. Regional hydrological indicators of sustainable development and indicators of ecological consequences of water resources management.
2. Agricultural production, economy, social-demographic indicators, investments.
3. Power engineering (requirements, production, impacts, damages, compensations).
- 4, 5. Diversion from transboundary rivers, return flow, diverted water productivity.
6. Available water resources, diversion from rivers, water reservoirs and power plants operation mode.
- 7, 8. Power plant modes
9. Restrictions on water reservoir filling to the end of year (season).

NOTES

1. Kyrgyzenergo has now been restructured as separate power production, power transferring, and power distributing bodies.
2. This view was expressed in a survey of more than 250 participants in multi-stakeholder workshops and training in the ICWC Training Center.

Index entries: Aral Sea, transboundary rivers, water conflicts, interstate cooperation

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TECHNICAL FOCUS PAPER

Integrated water resources management in Central Asia:

The challenges of managing
large transboundary rivers

www.gwp.org



Global Water Partnership (GWP), established in 1996, is an international network open to all organisations involved in water resources management: developed and developing country government institutions, agencies of the United Nations, bi- and multilateral development banks, professional associations, research institutions, non-governmental organisations, and the private sector. GWP was created to foster Integrated Water Resources Management (IWRM), which aims to ensure the co-ordinated development and management of water, land, and related resources by maximising economic and social welfare without compromising the sustainability of vital environmental systems.

GWP promotes IWRM by creating fora at global, regional and national levels, designed to support stakeholders in the practical implementation of IWRM. The Partnership's governance includes the Technical Committee (TEC), a group of internationally recognised professionals and scientists skilled in the different aspects of water management. This committee, whose members come from different regions of the world, provides technical support and advice to the other governance arms and to the Partnership as a whole. The Technical Committee has been charged with developing an analytical framework of the water sector and proposing actions that will promote sustainable water resources management. The Technical Committee maintains an open channel with the GWP Regional Water Partnerships (RWPs) around the world to facilitate application of IWRM regionally and nationally.

Worldwide adoption and application of IWRM requires changing the way business is conducted by the international water resources community, particularly the way investments are made. To effect changes of this nature and scope, new ways to address the global, regional and conceptual aspects and agendas of implementing actions are required.

A **Technical Focus Paper** is a publication of the GWP Technical Committee aimed at harnessing and sharing knowledge and experiences generated by Knowledge Partners and Regional/Country Water Partnerships through the GWP Knowledge Chain.

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Acronyms

ASBmm	Aral Sea Basin model
BWO	Basin water organisation
CMO	Canal management organisation
CWC	.....	Canal water committee
IWMI	.....	International Water Management Institute
IWRM	.....	Integrated water resource management
NGO	.....	Non-governmental organisation
RESP	.....	Rural enterprise support project
SDC	.....	Swiss Agency for Development and Cooperation
SIC ICWC	.....	Scientific-Information Center of the Interstate Coordination Water Commission of Central Asia
UNESCO-IHE	..	UNESCO-IHE Institute for Water Education
WUA	.....	Water users' association

Foreword

This Technical Focus Paper is the second in a series of papers that provide a critical review of progress made in planning and putting integrated water resource management (IWRM) into practice. The papers synthesise the challenges, the successes, the setbacks, and the direction for further integration. They provide valuable insights from which others can learn lessons and apply them to their particular and often unique circumstances.


This paper focuses on IWRM experiences in Central Asia where the major rivers – the Amudarya and Syrdarya Rivers – flow from the headwaters in Kyrgyzstan, Tajikistan, and Afghanistan to the downstream Fergana Valley in Kazakhstan, Turkmenistan, and Uzbekistan, and are a part of the Aral Sea Basin. Water demand is dominated by energy requirements and irrigation, which are central to economic life in the region. There is a long history of irrigation in the region, the influence of the Soviet Union, and some 15 years' post-independence experience of introducing IWRM in the Fergana Valley. The paper describes building new infrastructure and, equally important, reforming institutional structures from the 'top-down' and from the 'bottom-up'. It also addresses the successes and the immense challenges still facing the region, particularly the transboundary water issues where nation States have differing views and priorities for water use.

This success so far in putting IWRM into practice is largely due to the commitment of those leading the national water organisations and so our thanks for this publication go to Dr Anatoly Ryabtzev and Dr Amirkhan Kenshimov in Kazakhstan, Janishbeck Bekbolotov and Barataly Koshmatov in Kyrgyzstan, Said Jakubzod in Tajikistan, and Abdurakhim Jalalov and Dr Shavkat Khamraev in Uzbekistan. They set the pace for maximising the benefits of IWRM and putting the principles into practice in Central Asia. They mobilised many thousands of water and agrarian practitioners to adopt more productive water management practices. This approach is now seen as the way forward for effective, equitable, and sustainable water management under the conditions of growing water stress in Central Asia.

I am grateful to the the authors Viktor Dukhovny, Vadim Sokolov, and Dinara Ziganshina for this excellent publication. My thanks also to the GWP Technical Committee members for their invaluable comments and suggestions during the drafting stages.



Dr Mohamed Ait Kadi
Chair, GWP Technical Committee



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Chair, GWP CACENA

Executive summary

The countries which make up Central Asia – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan – are all interconnected by shared water resources, mainly from the Amudarya and Syrdarya Rivers. Most of the population of Tajikistan, Turkmenistan, and Uzbekistan depend directly or indirectly on irrigated agriculture and 90 percent of the region's energy needs come from hydropower. Together these countries face limited water resources, increasing demand for water as populations and economies grow, and competition and increasing risk of conflict over water among the different water users. Like many regions across the world, Central Asia is seeking ways of making the best use of limited water resources, and integrated water resources management (IWRM) is seen as the means of achieving this.

Central Asia has a long history of managing water because of its importance to the economic development of the region's population. In the 1950s this economic development was dominated by the USSR, but since independence, States have developed their own strategies which now must be realigned by mutual agreement to better manage their shared and limited resource.

The region's agrarian sector continues to undergo radical reforms as the State and collective farms are moved into private hands within a market-based economy with its inherent benefits and volatile risks. IWRM planning initially began in the Fergana Valley with a 'top-down' approach as decision-makers realised that significant institutional and legislative changes would be required, but this failed to engage the lower end water users. To resolve this, the 'top-down' approach was combined with a 'bottom-up' approach as a process of 'hydrographisation' began, which changed water management from within administrative boundaries to watershed boundaries, and water users' groups were formed and encouraged to take on water management functions within a restructured water management framework.

Experience in the region over the past 15 years suggests that IWRM can provide the foundation for increasing water security. The successes were due in part to a good understanding among water professionals of the need to make better use of the available scarce water resources. Generating driving forces was important to provide triggers for change and to help promote further development and progress. Political support was also vital as officials became aware of the visible benefits of IWRM reforms. The outcomes of this were reduced water wastage, increased productivity, and a water management sector that experienced a more democratic involvement of stakeholders with less influence from government officials and professionals.

The paper draws many lessons from this experience about introducing IWRM at many different levels of management – from interstate, to national and district level. These lessons addressed:

- disseminating information to a wide range of audiences over large areas (approximately 1 million hectares)
- the importance of measuring and monitoring the impact of interventions
- managing supply and demand
- the importance of good governance.

Developing capacity in all its dimensions was also a vital ingredient. Not least was the demand for experienced staff at all levels. This was difficult to satisfy as the current labour force is reaching retirement age and many young people are seeking more lucrative employment in other sectors of the economy. Incentives are needed to attract the best people into water management.

The paper finally addresses the issue of transboundary water management. One example cited is the conflicting interests of releasing water for commercial hydropower generation in one country at times when it does not coincide with the water needs of downstream irrigation in another one, and so it flows to waste. The need for interstate cooperation in order to negotiate the trade-offs is clearly vital if scarce water resources are to be used to best effect.

A key challenge for water managers in Central Asia is to form a critical mass of driving forces at different levels. The number of IWRM adopters is growing, but the involvement of stakeholders at all levels and increasing the number of IWRM adopters will be crucial for success. This can be done, but it will need incentives, motivation, and stimulus to ensure that IWRM reaches the stage when the process will be self-sustaining without strong external support and promotion.

1 Central Asia's water challenge

1.1 The Central Asian region

Central Asia lies between the Ural Mountains to the north and the Hindu Kush to the south, and between the Caspian Sea to the west and the Tien Shan mountain system (near the border with China) to the east. The region covers 4 million km² (10 percent of the Asian continent and twice the combined areas of France, Germany, Great Britain, Italy, and Spain). It stretches 2,400 km from west to east and 1,280 km from north to south. The territory comprises Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan (Figure 1). The combined population is about 65 million and if northern Afghanistan, which is part of the Aral Sea Basin, is included then the population reaches 74 million.

Figure 1. The countries of Central Asia around the Aral Sea



Central Asia is an arid region. Steppe and desert cover over 75 percent of the land area, but the high mountain ranges along the southern, eastern, and north-eastern borders play a key role in making the region suitable for farming.

More than 6,000 rivers (over 10 km long) originate in the mountains, including the great Amudarya River and the Syrdarya River. The vast Turan lowlands stretch out between these rivers. There are densely populated oases located mainly along the upper and middle reaches and the irrigated areas in the lower reaches and deltas. These areas are surrounded by deserts that are moving as a result of natural processes that sometimes change the direction of rivers. In the past there have also been human interventions that have been destructive to rivers.

Water resources are predominantly transboundary in nature. Most of the region's surface water resources are generated in the mountains in Kyrgyzstan, Tajikistan, and Afghanistan. These waters flow into the two main rivers to countries downstream – Kazakhstan, Turkmenistan, and Uzbekistan – which are a part of the Aral Sea Basin. Water resources are critically important to the region's economy, its people, and the environment. Irrigation, for example, is vital for agricultural production and most of the population of Tajikistan, Turkmenistan, and Uzbekistan

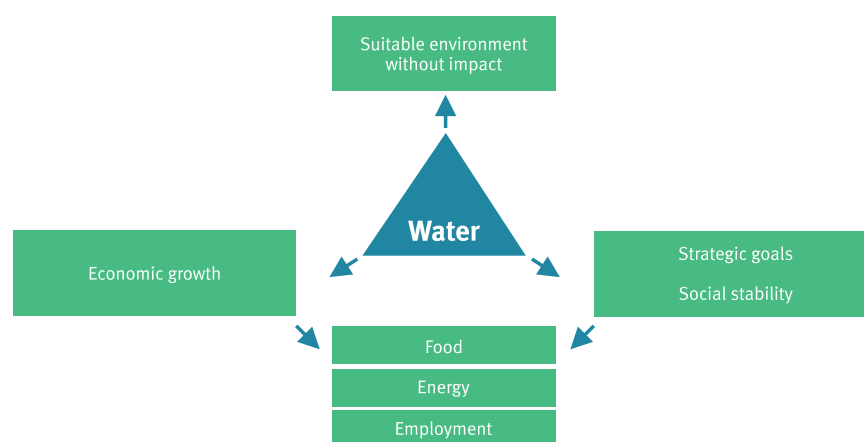
depend directly or indirectly on irrigated agriculture. Water is also important for energy production – hydropower energy satisfies more than 90 percent of the total electricity needs in Kyrgyzstan and Tajikistan, and is also an export commodity. The competing demands of agriculture in downstream countries and hydropower generation in upstream countries fuel serious political disputes in the region, putting water at the heart of regional security and stability.

1.2 Water resource challenges

The countries which make up Central Asia – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan – are all interconnected by shared water resources, and together they are facing major water problems. Water resources are limited, demand for water is increasing as populations and economies grow, and competition and potential conflict over water increases among the different water users. Like many regions across the world, Central Asia is seeking ways to make the best use of limited water resources. Confidence in the usefulness, accuracy, and timeliness of this approach is growing among water practitioners involved in a number of large-scale projects at both lower and middle levels of water management. The similarities between IWRM and traditional Muslim and ethical rules of water use prompted the desire of many people to initiate and implement this approach and particularly to involve water users in the management process. This is considered important in connection with the unfinished restructuring of agriculture and water management organisations in the transition towards a market economy. It is in sharp contrast to the previous top-down perspectives of water planning and management.

Experience so far in Central Asia, particularly in the Fergana Valley, suggests that IWRM can provide the foundation for increasing water security. This means sustainably providing water to all sectors of the economy, including social development, and meeting the requirements of the environment (Figure 2). Water security links the dynamics of economic growth with social and environmental stability.

Figure 2. The elements of increasing water security



The Fergana Valley is one of the most socially tense regions in Central Asia. It is shared by the three administrative provinces of Kyrgyzstan, Tajikistan, and Uzbekistan. The IWRM has managed not only to reduce the total water intake for all needs, but also to significantly increase the total volume of agricultural production and the related industries. It is noteworthy that during two periods of acute water shortage, in 2008 and 2011, limited water availability was successfully managed over 130,000 hectares of irrigated land.

Based on this experience of developing and improving water management in the Fergana Valley over a 15 year period, this paper sets out the lessons learned and the way forward for the Central Asian region. It briefly describes the water history of the region from Soviet times through to independence, and the water challenges that came with the significant changes in politics, water management, and administration. It discusses the reconstruction, modernisation, and development of new facilities and new lands for irrigation, and the equally important components of organisational and legal reforms, finance, and technical improvement. Also described are the 'soft components' of 'social mobilisation' and 'human development'.

The paper emphasises that putting IWRM into practice is not just about investment in infrastructure. It makes the case that such investment will only succeed within an 'IWRM environment', which requires the support of many stakeholders and a willingness among the whole complex of managers and decision-makers to cooperate and to orient their thinking towards future water demands. The success so far in achieving an enabling environment in Central Asia is the central theme of this paper, particularly the significant challenges of managing transboundary water resources. Progress is being made, but much still needs to be done – it is a work in progress.

2 The roots of water management in Central Asia

Central Asia has a long history of water management because of its importance to the economic development of the region's population (Dukhovny and de Schutter, 2011). Some of the first water control structures appeared in the region several thousand years ago, at the time when the Nile flooded ancient Egypt and 'rope' irrigation (underground tunnels called 'ropes' or 'qanats') was widely used in ancient Iran. In Central Asia, water has always been the basis of civilisation and the formation of States. The statement by Prince Massalskij VI, who was Director of the Department of Land Improvement of the Russian government in 1913, illustrates this:

Of all the monuments of hoary antiquity in Central Asia, the most attention is paid to ambitious irrigation facilities in the form of canals, often resembling fairly large rivers in regards to extension and water abundance. The great importance of irrigation water which creates life and culture in the dead deserts is well known to the population, which from time immemorial has been accustomed to look at the revival of land through irrigation as a charitable deed.

During this time it was appreciated that large-scale construction of water projects alone was not able to create the basis for the quality of life that was expected from bringing water to the land. GK Rizenkamph, an engineer and scientist, when leading the development of the virgin lands in the Hungary Steppe, outlined an integrated approach to water resources development, which was implemented half a century later. He wrote in 1915:

The task of the creators of irrigation systems is quite complicated. The irrigation network is the canvas on which life will embroider its stories; and in the process of

creation, it is essential to see very clearly all aspects of future life. Development of the irrigation system is not an end in itself: it is a part of the universal whole – the revival of the desert – hence the main challenges arise, and the irrigation system should be organically linked to other aspects of life. A key requirement is to ensure the most efficient organisation of all life, and not simply focus on the construction of the irrigation network; it is necessary to achieve maximum efficiency in general, not in just one specific component.

It is necessary not only to design an irrigation system, but also to plan the development of the project area, which should include the organisation of a system of roads, industrial sites and shopping centres, as well as the most appropriate energy sources for future factories and plants. For that it is necessary to prove that the designed irrigation system is blended in with the overall organisation of the future life and is a part of a well thought out whole.

Rizenkaph and his associates worked with these principles to design and build large hydraulic hydropower complexes. The first was the Farkhad hydro system on the Syrdarya River in the 1930s. At the same time, construction began for Bekabad city and two large industrial complexes producing steel and cement. Similarly, the hydropower complex at Kairakkum was built on the same river in the 1950s. The main feature of both enterprises was that they should operate in an integrated manner within the framework of incorporated institutions.

The pinnacle of applying this integrated approach came with the development of a new zone in the Hungary Steppe shared (at that time) by three republics of the former Soviet Union – Kazakhstan, Tajikistan, and Uzbekistan. The project was initiated by the Soviet Government in 1956. The water complex of the Hungary Steppe covered over 1.0 million hectares of desert lands and was supplied with water from the Syrdarya River via the Farkhad Dam and three large canals. The whole system was based on principles which are now the main features of IWRM.

In 1958, the USSR Council of Ministers issued the decree which outlined the establishment of a construction industry enterprise and the organisation of maintained State farms (*sovkhozes*) in the Hungary Steppe. During the construction of the irrigation infrastructure, modern irrigation techniques, such as automated control, were introduced along with vertical and closed horizontal drainage, lined canals, and other anti-seepage measures. To accomplish all this, the entire management was entrusted to a single organisation, *Glavgolodnostepstroy*.

In addition to the irrigation and drainage infrastructure, attention focused on constructing industry, roads, railways, power, water, gas and heat supply systems, and maintenance companies, and the other infrastructure necessary for the State farms' sustainability. Social infrastructure – shops, hospitals, schools, catering facilities, rural clubs, and more – were also constructed.

Glavgolodnostepstroy created subordinated organisations for providing operation and maintenance services, and for managing agricultural activities on the State farms. It also provided credit, equipment, seeds, fertilisers, and mechanisation services.

By 1970, the area was producing 370,000 tonne of agricultural produce annually with a value of Russian Roubles (RUB) 180 million. In 1980 this had increased to 1.8 million tonne with a value

of RUB 488 million¹. Cotton was the main crop; others included vegetables, horticulture, melons, livestock, and poultry.

This project was a good early example of targeted economic improvement under the influence of irrigation. In this system all kinds of water resources and the management of water and land were integrated. There was close alignment of all levels of the water hierarchy and the needs of all water users were taken into account. Experience of this project convincingly demonstrated that, with proper control and management, it is possible to significantly improve the natural and economic conditions in a former desert.

Another example of an integrated approach to water management in the former Soviet Union was the 'Scheme of Complex Use and Protection of Water Resources'. In western practice this is known as a 'Basin Master Plan'.

The complex schemes focused on economic development in areas selected by the Soviet Union's State Planning Committee. In reality, however, the plans were not backed by the required capital investments. As a result the irrigation infrastructure was not completed and attention focused on scattered measures to improve water use. Consequently, the desired reduction in per capita water consumption was not achieved. This increased water scarcity in the basin, especially in dry years. Nevertheless, the present independent Central Asian republics use water allocation principles that were originally approved by the Soviet State Planning Committee on the basis of those schemes (Dukhovny and de Schutter, 2011).

Previous attempts to integrate water management in the region helped to create an understanding among water professionals of the viability of this approach and how it could positively shape and influence water policy and practice.

The Soviet era had a positive influence upon the present and future development throughout the region:

- The high level of water education and scientific research work established a sound base for building up water resources management potential.
- Water professionals in the different republics of the former USSR integrated their work using common uniform standards, rules, methods, and approaches, and these established the ground rules for future cooperation.
- In the six to eight years before the collapse of the USSR, the Soviet Government focused on plans to improve the socio-economic and environmental situation in the Aral Sea Basin, (establishing two basin water organisations [BWOs]), and allocated considerable investment for infrastructure and social rehabilitation projects.

These created the required pre-conditions for a smooth transition from a command economy to a market-oriented one. Independence has provided new opportunities for development, but, at the same time, it has also disrupted the economies in the various States. All five States have rapidly moved away from the command economy and, although four countries have proclaimed their status as republics,

¹ At 1989 prices these amounts are equivalent to US\$ 321.4 million and US\$ 871.4 million respectively.

their political structures, aspirations, and ideals were quite different from any well-known political model and from each other.

The agrarian sector in Central Asia is now undergoing radical transformations, including the restructure and transfer of large State and collective farms into smaller private or leased farms. This has created a number of problems. Farms are now run by new people who do not have the broad agricultural experience for efficient crop production and irrigation. In the past, agriculturalists worried only about weather conditions, uncertainties of water flow, diseases and pests, and changes in agricultural output prices. Nowadays, the degree of risk has increased significantly because of changes in public policy and agrarian institutional structures, incomplete infrastructure, weak State support, and poorly developed markets. Farmers now have to find their own input suppliers, establish relations with buyers, and cope with price fluctuations for agricultural outputs and inputs (fertilisers, fuel, chemicals, etc.) Thus, irrigated agriculture has lost some of its profitability, which has not been helped by falling agricultural commodity prices worldwide. This has seriously affected farm incomes and employment in the rural sector, causing significant social damage.

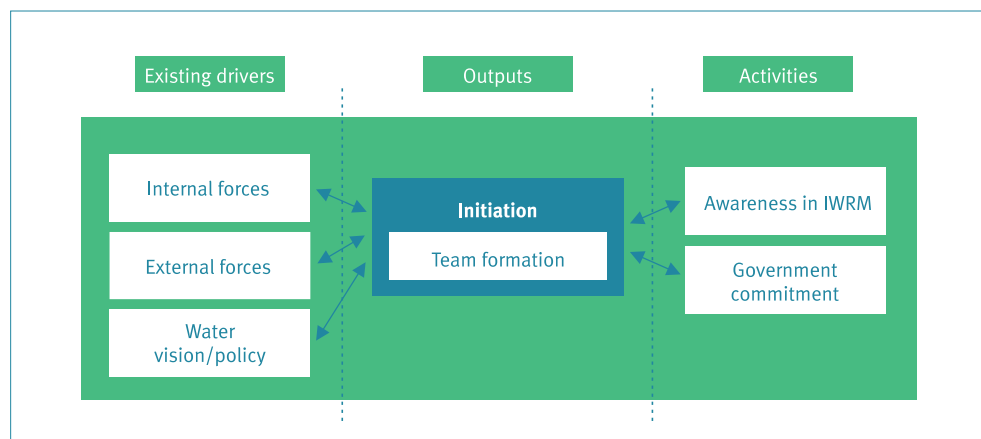
2.1 A 'top-down' approach

The implementation of IWRM planning in Kazakhstan and Uzbekistan, supported by UNDP projects, needed to start at the top – hence the initial focus on a 'top-down' approach through national governments.

In Kazakhstan

Kazakhstan was a pioneer in this; the process beginning in 2000 based on the pathway set out in Figure 3. Kazakhstan started to develop all the pre-requisites for the transition towards IWRM. Water experts and decision-makers realised that to ensure development and implementation processes it would be necessary to carry out a number of significant institutional, legislative, and information changes. Between 2000 and 2003 the key role in water management was legally assigned to the Committee for Water Resources of the Ministry of Agriculture and eight basin management authorities. By 2003, new water legislation had been formulated.

Figure 3. Classic scheme for initiating and mobilising IWRM planning (CapNet, 2005)



IWRM planning was first introduced in a few places. First, at the international level, the Government of Kazakhstan announced, at the World Summit on Sustainable Development in Johannesburg, that it agreed to prepare a plan to put IWRM into practice by 2005. This received the support of the international community and donors represented by the Government of Norway, UNDP, and the Global Water Partnership (GWP). In the course of an official visit to Kazakhstan by the Prime Minister of Norway, Mr KM Bondevik, in May 2004, an agreement was concluded to financially support the development of an IWRM National Plan for Kazakhstan. The Committee on Water Resources, in cooperation with the various ministries and departments, was tasked with developing the plan (UNDP, 2006).

A multi-sector approach was required in order to manage water resources in an integrated way, which meant developing links and structures to coordinate the various major water-consuming sectors and to bring them into the planning process from the beginning.

It was important to have wide participation since most water management problems were experienced at the lowest levels. Water management changes needed to be directed at individual activities and intensive consultation with all stakeholders was essential.

A Task Force was set up comprising international and national experts. An interdepartmental Task Force was established to liaise with government structures. The group comprised representatives of all relevant ministries and departments invited by the Committee for Water Resources. Workshops, roundtables, and training courses were organised by the Committee for Water Resources of the Ministry of Agriculture with participation from:

- Emergency Control Ministry
- Ministry of Economy and Budget Planning
- Ministry of Public Health
- Ministry of Environment
- Ministry of Energy and Mineral Resources
- Committee of Forestry and Hunting of the Ministry of Agriculture
- Fishery Committee of the Ministry of Agriculture
- Department of Farming of the Ministry of Agriculture.

The Committee for Rural Development of the Ministry of Agriculture was required to raise public awareness and improve the knowledge of the main project implementers. In 2005, a Concept of Transition to IWRM was developed and published for consultation. Its purpose was to present proposed outline plans and principal components. It was then sent out for comment to all interested parties, such as government agencies, institutions, local governments, NGOs, and leading experts in the country and in the Central Asian region for comments and observations.

The plans were drawn up by a team working under the direct supervision of the First Deputy Chairperson of the Committee of Water Resources. Following on from the concept, the first version of the National Plan was prepared and submitted to all stakeholders for consideration in November 2005.

A significant success factor in this initial process was the political support and commitment at the highest level of government. Such political support enabled:

- priority water management problems to be solved at the interdepartmental level
- effective planning coordination (the interdepartmental group received political support for the formation and operation)

- a water resources development vision, taking into account political goals compatible with other national development goals and vice versa, to be enunciated, and water resources management and objectives to be taken into consideration in the political agenda
- sustainable water management approaches to be included in the national development plans, activities, and political statements of other sectors
- the political effects of the IWRM plan to be embedded throughout the entire process rather than at a formal end stage (thus ensuing ongoing improvement of the works)
- decisions to be made according to the suggested plans as well as legislative and institutional reforms
- an IWRM plan to be adopted and implemented
- government funds to be allocated and donor assistance mobilised.

Decree No 978, of 11 October 2006, of the Government of the Republic of Kazakhstan "On agreement between the Government of the Republic of Kazakhstan and UNDP concerning the project 'National Plan of Integrated Water Resources Management and Water Efficiency for the Republic of Kazakhstan'" approved the development of the programme 'Integrated Water Resources Management and Improvement of Water Use Efficiency in Kazakhstan till 2025'.

Kazakhstan demonstrated, after completing the plan for IWRM, how to gain acceptance by all beneficiaries, including the government, in the form of a national long-term programme.

The 'top-down' approach in Kazakhstan covered the national and basin levels. It helped to lay down the legal and institutional frameworks for the activities of a national regulatory body and the basin units. It adapted existing structures and management techniques for the future development of IWRM. Some progress was made in improving water management information systems and in developing a national programme for improved water management. But this project did not work well below the basin level in involving end water users in IWRM. Of the 177 items in the plan only three dealt with water management issues below the basin level. National water councils and basin water councils were still led by administrative officials rather than by elected stakeholders.

In Uzbekistan

Using the same 'top-down' approach, the UNDP funded the 'IWRM and Water Efficiency Plan for Zarafshan River Basin' in Uzbekistan. This project also covered the basin and national levels. The Zarafshan River Basin already had an institutional foundation and favourable conditions for IWRM because basin management administration, *Zerdolvodhoz*, had been established there in the early 1930s. Initially, *Zerdolvodhoz* served two provinces – Samarkand and Bukhara – and then partially served the Jizzak and Kashkadarya provinces. The project had three components:

- improved legal and institutional framework for IWRM in Uzbekistan through the Government's Project Advisory function and modernised national water legislation
- improved communal water services and utilities within the Zarafshan River Basin by developing a strategy for meeting MDG goals for improved public water supply between 2010 and 2015; achieving a 90 percent centralised water supply and 13 percent sewage systems for rural and 70 percent for urban areas; with all being equipped with water measuring devices
- IWRM and a water use efficiency plan for the Zarafshan River Basin.

As in Kazakhstan, this project contributed to improving IWRM governance, but in practice it did not cover all levels of water management and all economic branches to meet the water

requirements of end water users. Most importantly, it did not achieve the expected improvements, enhanced capacity, and increased management efficiency.

National policy dialogues on IWRM and water supply and sanitation under the European Union Water Initiative implemented by the United Nations Economic Commission for Europe and the Organisation for Economic Co-operation and Development have also focused on inter-sector coordination at the national level. These initiatives were useful in creating an initial understanding of IWRM at the upper levels, but they could not provide specific mechanisms for practical IWRM integration at all levels without addressing both the governance and management dimensions of IWRM.

The water situation is constantly changing and it needs specialists or water users with extensive knowledge and experience of maintaining infrastructure, financial and organisational administration, and technology and management in order to adapt. Local knowledge and experience is also important, particularly in relation to extreme and unique local situations. That was why the main efforts now needed to be directed to establishing managerial tools and building capacity.

2.2 Introducing a 'bottom-up' approach

A multi-level perspective formed the backbone of IWRM in the Fergana Valley (IWRM-Fergana) project. It was implemented by national teams from Kyrgyzstan, Tajikistan, and Uzbekistan on the command areas of the Aravan-Akbura canal in Kyrgyzstan, Khodja-Bakirgan canal in Tajikistan, and the South Fergana canal in Uzbekistan (Figure 4). The area included over 116,000 hectares of irrigated land served by a canal system. The Swiss Development Cooperation (SDC) provided financial assistance and technical assistance came from the International Water Management Institute (IWMI) and the Scientific-Information Center of the Interstate Water Coordination Commission (SIC ICWC) in Central Asia. They provided methodological and organisational guidance for project implementation (Dukhovny et al., 2008).

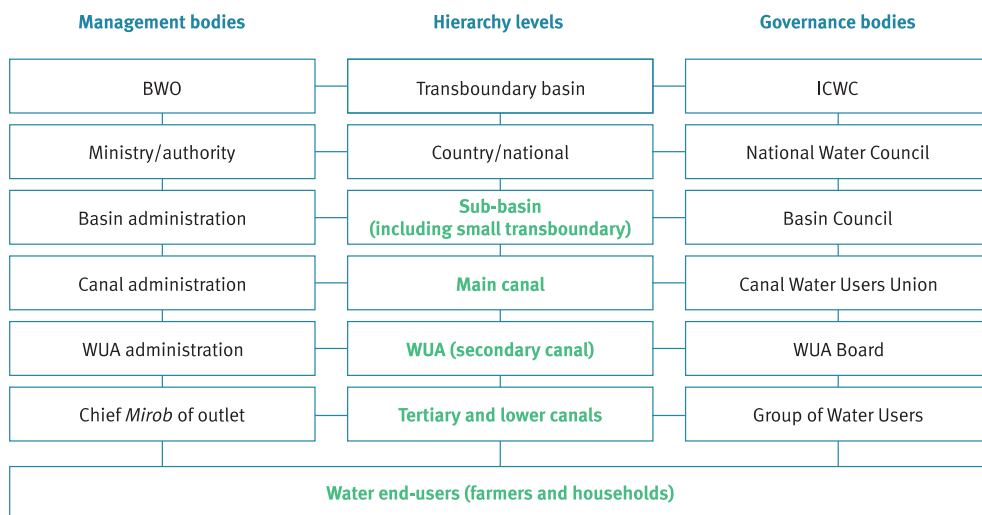
Figure 4. Fergana Valley – the area for IWRM implementation



The multi-level approach was to cover several levels of water management hierarchy – starting with the end water users and former on-farm network of *kolkhozes* (collective farms) and *sovkhozes* (State farms) up to main canal management and beyond into small transboundary river basins. The aim was to manage the interdependencies between various stakeholders with the overall goal of contributing to more secure livelihoods, increased environmental sustainability, and greater social harmony.

The project used a range of tools to deal with organisational, legal, financial, and engineering measures. The joint activities of stakeholders at all levels were based on agreed procedures and methods for equitable and stable water allocation under the control of water users. The project revised the institutional set-up for water delivery management according to hydrographic boundaries (Figure 5), linked several levels of water hierarchy, established cross-sector integration, linked different types of water, and shifted from supply to demand management (Figure 6).

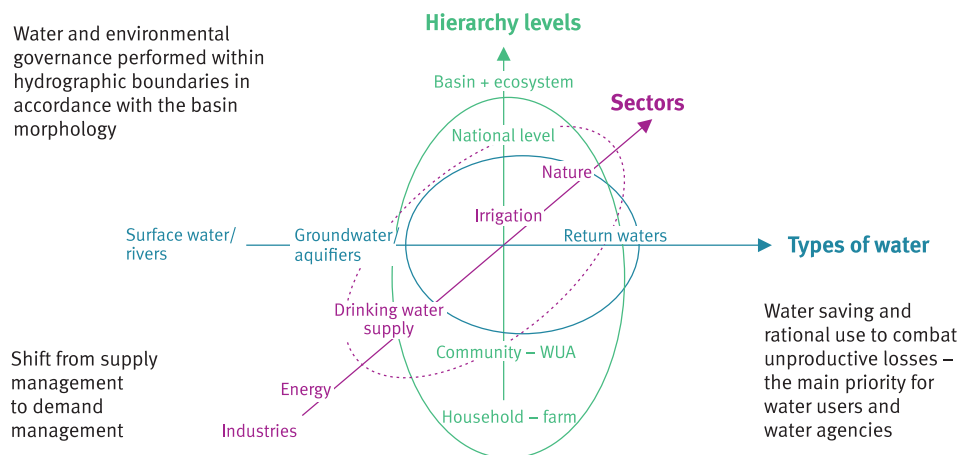
Figure 5. Levels of water hierarchy in the Fergana Valley



New institutions and 'hydrographisation'

The water management institutions were set up according to hydrographic principles at various levels. This is known in the region as 'hydrographisation' (Mirzaev and Ergashev, 2011b). It involves setting up institutional structures which enable water delivery systems to be managed within hydrological units rather than within administrative boundaries.

Figure 6. Consistency of IWRM in the Fergana project



Hydrographisation was applied because it helped to reduce water losses and control water delivery accurately and with security. It provided a basis for the uniform and equitable distribution of water among all end-users. This was implemented in the Fergana Valley along two lines – management and governance. First, the canal management organisations (CMOs) were linked by contracts to the administration of water users' associations (WUAs). The second involved the establishment of canal water committees (CWCs), boards of WUAs and water users' groups.

Establishing WUAs produced considerable progress in stakeholder involvement in water-related decision-making processes (Figure 7). This not only reduced administrative dominance, but it also prevented the possibility of water organisations using their power to take over management responsibilities. Public monitoring and water accounting systems were organised through proper stakeholder participation, which included regular monitoring by representatives from the CWC to ensure fair and equitable water allocations among the different sections along the major canals.

Hydrographisation and public participation enabled unproductive water losses to be identified and eliminated, including the problems of poor and unreliable supply at the tail end of canals. This linked all levels of the water hierarchy and organised the control of water delivery and allocation. Those functions are now mainly performed by water management organisations in partnership with their public committees or councils as well as WUAs.

The introduction of hydrographisation along the South Fergana canal, the Big Fergana canal, and Big Andijan canal are illustrated in Table 1.

Figure 7. Dynamics in the development of WUAs in the Uzbek part of the Fergana Valley

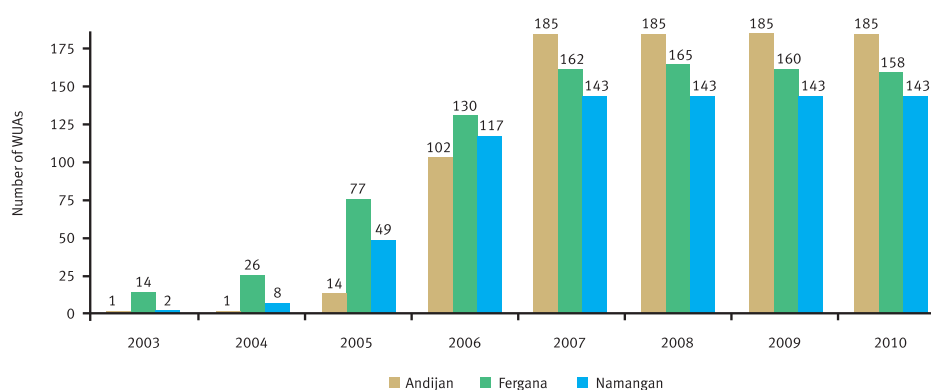


Table 1. No of WUAs and areas irrigated along canals in the Fergana Valley (2010)

Indicator	South Fergana canal	Big Fergana canal	Big Andijan canal
Average area (ha)	2,413	1,666	1,796
Number of WUAs	37	93	49
Hydrographic WUAs (%)	85	56	38

Although water is delivered by main canals from the river, a feature of irrigation in the region is that additional water flows in from small rivers running within the command areas. This water and irrigation system is rather unique in terms of morphology, water consumption, hydro-module zoning, and secondary water sources. Managing water under such conditions is as much an art as a science and it relies on professionals who have had long-term practical experience in managing such systems.

Although hydrographisation is a logical step in managing water within catchments, it is a process that is not well understood or accepted by some. The approach has its critics in those who advocate a so-called 'polycentric approach' that emanates from the assumption that irrigation systems have often more than one source for water delivery. On this basis, some are likely to reject hydrographisation and invoke a mixed structure of water delivery systems (Wegerich et al., 2012).

2.3 Improving efficiency through end-user outcomes

The IWRM-Fergana project is designed primarily to reduce water losses by using improved management tools to bring about reform and help water management institutions and water users to better manage available and limited water resources. Various management instruments were used, such as a management information system for main and secondary distribution

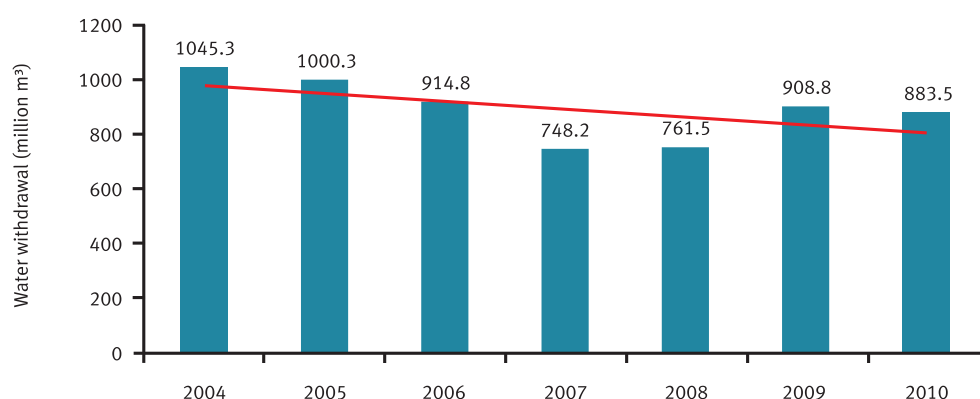
canals, updated hydro-module zoning to assess irrigation rates and scheduling, daily planning of water distribution among users, and hydrometric services for water users (SIC, 2007; SIC and IWMI, 2006).

The reforms resulted in significant reductions in water withdrawals from rivers. For example, the total water withdrawal for the South Fergana canal in Uzbekistan decreased by more than 15 percent during the eight years of project activities (Figure 8).

Within the project area, indicators of water use efficiency and water productivity at the farm level showed improvements (Mirzaev and Ergashev, 2011a). These led to improvements in financial sustainability for farmers and WUAs. Other improvements included:

- overcoming water deficits during 2007/2008 without loss of crop yield and total crop production
- reducing seepage losses by 10 percent at the WUA and water consumer levels when compared to former water distribution practices
- transferring water to the WUA balance sheets by registering structures at key canal junctions in the WUA irrigation network and constructing off-takes at every farm.

Figure 8. Total water withdrawn for irrigation along the South Fergana canal



Significant reductions in water consumption per hectare were observed in all pilot canal areas over a period of eight years (Table 2). This indicator was applied more widely to neighbouring areas outside the project.

Table 2. Changes in water consumption in selected canals between 2004 and 2010

Pilot canal	Water consumption (000 m³/ha)	
	2004	2010
Aravan-Akbura canal	8.11	7.88
Khodja-Bakirgan canal	14.04	7.15
South Fergana canal	11.35	8.45

The uniformity and stability of the water supply increased in the pilot zones. In the Aravan-Akbura canal zone, water supply uniformity increased from 59 percent to 90 percent, water supply stability to 87 percent, and unproductive losses along the canal decreased from 47 percent to 31 percent.

In the South Fergana canal the stability of the water supply exceeded 92 percent in 2011 (in comparison with 60 percent in 2002), the uniformity of the water supply was almost 92 percent, and unproductive losses fell to less than 10 percent.

In the Khodja-Bakirgan canal zone, where inflow is not regulated by reservoirs like the other two canals, total annual water use decreased from 113 million m³ to 83 million m³ because of improved water ordering and delivery routines.

At the heart of the improvements were the economic and financial stability of the water management organisations and the availability of equipment and qualified personnel. The project enhanced the financial discipline within WUAs and created conditions for improved financial sustainability, thus raising the authority of the WUAs among the water users. Payments from water users for WUA services were reported to have risen by 75 percent in 2010 and 2011 when compared to WUAs outside the project area.

Fee collection in a number of WUAs within the project area reached US\$ 15–30/ha. In comparison, the average for the Fergana Valley was US\$ 5/ha. In Kyrgyzstan and Tajikistan at the main canal level, a flexible economic system was developed through a combination of budgetary financing and payment for water supply. At the WUAs' and end-users' level, a financial budgeting system was developed and introduced, fixed assets were added to the WUA balance sheet and depreciated, and reserve funds were formed. There was an annual increase in the volume of services provided and funds received; accounting and reporting in the WUA was also streamlined. Transition to the payment for WUA services depending on the volume of water supplied was carried out in all the pilot areas.

Attention was also given to improving water and land productivity on individual farms and plots. In all three countries, a framework was introduced for assessing the situation on irrigated farms and for transferring innovative solutions through the new system of interrelations between the different bodies. A chain of extension services for farmers was created and this had a significant impact on the efficiency of irrigation water use and productivity (Jumaboev et al., 2013).

The amount of irrigation water used to grow cotton was significantly reduced compared to the average at the provincial level. Reductions were 30 percent in Kyrgyzstan and Tajikistan, and 59 percent in Uzbekistan (Figure 9).

Cotton crop yields increased at the project sites (Figure 10). This was made possible by examining both irrigation and agronomic issues. This approach allowed the project to develop recommendations to ensure the efficient use of water and all other resources. Productivity in the project area was considerably greater than the average in the province.

3 KEY LESSONS LEARNED AND WAYS FORWARD

Figure 9. Comparison of water use for cotton at project sites with the average water use at the provincial level

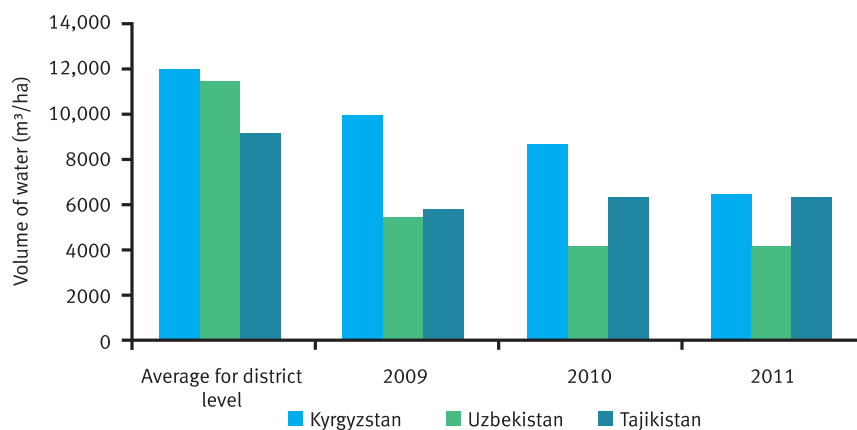
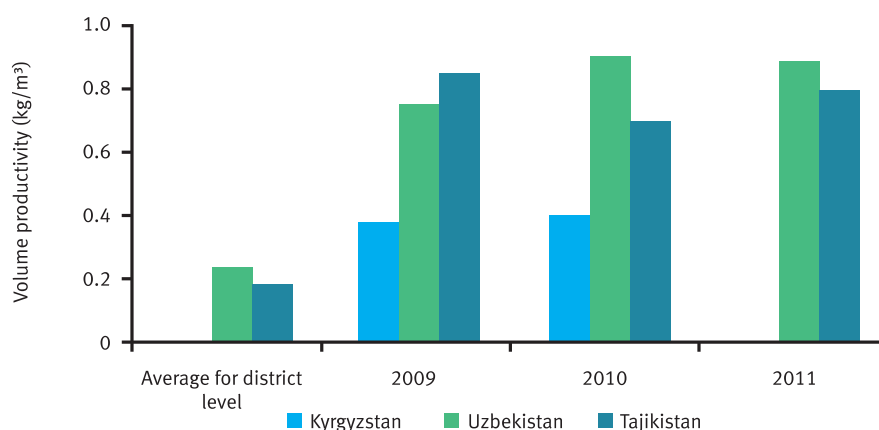


Figure 10. Comparison of cotton yields at project sites with the average yields at the provincial level



3 Key lessons learned and ways forward

The approaches developed and tested within the IWRM-Fergana project were specific and results-oriented. Although the degree of success varied across scales and countries it was considered that the viability of an IWRM approach was proven. In this section we draw lessons from this experience – both failures and successes – and outline the way forward for putting IWRM into practice across the region.

The scale and scope of IWRM implementation can be seen through the hierarchical and sector focus of the key IWRM projects implemented in Central Asia (Table 3). Three key lessons can be drawn from this.

Table 3. Water management hierarchy levels in different IWRM oriented projects

Project	Levels of hierarchy							
	International	National	Sector				Canal management	Other water users
			Irrigation	Water supply	Hydropower	Ecology		
National IWRM plan in Kazakhstan	available	available	available	available	none	available	none	available
IWRM in Zeravshan Basin	none	available	available	available	none	available	none	available
IWRM in Fergana Valley	partially ²	available	available	none	none	available	available	available
RESP 2 Uzbekistan	none	available	available	none	none	none	partially	available
WAREMASP ³ Uzbekistan	none	available	available	none	none	none	none	available

3.1 From irrigation to other sectors and ecosystem needs

Past and ongoing projects have clearly focused on irrigated agriculture as the dominant water user. Some 85 to 90 percent of available water resources is used for irrigation on farms, *dehkan* (small) farms, household plots (Turkic – *tamarka*), and rural settlements which require stable and secure supplies.

Problems in coordinating projects

Two projects are being financed by SDC – one dealing with irrigation and another with rural water supply – within the same territorial boundaries in the Fergana Valley. Both projects had to deal with the issues of operations along big canals. The rural water supply project aimed to provide water for drinking purposes to villages and individual farms that do not have centralised water supply systems. The water for this purpose is taken from irrigation canals, and water management organisations have to plan special releases along the canal 365 days a year. The absence of coordination between the two projects complicates the operational functions of the institutions established under the irrigation project, and provokes an inefficient use of water because only 5 to 10 percent of these targeted releases are used efficiently.

² At the level of two small transboundary rivers.

³ WAREMASP – a project on IWRM implementation in the irrigated areas with pumping systems for water delivery in the Fergana and Zeravshan Valleys supported by the Asian Development Bank and SDC.

3.1.1 Working at different levels

Working at different levels can help to ensure better cross-fertilisation, coordination, efficiency, and sustainability (GWP, 2004). But a feature of IWRM implementation in Central Asia so far is that virtually all past efforts were concentrated at the national and basin levels (GWP CACENA, 2006). Only the IWRM-Fergana project went further and dealt with water management at the lower levels (main canal, WUAs, and farmers) and created interrelations between the levels.

The vision for the IWRM-Fergana project was to introduce activities at all levels and was formulated and approved by the national water authorities in Kyrgyzstan, Tajikistan, and Uzbekistan. Recommendations were made to introduce IWRM at a number of levels.

Interstate level

Recommendations included:

- Strengthening the role of BWOs and transferring all structures along the river to their control. Establishing interstate basin public councils comprised of key stakeholders, including local governments and the owners of all major hydro schemes, representatives of environmental protection agencies, and delta committees.
- Increasing the accuracy of all water accounting, including groundwater and return flows. These recommendations met with opposition from national water authorities and hydropower authorities as each wanted to maintain their authority and their own national interest. This required strong political involvement and almost seven years of negotiations at the ministerial level to resolve.
- Establishing river water users' committees on each small river. This measure was only successful for the Khodjibakirgan River (between Kyrgyzstan and Tajikistan) and the Shahkimardan River (between Kyrgyzstan and Uzbekistan) at the local community level with the participation of provincial water organisations from each State. In all, more than 20 small river basins have now requested a similar approach.

National level

Recommendations included:

- Transferring the Main Water Resources Administration, Uzbekistan and the Water Resources Department of Kyrgyzstan to direct governmental authority or restoring the Ministries of Water Resources
- Strengthening the role of the Fergana Valley Main Canal Management Authority and the small river basin committees which report to it
- Converting the Irrigation System Authorities, which are units in the structure of the basin management organisations, into bodies responsible for water demand management
- Improving the legal framework:
 - securing a right to water for every water user in the form of a minimum volume of water per unit area (in agriculture), per produce (in industry), and per capita (in public utilities), based on biological and technological needs and focused on potential water productivity
 - establishing yearly targets for water conservation with relevant capital investment plans for all levels and sectors of the water hierarchy
 - creating a National Public Commission to provide assistance in improving water management.

IWRM concept is used as a 'slogan'

In the USA, the IWRM concept is used as a 'slogan' to implement it in various forms – from small to multi-sector projects, and under different headings such as 'Interstate river commissions', 'Ecosystem management', and 'Watershed approach'. In 2012 many initiatives were registered under this slogan. But common to them all was the involvement of stakeholders; their union under the slogan along the river basin or catchment area and the collaboration between the agencies and organisations within a basin or river commission striving for environmental independence. But one thing was clear – IWRM requires a more systematic and economic approach. (Layzer and Shulman, 2013)

Province and district level

Recommendations included:

- Establishing public councils for small river basins and canals, and WUA support departments in basin management organisations
- Improving the economic and financial viability of WUAs; establishing WUA support funds in local banks and creating favourable conditions for loans
- Creating water and land commissions at the district level to monitor land and water productivity.

Dissemination

Recommendations included:

- Expanding the implementation of IWRM to the whole Fergana Valley in Kyrgyzstan, Tajikistan, and Uzbekistan – approximately 1 million hectares
- Intensifying the development of knowledge transfer systems for farmers and WUAs based on the experience of IWRM-Fergana and water productivity projects in order to cover all irrigated areas in the Fergana Valley
- Disseminating the complex technical, managerial, financial, and organisational guidelines and recommendations from the IWRM project.

Agencies and donors may have other priorities...

Although all the countries prepared their visions for the expansion of IWRM with support from international agencies, donors also have their own priorities and choices. For example, the Rural Enterprise Support Project (RESP-2) funded by the World Bank and SDC envisaged disseminating and upscaling the IWRM-Fergana experience. The main goal was to create conditions for the World Bank to allocate a loan that would address irrigation system rehabilitation. The project only focused on implementing hydrographisation of WUAs within seven provinces and providing capacity-building programmes. It did not address the other interconnected issues of managing water, such as main canal management, the managerial tools needed at the WUA level (such as updating rates of water consumption, daily water scheduling, and extension services for information distribution to water users) and the issues of social mobilisation among key stakeholders. As a result there was no visible reduction in water intake in any of the seven provinces, nor were there any observed increases in agricultural production. There was also no organised monitoring of the stability and equity of 'top-end tail-end' water delivery.

Such partial dissemination of the IWRM experience without sufficient evaluation of the outcomes discriminated against the potential success of the IWRM approach. This rather fragmented implementation failed to make the connections between water management levels and these are unlikely to improve if these limited interventions are scaled up to include the entire country.

3.1.2 Measuring and monitoring impact of interventions

When undertaking reforms and changes in day-to-day activities in the water sector, the focus needs to be on practical outcomes and results achieved rather than on the process. All changes (even institutional) need to be measured with relevant water-related indicators, such as 'more drops of water saved per any other action'. A good balance is needed between social equity, economic effects, and ecological sustainability.

More than ten projects with IWRM in their titles were examined and only one of these projects adopted indicators of water use improvement. Only the Fergana Valley project measured water use and provided evidence of a significant reduction (15 percent) and increasing yields and water productivity. All the other projects either did not monitor water use or did not intend to do so.

3.2 A holistic and systematic approach to IWRM

An IWRM approach needs to consider social, economic, and environmental spheres of influence – not managing, but rather tracking changes based on multilateral monitoring and organising information for use in adaptive management.

Every person and every social unit – family, community, and WUA – as well as administrative territorial units of economic and political systems are connected to water. These elements define a complex set of factors, aspirations, plans, needs, resources, and their interactions, which need to be considered when building an integrated, systemic, and holistic approach to water management.

A holistic approach does not imply that putting IWRM into practice should be done by a single organisation. This is not only undesirable, but is practically impossible because of the enormous number of actors, links, connections, relations, factors, consequences, water sources, and their consumers inside and outside the water sector. Evers and Nyberg (2013) listed a number of complex features that are important when implementing IWRM in large river basins.

Some 15 years' experience in Central Asia confirmed the appropriateness of this list:

- There is a need to integrate natural and social systems. The Scientific-Information Center of the Interstate Coordination Water Commission of Central Asia (SIC ICWC) and UNESCO-IHE created a computer model, 'ASBmm' (Aral Sea Basin model), combining both hydrological and socio-economic data, in order to examine a range of future scenarios within the basin.
- The existence of different management units (small, medium, and large) and their interrelationships need to be taken into account.
- There is a need to manage water-related issues crossing administrative borders and units.
- There is a need to account for many different workspaces and objects, beginning with the main rivers and finishing with the end water users.
- There is a need to account for the availability of (and the often contradictory) management objectives and measures.
- There is a need to involve all stakeholders and the public, or their representatives, in policy-making and water governance.

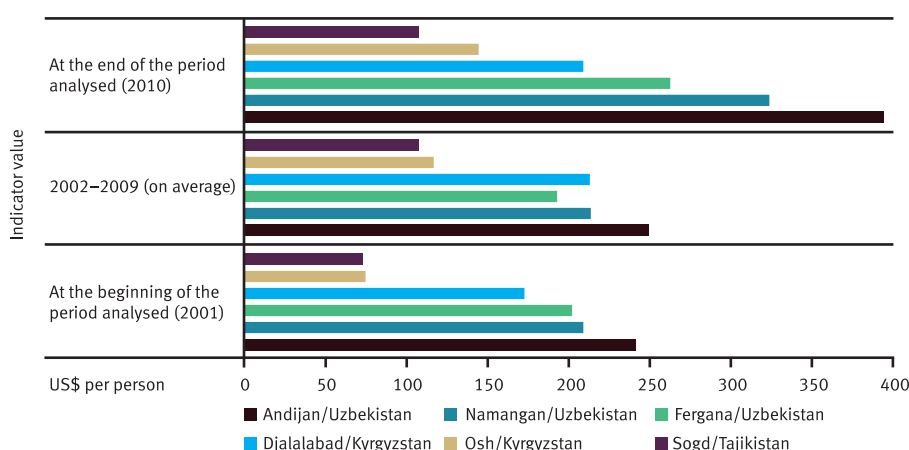
In arid zones these difficulties are exacerbated by competition between sectors, which can become regional political issues involving powerful interests. This can create instability and insecurity for water delivery processes and result in the stakeholders' desire to solve these problems, not by integration, but by actions that are based on self-interest and security at a national and even the local level.

Considerable attention was paid to social mobilisation and integration as a component of IWRM. Lubel and Edelenbos (2013) speak about widespread social integration, but experience in the region suggests limiting social integration to the levels of rural and urban water consumers, their associations, water management organisations at different levels, and secondary (associated) water users. At present social integration among management levels, at the regional, sector, and national scales are not considered to be realistic. Penetration into this social sphere including decision-makers was limited to monitoring, analysis, and feedback.

Permanent monitoring and analysis of many socio-economic indicators to assess the impact of management decisions was organised across the entire Fergana Valley.

Figure 11 shows the monitored improvements in gross agricultural product in all provinces where project interventions were conducted.

Figure 11. Changes in the gross agricultural production in the Fergana Valley 2001 to 2010

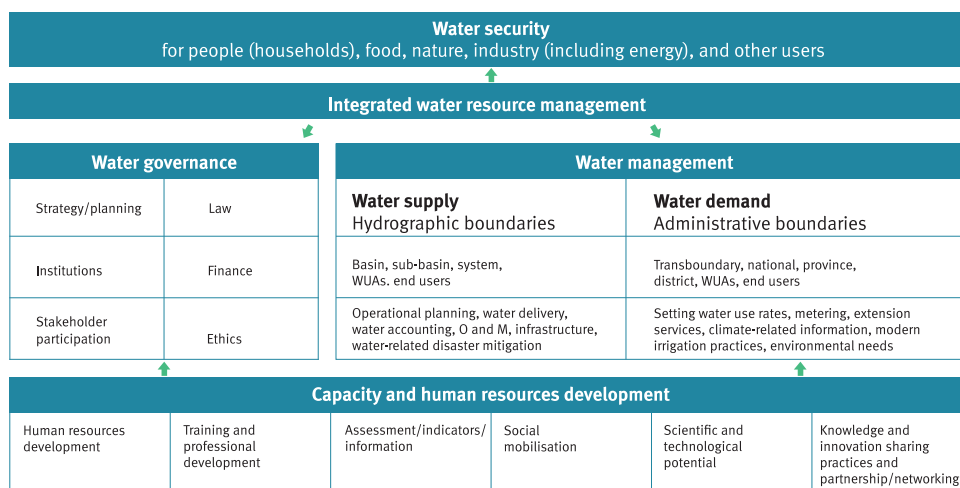


Source: Hydrological study in the Fergana Valley (SIC ICWC, 2012).

Water governance creates the 'rules of the game' and provides mechanisms. In contrast, water management deals with implementing, making rules operational, and applying them and the procedures for water allocation, delivery, and conservation. It also covers the interaction with other related activities (Dukhovny and Sokolov, 2005) (Figure 12).

Governance provides the foundation for successful management. It has its own specifics at all levels and it reflects the specifics of the entire management system that has evolved in a given country. Hence there is no 'blue-print' solution for either governance or management (Dukhovny et al., 2008).

Figure 12. Key elements of water governance and management



3.2.1 Managing supply and demand

Institutional water reforms in the region illustrate the greater focus on augmenting water delivery rather than managing water demand. Currently water management organisations and their various divisions are responsible for both water delivery and water use, so they pay less attention to managing demand, which is managed within administrative units rather than hydrographic boundaries. The fact that hydrographisation is not yet completed across the region could be explained by the lack of understanding that water delivery institutions need to follow hydrographic boundaries. This misunderstanding creates confusion and duplication and a separation of duties. For example, hydrographisation assumes that the implementation of water delivery planning follows the chain 'farmers' requests – WUA – canal managers – basin irrigation system administration – basin water organisation'. In this set-up, irrigation system administrations are redundant bodies and unnecessary intermediaries in the water delivery chain. But within the IWRM-Fergana project this administration takes on the function of water demand management. However, relevant recommendations developed for governmental bodies as a result of the project activities have yet to be taken into account.

Water delivery management

Water can be supplied from transboundary, national, basin, or local sources or a combination of sources. But within the hydrographic boundaries water delivery management is normally coordinated by a single organisation to ensure that water in an acceptable/agreed quality and quantity is delivered to all users and the environment on time. Although centralised or combined systems can be difficult to manage, they can be more cost-efficient compared to autonomous ones.

Based on past experiences of water delivery systems in the region, good water management includes:

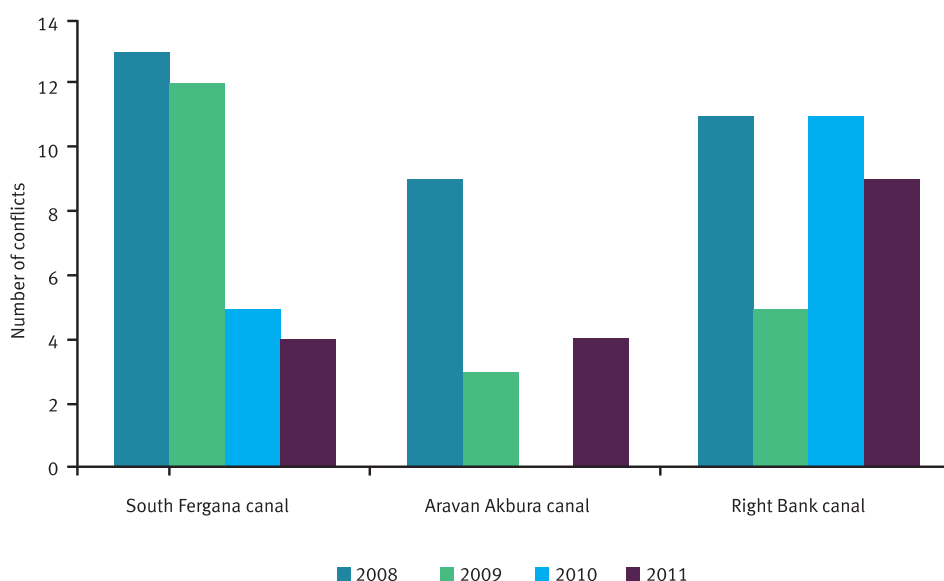
- Annual, seasonal, monthly, ten-day, and daily planning that links together water requirements with the water delivery network capacity and the different water sources. This is based on the average long-term needs with the possibility of adjustment in accordance with the specifics of the year/season, including climatic and other features. Setting up ten-day (or weekly) and daily planning, and distribution of water at WUAs, as well as setting limits and control measures, are especially challenging.
- Water delivery systems differ substantially. For example, in rural communities (*mahalla* committees) water is distributed by *mirabs* according to each community's rules and established regulations. Another type of water delivery is the combination of a constant (weekly or ten-day) supply for first, second, and, sometimes, third order canals and a variable supply, which is dependent on daily operational schedules and the capacities of the distribution canals. In such a situation, water rotation is permanent and is often applied to canals of higher order, particularly in dry years/seasons. A municipal water supply, which should follow changes in daily and seasonal water requirements, is a completely different system. The mandatory element of such a network is the availability of balanced storage and the ability to control the operation of pumping units from wells or a centralised system.
- Setting up water accounting for end-users and throughout the entire water delivery chain. Flow measuring devices are needed in order to control water delivery schedules and enable adjustment when there are deviations from planned modes. Automated accounting systems for a water delivery network are most desirable. These can be in the form of SCADA (supervisory control and data acquisition) systems, or organised network operations based on needs with automated accounting only for end-users. In the absence of an automated system it is important to organise accounting systems that monitor the amount of water transferred from one level to another in the management system in order to ensure the stability of the water supply and the accuracy of water metering.
- Providing essential services, such as cleaning, repair, and maintenance, and keeping the entire delivery network infrastructure in good working condition. But this 'simple' engineering measure is not always implemented because of a lack of funds, machinery, or labour. At the WUA and farm level this problem is partially solved by involving the local population in the form of *khashar* or public works. But it is important for management to retain specialised works, such as cleaning and flushing drainage, repairing gates, and lifting facilities, as well as automation and accounting systems.

A significant outcome of improved consultation and stakeholder involvement along the pilot canals was the reduction in disputes as the struggle for water at the borders of administrative areas between the provinces and districts disappeared. Disputes emerged rapidly in the region following independence as land was privatised and redistributed in the early 1990s and large numbers of small land owners needed access to State-owned canals. Access was often only possible across the fields of neighbouring farmers. Disputes arose over delivery (volume and timing), overuse and alleged stealing. This was exacerbated by poorly maintained on-farm networks, which were previously repaired by government water organisations. The result was a deteriorating infrastructure, inefficient water use, poor agricultural outputs, and widespread animosity among the rural population.

3 KEY LESSONS LEARNED AND WAYS FORWARD

The decrease in the number of conflicts and disputes along the pilot canals (Figure 13) as a result of project interventions was evident in the years of different water availability and was attributed to hydrographisation and public participation in decision-making. The WUA members are owners of the on-farm water processes and function as an effective dispute resolution organisation. They also ensure rapid dissemination of technical knowledge and have served as 'test-beds' for democratic decision-making and building social capital.

Figure 13. Conflicts and disputes in the pilot canals during the period 2008 to 2011



Water demand management

The goal of water demand management is to reach the potential or economically feasible level of water and land productivity based on a 'bottom-up' governance approach. Although the main area of demand management interventions was at the water users' level, there was a role for this at the national level. The key elements of demand management implemented included:

- Setting technically reasonable water use rates to correspond with modern water use practices and actual local conditions. The hydro-module zoning, which has been in use since the 1980s, was updated. Based on FAO's (1992) CROPWAT, new irrigation norms were generated in accordance with new hydro-module zoning (Figure 14). This takes into account the specific features of irrigated contours at the secondary canal and farm levels. Updating the irrigation rates based on the new zones reduced water delivery to the farms by between 25 and 30 percent when compared to the 'old' hydro-module zoning, and crop yields were slightly increased above the average for the province. The improved crop yield was the result of increased support from the extension service under the project's supervision, providing proper recommendations on appropriate crops, farming, irrigation, and soil fertility practices.

Figure 14. Updated hydro-module zoning for five districts in the Fergana province of Uzbekistan (The different colours show areas with different soil fertilities and levels of groundwater)



- Organising meteorological data services for water management departments, WUAs and farmers to provide ten-day and daily information on changing weather conditions and climatic parameters. This will assist in properly assessing evapotranspiration for a given locality and making decisions about times for and rates of irrigation. Unfortunately, the project only installed two automatic meteorological stations because of limited finances.
- Introducing advanced methods for the real-time scheduling of water distribution among off-takes to irrigation contours. This was done to achieve stability in water distribution from the main canal to the WUAs' irrigation networks and reduce operational losses. The practical application of daily water distribution planning at the WUA level enabled water losses to be reduced by between 7 and 10 percent by reducing the mismatch between water delivery and distribution (Table 4).

Table 4. Reductions achieved in water losses by using daily water distribution plans for WUAs (WUA 'Akbarabad' case study, Uzbekistan)

Indicator	2007	2008	2009	2010
Water losses along distribution canal RP-1 in WUA 'Akbarabad' before project interventions (distribution based on ten-day scheduling)	31% of total intake			
Water losses after implementation of daily scheduling	21%	21%	21%	23%

- Introducing a computer-based daily water distribution model, including geographic information systems elements, at the WUA level. This model improved decision-making when conditions changed around the irrigation contours (water availability, weather parameters). It enabled timely corrections⁴ to water distribution schedules along WUA off-takes. The model was tested in the WUA 'Akbarabad', and showed that the WUA operator quickly learned how to use the model to good effect. By 2012, daily water distribution

3 KEY LESSONS LEARNED AND WAYS FORWARD

schedules were being adopted and used in practice on an area of about 100,000 hectares within WUA irrigated contours across the Fergana Valley.

- Install water measuring devices for all water users (Figure 15). Initially, many gauging points were built and calibrated in the WUAs at key points along the irrigation network. Gauging devices were then built at users' off-takes with users taking part in their construction. The activity included training for the construction and operation of water measuring facilities in order to extend water metering to the lowest level of the water hierarchy. Part of the costs of the installations was carried by the users. The project also developed and disseminated special registers of 'request-delivery' for water volumes from the canal management organisation to the WUA and from the WUA to the water users to fix agreed water volumes.

Figure 15. Construction of water metering devices at the WUA level, Kyrgyzstan



- Cultivating a common interest in saving water among the water users. To achieve this, farmers were integrated into the water users' communities, such as *mahalla*, urban neighbourhoods, WUAs, and unions of farmers along the canal. Group members elected a leader who organised water distribution and water amounts, according to specific field and crop conditions.
- Adopting up-to-date irrigation management practices to improve soil moisture uniformity and reduce unproductive losses at the field level. This increased water productivity from 47–53 percent to 70 percent in an area of more than 100,000 hectares.
- Developing knowledge transfer and extension services to WUAs and farmers. These were directed at making the most efficient and sustainable use of resources in irrigated agriculture.

To ensure wider dissemination of the knowledge gained from project implementation, a system was set up to assess needs, develop new technologies, and translate knowledge using language acceptable to farmers. This was established in the period 2008 to 2011 as part of the Water Productivity Improvement project. The system included four key actors: (i) research institutions (knowledge generators); (ii) information centres; (iii) information and knowledge

⁴ The primary base for the daily water distribution plan is the seasonal water use plan, with the water delivery limits set in accordance with a deficit of water level for a given vegetation period. If a change in water availability in the main source is expected for the coming ten-day period, the canal management organisation informs the WUA in advance, and, in turn, the WUA corrects the daily water distribution schedule for the coming ten-day period.

disseminators (extension service); and (iv) farmers (knowledge implementers). The main task was to ensure information and knowledge flowed to and from farmers in a continual and user-friendly way.

Figure 16. Farmers' field school in the Tajik part of the Fergana Valley



Figure 17. Workshop in Fergana on water and gender

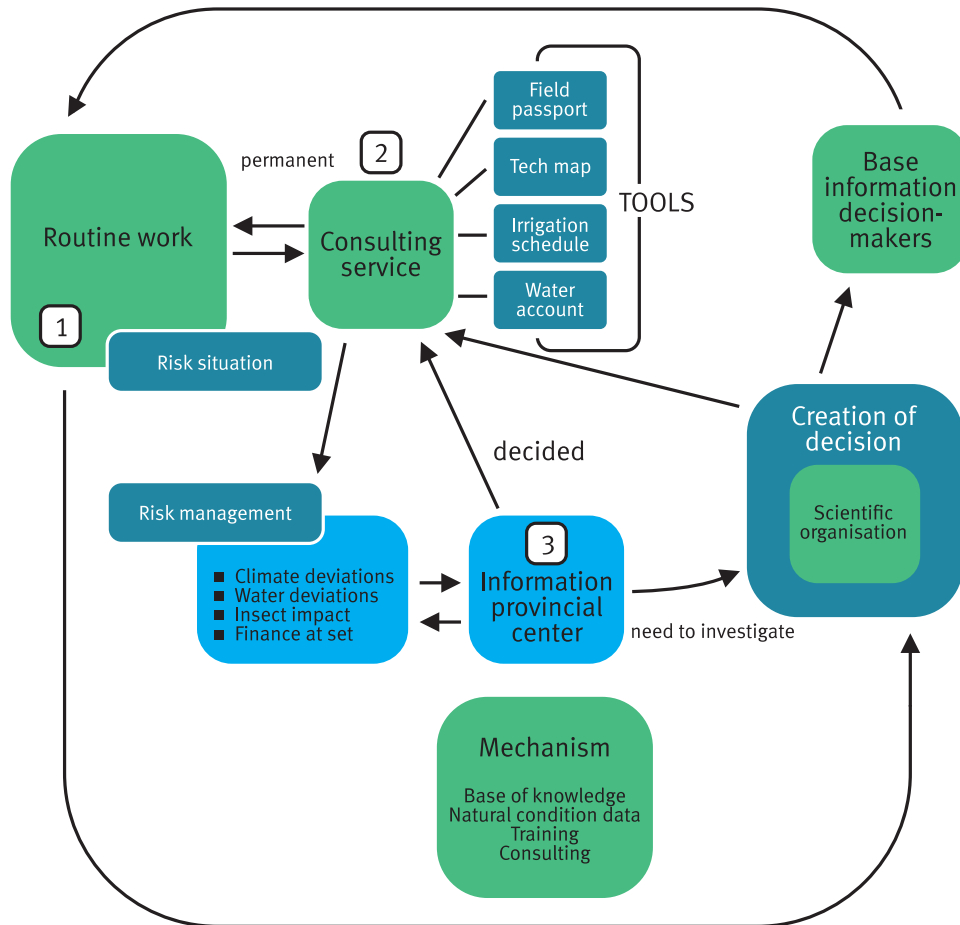


The project established information centres in water management organisations with skilled and experienced staff. A system for the effective communication of new ideas and approaches to farmers was developed using knowledge disseminators (extension service specialists), who included researchers from local universities. Information centres provided knowledge disseminators with materials, provided locations for conducting workshops, and, in coordination with research institutions, prepared templates for documentation. They also helped to find the most appropriate ways to transfer new approaches and skills to farmers.

The various interactions among the key IWRM system partners within the extension service are illustrated in Figure 18. Information from the provincial centre is prepared based on recommendations from research centres and universities and adapted to local conditions. The information from the research institutions is based on analysing farmers' requirements and undertaking research to find appropriate solutions.

Information centres also ensured feedback from the agricultural production level to public agencies at the provincial and national levels by summarising the effectiveness of various activities and detailing the shortcomings which constrain the achievement of planned targets and the preparation of proposals for decision-makers. This has led to an increased understanding of grassroots' problems at the provincial and national levels and improved understanding of IWRM. The outcome of this feedback has been a number of revised State regulations and even revision of the law on water use.

Figure 18. Interactions among key IWRM system partners within the extension service



Environmental requirements and climate adaptation measures

The need to maintain environmental equilibrium, in which water plays a crucial role, is widely accepted, but practical implementation is slow and needs to be taken more seriously.

In the project pilot zones, the main goal for nature conservation was to control water protection zones along water delivery networks and hydro-structures. Provincial hydrogeological reclamation expeditions, which are included in the water management institutional structure, have responsibility for controlling the reclamation of irrigated lands and preventing degradation.

3.2.2 Good water governance

Good governance is essential for the effective implementation of IWRM. Water governance sets the rules of the game (both formal and informal), establishes institutions, and engages stakeholders in water-related decision-making in a transparent, inclusive, equitable, coherent, and integrative way. Governance arrangements differ across countries and even across vertical hierarchies within a country. In Central Asia, the water sector reforms took into account those local specificities. Water governance includes the following elements:

- policy and planning
- legal and institutional frameworks
- financial incentives
- stakeholder engagement
- water ethics.

These elements of good governance, as related to IWRM implementation in Central Asia, are described in more detail in Table 5.

Table 5. Readiness of Central Asian countries to adopt IWRM principles via good governance

Actions to achieve good governance	Central Asian countries				
	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
IWRM recognition in national legislation	accepted	accepted	accepted	no information	accepted
Recognition of hydrographisation	accepted	accepted	accepted	no information	accepted
Completion of hydrographisation	100%	100%	no information	no information	70%
Recognition of the public participation	accepted	accepted	accepted	no information	accepted
Public involvement	formal	formal	formal	no information	formal
Recognition of water committees	accepted	accepted	accepted	no information	accepted
Operation of water committees	formal	formal	formal	no information	formal
Effective financial mechanisms	no information	no information	no information	no information	no information
Encouragement of water saving	no information	weak	no information	no information	weak
Law on water users associations	accepted	accepted	accepted	no information	no information
Completion of WUA establishment process	accepted	accepted	no information	no information	accepted

Long-term planning and strategy development

Since independence, numerous exercises have been undertaken to introduce long-term planning (Dukhovny and de Schutter, 2011). However, disagreement among the countries has prevented development of long-term planning options.

The 'Regional Strategy of Water Resources Development and Use', developed in 1998 by five national working groups under the umbrella of the Executive Committee of the International Fund for Saving the Aral Sea (IFAS), was specifically authorised to develop a long-term strategy. However, this was not implemented because it did not contain any specific long-term quantitative and qualitative indicators. This is similar to the events in 1994 when the 'Concept of Socio-economic and Environmental Development in the Aral Sea Basin' was approved by the Central Asian governments, but not implemented.

The lessons learned show it is necessary to elaborate a regional strategy with more clear and tangible indicators for implementation. Such a strategy would include:

- indicators of water withdrawals from surface, ground, and return water sources for each country and each zone for five-year periods
- parameters of flow regulation of main reservoirs and, accordingly, monthly releases
- the range of possible changes in the basic parameters especially for dry years
- water conservation goals in each country for five-year periods
- joint actions on climate change adaptation, including extreme events and risk management
- requirements for sanitary and environmental flows
- the role of IWRM in achieving these targets.

Improving legal and institutional frameworks

The legal framework is a set of documents, such as codes, laws, and regulations that define the rules and procedures. Implementing enacted laws and regulations depends on a well-functioning institutional system with a clear understanding of legal prescriptions and an effective apparatus for law administration and enforcement. Hence, it is important to have good laws on IWRM, but it is even more important to work on their implementation.

In Central Asia, countries have taken different approaches, but they are committed to pursuing institutional and legal reforms based on IWRM principles. Most prominent are the new water laws – Water Code of Tajikistan in 2000, Water Code of Kazakhstan in 2003, Code on Water of Turkmenistan in 2004, and Water Code of Kyrgyzstan in 2005. In Uzbekistan the 1993 Law on Water and Water Use was updated in 2009 with elements of IWRM. Among these water codes, those of Kazakhstan, Kyrgyzstan, and Uzbekistan are the most progressive.

Kazakhstan The 2003 Water Code includes provisions related to basin water management and the establishment of a basin council as an advisory body that involves all stakeholders. It introduces a new concept of environmental flows with a view to achieving a balance between ecosystem sustainability and the competitive demand for water. The National IWRM and Water Efficiency Plan for 2009–2025, which outlines a set of legal, financial, institutional, and technical measures to enable favourable conditions for IWRM implementation, was prepared and completed in 2009. On the basis of that, the Global Water Partnership (GWP) was supporting the process, and in 2014 the State programme of water management was approved by the government.

Kyrgyzstan The 2005 Water Code also takes the principles of IWRM seriously. It introduces basin water management, transfers decision-making power to the lowest appropriate levels through the establishment of WUAs, improves provisions for drinking water, dam safety, and environmental protection, and spells out the economic value of water resources. However, implementation challenges are significant. Most importantly, the Code has yet to be put into practice because of financial, institutional, and human resources constraints. Experts agree that the 2005 Water Code needs to be revised and strengthened by more specific regulations as well as financial and human capacities in order to play a prominent role in enabling a more favourable environment for IWRM implementation.

Tajikistan Legal and institutional reforms to enable IWRM implementation are under preparation. In 2011 the government approved the principles for water sector reforms aimed at establishing:

- basin water management (as a replacement for water management within administrative units)
- a single coordinating body for national water management
- water operation control through relevant agencies
- water users' participation in water management at the highest appropriate level
- water management by four river basin organisations.

In practice, the institutional revision of water management began in November 2013 when the Ministry of Energy and Industry was transformed into the Ministry of Energy and Water Resources and the Land Reclamation and Irrigation Agency was established.

Turkmenistan A considerable number of steps have been undertaken to reformulate the existing legislative and regulatory frameworks on water and environmental governance. Thus, the 2004 Water Code outlines the main rules for water resources management and conservation, sets the boundaries of jurisdiction, and defines the responsibilities of the main public authorities for water management. It foresees the establishment of water zones to protect waters from pollution, obliges water users to use water rationally, and requires the Ministry of Water Economy to design general and basin schemes for the integrated use and protection of water resources. The 2010 Law on Drinking Water seeks to improve the population's access to safe drinking water, although water quality monitoring is rather scattered, uncoordinated, and geared towards specific sector interests. Currently, the inter-ministerial expert group established within the National Policy Dialogue is developing a new water law to advance IWRM implementation.

Uzbekistan The existing legal instruments in Uzbekistan provide for the transition to basin water management and the rational use of water for the needs of the population and the economy. Further improvements in water and land use, through better drainage and an increase in the efficiency of the agricultural water supply by modernising irrigation, are envisaged. After a long debate, the 1993 Law on Water and Water Use, the key piece of water legislation, was amended in 2009 to include provisions for the establishment and operation of WUAs. Currently, the Ministry of Agriculture and Water Management, in cooperation with UNDP, is drafting a new water code that seeks to incorporate the main principles of IWRM to address current and future water-related challenges.

In summary, the Central Asian countries are gradually introducing IWRM principles into their legal frameworks. Because of financial, technical, and human resources constraints, the countries are also experiencing difficulties in putting their laws and policies into practice and ensuring that these instruments are effectively enforced and monitored. The biggest challenge is to ensure that secondary legislation is available and coherent. Currently there are situations in

all countries where regulations and bylaws are either absent or impose contradictory requirements. For example, there are mismatches in the provisions of some legal and regulatory documents that deal with the establishment of WUAs and their operation in Uzbekistan. According to the Law on Water and Water Use, WUAs were to be established as non-governmental organisations that are accorded favourable tax treatment. But tax police struggle to reconcile the provision of services by WUAs (generally treated as a commercial activity) with their not-for-profit status and in some cases refuse to exempt WUAs from the duty to pay certain taxes. Therefore, even though there is progress in the formal acceptance and practical implementation of IWRM in Central Asia, the legal and institutional framework needs to be further strengthened and improved.

Financial and economic mechanisms

One of the most important factors of IWRM sustainability is the development of financial and economic mechanisms for water management. For example, it is essential that water management organisations, WUAs, and water users remain financially feasible. For the stable operation of the entire water infrastructure it is important that the government and water users cover not only current costs, but also depreciation and modernisation costs. Salaries of most water managers are significantly lower than specialists in other sectors such as energy and communications. The level of water funding is now only 60 to 70 percent of the 1990 level. Without proper financing the water sector cannot sustain its operation and maintenance responsibilities, renew infrastructure, and implement risk mitigation actions. Key measures to ensure the financial sustainability of IWRM institutions include:

- introducing a volumetric method of payment for water delivery services and water as a resource
- differentiated payments depending on the nature of water use; e.g. for irrigated agriculture – at least 5 percent of farm net profit
- introducing the 'polluter pays' principle
- water saving fully covered by the user; social justice is achieved through cross-subsidisation
- introducing premium incentives for water saving by water users and water management organisations and penalties for overuse, as well as preventing a budget decrease in dry years
- penalties for violating environmental flows and observance of regulations should follow the rules of payment for environmental services.

Stakeholder engagement and water ethics

The greater involvement of various actors can ensure that water governance processes and their outcomes are more open, inclusive, and effective. Public participation can change poor administrative procedures, such as when water demand is managed according to the interests within certain administrative boundaries or to sector interests. Stakeholder involvement can ensure that the principles of equity, equality, and stability in water delivery and use are respected in practice.

The lessons learned so far show that, for effective public and stakeholder engagement, it is most beneficial to establish participatory water institutions, increase understanding and support from water management organisations and water users to sustain these institutions, raise public awareness, and promote local leadership and ownership. There were attempts to create National Water Councils as platforms for coordinating the activities of different ministries, agencies, and other organisations on water issues at the

national level. But ensuring that all stakeholders are truly represented and that the councils operate on a regular basis is not an easy task. For example, the National Water Council in Kyrgyzstan (established in 2003) stopped functioning in 2009 and only resumed operating in February 2013.

The Water Codes in Kazakhstan and Kyrgyzstan provide regulations for the establishment of the basin councils – advisory bodies that involve all stakeholders – to facilitate participatory water management and better coordination among agencies dealing with water. In Kazakhstan, several basin councils were established during the period 2005 to 2008 and it is reported that some of them operated effectively. In Kyrgyzstan, only two basin councils – for the Talas River and Kugart River Basins – were formally established, but they are still not functioning regularly. Some progress was made within the National Policy Dialogue in establishing the Chu River Basin council, with its first meeting conducted in February 2013.

Participatory water management at the lowest level was largely introduced by establishing WUAs. Relevant laws were enacted in Kyrgyzstan, Tajikistan, and Kazakhstan (for the establishment of cooperatives of rural consumers of water). After a long debate, the 1993 Water Code of Uzbekistan was also amended in 2009 to include provisions for establishing and operating WUAs. But a great deal needs to be done to ensure that water users and their associations are equal partners in the water management landscape, both in law and in action. Not all WUAs were established according to hydrographical boundaries and so their sustainable financial operation needs to be ensured through proper supporting measures and enabling regulations.

The IWRM-Fergana project also introduced new forms of stakeholder participation and integration at the main canal level. Canal water users' unions were formed, while canal administrations brought together water supplier organisations along the main canals. To integrate water suppliers and agricultural water users, governing boards were established for canal water committees (CWCs). In order to integrate all key stakeholders in the area of the main canal, such as water operators, users, local authorities, environmentalists, water suppliers, energy generators, and NGOs, the Council of Canal Water Committees was formed. The IWRM-Fergana project also initiated the integration of stakeholders in water demand management to improve water and land productivity through the formation of a Water and Land Commission at the district level.

Putting these new water governance arrangements into practice at various levels has produced many challenges. Even WUAs, which were established as non-governmental organisations and presumably have to serve their members' interests, experienced difficulties in doing so. Sometimes this was a consequence of the establishment being initiated through 'top-down' approaches and water users and WUA staff not being prepared to operate under the new conditions. It is important to select a good manager for a WUA, based on the opinions of 'elders' (respected leaders of rural communities), local *mirabs*, and the majority of WUA members. Special units within water management organisations to support WUA operation are needed, but so far these units only operate in Kyrgyzstan.

The IWRM-Fergana project was successful in establishing and strengthening WUAs because of its extensive social mobilisation activities. By monitoring WUA members' attitudes and engagement, social mobilisers acted to solve problems that caused dissatisfaction. They increased the degree of democracy, and gradually reached a stage where water users felt ownership for WUA operations. The role of social mobilisers, who trace the changes and emerging risks and help communities to adjust to new circumstances, has gained even more

importance in the light of a constantly changing natural, hydrological, and economic environment in Central Asia. Social mobilisers, together with extension services, provided the lead in managing risks by accumulating knowledge and skills on water, farming, and reclamation, and transferring them to end-users.

Experience to date suggests that active public participation provides a mechanism for integration, such as constant coordination of water management participants and water users, ensuring unity of action, and continuous coordination of efforts and measures. The mechanisms adopted included:

- weekly meetings of members of CWCs
- daily monitoring of the WUAs and their acceptance of water by the canal water committee chairman together with the canal chief of water distribution
- joint monitoring of water used by CWCs and the WUA management
- monthly real-time discussions with *mirabs*, mobilisers, management, and staff of the CWCs on the performance of the WUA and water management organisations using the financial and water use indicators
- regular training conducted by the project management together with basin irrigation system administrations and stakeholders.

Finally, all stakeholders, including water professionals and the public, must together generate the spirit and behavioural model for water ethics, the roots of which date back to the best canons of the traditional and religious sanctity of water in oriental customs. Stakeholder collaboration both develops and depends on common values and attitudes. The governance dimension of IWRM needs to ensure that water is governed in a way that serves the society and not just individuals or vested interests. Water, after all, is a public resource and belongs to everyone.

4 Developing capacity

4.1 Requirements for effective capacity development

IWRM is a multi-level and multi-faceted system which depends for its successful implementation on the available capacity for both water management and governance. Capacity has five dimensions: individuals (knowledge, skills, and attitudes), organisations (management functions, operational capacity, and human, financial, and information resources), the enabling environment (political, legal, and economic frameworks and budget incentives), partnerships (between distinct organisations and in a broader context) and communities (local communities, communities of practice, professional associations and networks, multi-stakeholder platforms, online groups, and other forms of knowledge sharing) (Lincklaen Arriens and Wehn de Montalvo, 2013).

Capacity development in this broad sense is about putting IWRM into practice by regional and national water management organisations and their international partners. But much more needs to be done to further increase capacity, especially in such areas as human resources development; improving computerisation, communication, and access to information systems; social mobilisation and transparency of information; building scientific and technical capacity to improve water use and management systems; and knowledge and innovation sharing practices and partnerships.

Human resources development

Currently, the total water management sector staff in Central Asia, excluding WUAs, is about 70,000. Annually the sector needs to recruit about 2,000 young professionals plus another 1,500 are required to service WUAs. The educational institutions and universities can produce these numbers, but the problem is that only 10 to 15 percent of those trained come to the sector; the rest search for more profitable jobs elsewhere. Employment in the water sector is not considered to be either prestigious or well-paid. To attract professionals, this has to change. The salaries of operational staff need to be increased so they are at least 20 to 30 percent higher than the national average for similar professionals.

The water sector is also facing an ageing labour force. Given that the water sector is attracting insufficient graduates and the existing highly skilled professionals are reaching retirement age, the potential loss of institutional knowledge is considerable. Furthermore, modern approaches to water management are not always easily accepted by older personnel, who require continuous training and knowledge exchange. Basic education is important, but contemporary challenges require water professionals and organisations to be adaptable to constantly changing circumstances. This in turn demands flexibility and adaptability within the professional development organisations. According to some estimates, professional development training is required at intervals of 7 to 10 years for 1,500 engineers annually in Uzbekistan alone. Taking into account the WUAs' requirements could double this number. Significant additional investment in skills and recruitment is, therefore, required to refresh and build the workforce for the future.

A continuing process of IWRM capacity development is required to meet the training needs of the region with a total 5,000 specialists a year. SIC ICWC's experience in this area suggests some important lessons for producing this capacity:

- Professional development organisations need to be demand-driven. Experience shows that training needs may differ even within the same target groups in different countries or regions within a country.
- IWRM capacity development needs to deal with all levels of the water hierarchy and be institutionally secured through the establishment of training centres and extension services. This was the main reason in 2010 for establishing the regional training centre, SIC ICWC, to provide top and middle level water professionals. This was followed by several national training units within the umbrellas of national water agencies in Kazakhstan (Almaty), Kyrgyzstan (Bishkek and Osh), Tajikistan (Hodjent), and Uzbekistan (Urgench, Andijan, Fergana, and Akbarabad). Some progress was made in establishing knowledge centres and extension services for farmers and in initiating special programmes for rural women within regional projects.
- Teaching materials need to be systematised and tested. SIC ICWC, with support from UNESCO-IHE, has developed educational materials (curricula) for four training blocks: (i) Integrated water resources management, (ii) Improvement of irrigated agriculture, (iii) International water law and policy, and (iv) Regional cooperation on transboundary rivers. Water professionals worked in partnership with educational institutions to ensure that all materials were well prepared in terms of content and methodology.

Improving computerisation, communication, and access to information

Developing capacity in the water sector includes establishing user-friendly databases (regional, national, basin, and local), knowledge bases (curricula, guidelines, and other practical and

informational materials), analytical tools, and models. Progress in this direction was made by establishing a regional information system and portal. This work was undertaken by the region's national water authorities, basin water organisations (BWOs) 'Amudarya' and 'Syrdarya' under the coordination of SIC ICWC, and with financial support from SDC. The CAWater-Info Portal (www.cawater-info.net) embraces large volumes of information including a knowledge base and regional information system. The main purpose of the information system is to build up a single system for accounting for the land and water resources in the Aral Sea Basin with the possibility of assessing the effectiveness of their use and to make forecasts. Thus, this system enables regular assessment of water use efficiency and allows managers to detect unproductive losses. Computer technologies and decision support systems are not widely used in the region, especially at the basin and local levels. Even the central apparatus of national water authorities could benefit from a more advanced use of modern tools such as geographic information systems (GIS), remote sensing, and analytical models. More work needs to be done to establish and improve communicative, informative, and analytical tools at the local, basin, and national levels.

Social mobilisation and transparency of information

To strengthen the capacity of the water sector, a system of social mobilisation and dissemination of water-related information needs to be established. This system would increase transparency in decision-making for water and ease the acceptance of innovations by key stakeholders and the public. Through social mobilisation, key stakeholders and the public can organise themselves to work collectively in newly established bodies, such as WUAs or basin councils, to produce their own development plans and strategies rather than them being imposed from outside. Through information dissemination, water management organisations can be alerted to new challenges, suggest measures to address those challenges, and encourage better water management practices. Hence, specialist personnel are needed who can deal with social mobilisation in water management organisations at the basin and sub-basin levels.

Building scientific and technical capacity to improve water use and management

IWRM requires the integration of science and industry in the quest for more advanced technologies and locally tested and adapted solutions. It is necessary to enhance linkages between training, applied research, and best practices in the region and worldwide through study tours, invited international lectures, joint regional and international training, and drawing lessons from projects to promote advanced and locally adapted experiences. Capacity development needs to be informed by research-based and field-tested evidence. The IWRM-Fergana project provides the best example of such comprehensive and research-driven work where capacity in IWRM was built through social mobilisation, training for different target groups (farmers, WUAs, and main canals organisations), field research, and the strengthening of institutional and legal frameworks.

This task also requires that research institutions, universities, academia, and the entire scientific community be constantly involved in the IWRM implementation process; and in parallel build their own capacity on IWRM through interactions with practitioners. Development of drought-resistant crop varieties, assessment of water, agriculturally related risk management, and the impact of a non-sustainable water sector on agricultural development should receive particular attention.

Knowledge and innovation sharing practices and partnerships

Finally, it is crucially important that the various water organisations – national and regional water institutions, educational and academic institutions, development agencies, and international organisations – work in partnership in order to create learning opportunities and assist with the generation and acquisition of new knowledge, skills, and attitudes. A broad range of knowledge and innovation sharing platforms needs to be available and promoted.

Capacity development and education can also promote and create conditions for communication and interactive dialogue among representatives of the Central Asian republics in order to foster peaceful cooperation on transboundary waters and gain consensus on water issues. Joint regional projects and training seminars provide excellent opportunities for informal communication and mutual learning. Countries also need to invest in future water leaders by supporting young water specialists to complete MSc and PhD programmes on IWRM abroad. A number of young professionals have already completed their education at universities in Germany (LUCA and ClinCa projects), the Netherlands (UNESCO-IHE), the UK (University of Dundee), and other countries. Unfortunately, local universities in the region are not yet ready to meet those needs, but some steps to enforce them have already been taken (see: http://en.dku.kz/index.php?title=Main_Page#Interdisciplinary_Master.27s_program).

The Central Asian experience shows that IWRM capacity development is a slow process that needs to be driven by local demand and have sustained support. This requires long-term commitment and strong leadership, which can be a catalyst for change. Today it is recognised that leadership can be exercised by individuals at all levels (Lincklaen Arriens and Wehn de Montalvo, 2013). The region must do its best to fully engage the biggest resource in the region – its human capital.

The GWP CACENA (Caucasus and Central Asia) network, with the inclusion of CapNet-UNDP (the international network for capacity development in IWRM) contributions, is playing a very effective role in disseminating IWRM knowledge in the region.

4.2 Drivers for IWRM sustainability

Water resources management cannot be locked in the frame of the narrow organisational, managerial, and economic aspects of water management and irrigated agriculture. Water resources determine, or at least affect, the way in which political, economic, societal, and natural systems function. The reverse is also true: these systems enable favourable conditions for good water management. Water managers and decision-makers need to consider these inter-linkages and reciprocal influences and how they impinge on water resources management.

The success and sustainability of IWRM depends on the complex dynamics of internal and external forces (Figure 19).

4.2.1 Destabilising forces

Demography and migration

The average annual population growth rate in Central Asia is between 1.2 and 2 percent despite the fact that a significant part of the population lives in rural areas (except for Kazakhstan), and

of this rural population a significant portion – more than 4 million people – are temporary labour migrants. Such indicators in rural areas create pressure on the whole social situation and on water in particular. Water demand increases because of greater municipal needs, and also because of the desire of rural inhabitants to maintain a share of irrigated lands. There are land resources available, but water is the limiting factor.

Climate change

Climate change has two implications – water requirements will increase because of the anticipated increase in temperature, and water availability will decrease in the long run as a consequence of glacier retreat.

Urbanisation

Rural populations are continually moving to cities and this can lead to reductions in the areas under irrigation as cities grow in size.

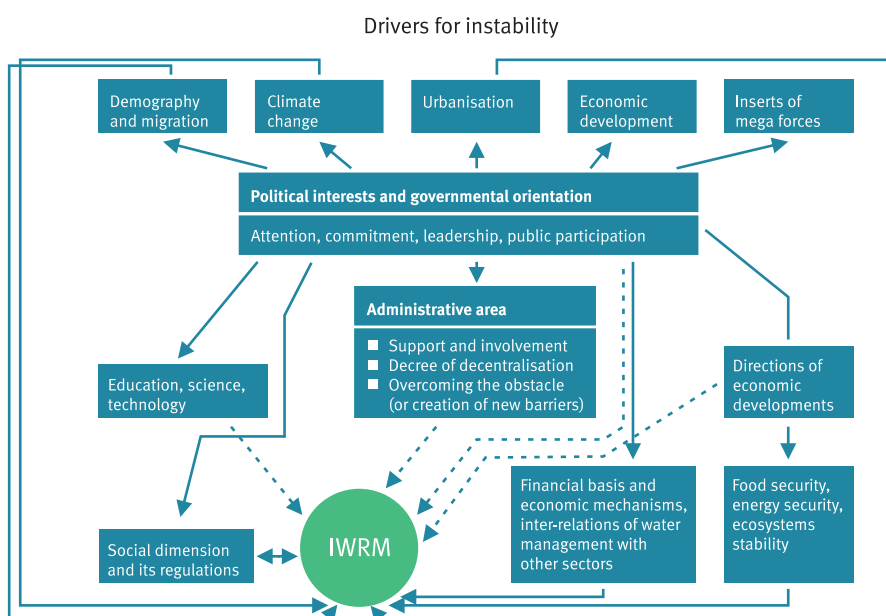
Economic growth

The need for economic growth is understandable. It ensures employment and the well-being of people and nations, but it needs to be achieved in a sustainable manner.

Vested interests

Vested interests play an increasing role in Central Asia, taking solutions to regional issues out of the region (e.g. Naryn hydropower cascade).

Figure 19. External factors that influence IWRM



4.2.2 Stabilising forces

The main stabilising forces include the responsible attitudes of national governments and local administrations, balanced economic growth, improved financial and economic mechanisms for the water and agricultural sectors, a good social environment, and scientific, educational, and technological capacity.

Politics and governments

The political set and governments face the urgent need to appreciate future water challenges and develop appropriate national strategies for the benefit of people and nature, taking into account the interests of riparian countries. Transboundary resources have to be seen not as a limiting factor, but as a stimulus for regional cooperation. Adherence to cooperation rather than the idea of absolute sovereignty needs to prevail. This is especially important for Central Asian countries that are closely interconnected through physical infrastructure, such as waterways, roads, and transmission lines, as well as having a common history, cultural roots, and traditions. Governments will need to take the lead in supporting the water sector and irrigated agriculture and ensuring that everyone has equitable and stable access to water without compromising the needs of ecosystems. They have to ensure that water resources are managed for the public interest and not for the vested interests of individual groups or corporations.

Administrative authorities

Administrative authorities will need to ensure that water policies and strategies are implemented through a range of mechanisms, including increased decentralisation and support. Existing bureaucratic barriers and the reallocation of funds from the water sector to other areas will need to be eliminated. It is especially unacceptable to divert capital investments targeted for water, land reclamation, and reconstruction. It is necessary to establish a regime of shared responsibility for effective water management. It is extremely important that local authorities increase their roles and positive influences in coordinating the diverse interests in agricultural production (including banks, input suppliers, and tax authorities) and work together on land and water productivity or, in other words, to gain 'more crop per drop'. This work can succeed only if all involved understand their roles and responsibilities.

Economic development

Economic development will be informed by the long-term assessment of water and land resources. Equally, the water sector has to adapt to new directions and the redistribution of productive forces. An example from Karakalpakstan, located in the lower reaches of the Amudarya River, illustrates the need for flexibility and adjustment to new conditions and circumstances. In dry years, such as 2001 and 2008, water supply below the Takhiatash hydro facility dropped to between 35 and 50 percent of the normal supply. This was primarily a result of the poor flow regulating capacity on the river, large channel losses, and poor operation of the upper reservoirs for hydropower production. In such circumstances, the districts of Karakalpakstan could not reliably receive even 50 percent of their water because water distribution networks constructed in the Soviet era had severe leakages and required significant water flow just to fill the canal reaches. Proposals to change the old policy of water distribution and to shift to smaller water limits for provinces (within 5 to 6 km³), review crop patterns, prioritise water allocation for the most densely populated areas, and refocus the sparsely populated northern areas on grazing, have not yet been accepted.

Moreover, countries must develop national plans for the long-term development and reconstruction of irrigated agriculture with a view to achieving food and energy security. From this perspective, crop planning on irrigated lands in each basin is an optimisation problem that can easily be solved if there are reliable data on current and future trends of certain types of agricultural products. In particular, water saved can be an alternative to developing new water resources or constructing more reservoirs. The IWRM-Fergana project experience demonstrates that institutional and cognitive solutions can save water at a cost of as little as US\$ 0.1/m³; significantly cheaper than solutions involving building more infrastructure.

Improved financial and economic mechanisms for water and agricultural sectors

Such mechanisms are still to be developed in Central Asian countries, but they can encourage farmers and others to make better use of available water resources. The introduction of financial and economic measures requires tight discipline and monitoring by banks, local authorities, water management organisations, and water users.

The social environment

This predetermines employment and poverty levels as well as access to drinking and municipal water supplies. Local communities, involving both men and women, can help ensure that IWRM organisational structures fit within locally established traditions and are accepted. Only in close cooperation with local communities can newly established participatory management bodies, such as WUAs and canal councils, receive true recognition and acceptance. It is important to pay due regard to clan, traditional, and community spirits as well as the unquestionable authority of elders, which can influence institutional settings and responses. Hence, regular public opinion surveys are essential both for community organisations and water management authorities at all levels.

Scientific, educational, and technological capacity

These are key capacities for integrating academic knowledge and practice through training, and adapting knowledge and experience to local needs and advancing innovations. The initial concept of IWRM implementation in the Fergana Valley was, in fact, developed with the involvement of research organisations and academia. In the stakeholders' meetings during project implementation, local provincial universities were involved. These institutions also recommended water and land productivity improvement techniques that had been tested and adapted to local conditions.

4.2.3 How can IWRM impact beyond water management?

Raising awareness about IWRM

IWRM, as a result-oriented approach, can bring many social, economic, and environmental benefits to a region. So, raising awareness is especially important at the beginning of IWRM implementation. A range of seminars with local, national, regional, and international partners helped to establish an initial understanding of IWRM in Central Asia.

Continuous collection of information and assessment

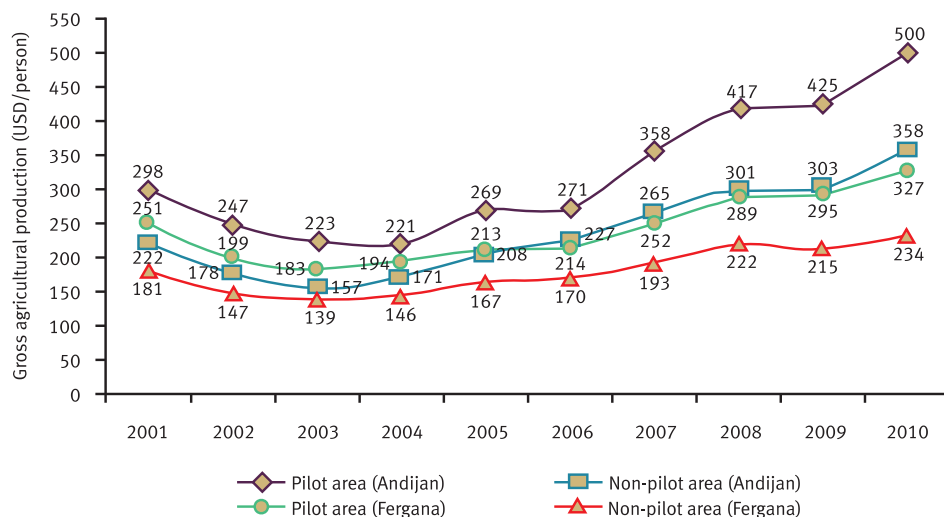
Efforts were made to accumulate information beyond the immediate water sector by using the Central Asian Regional Information Base and Portal (www.cawater-info.net). This enabled decision-makers and key stakeholders to access information, monitor major trends and changes in political and administrative arrangements, and to share and learn from international and local experiences and 'best practices'. Unfortunately, because of a lack of funding this system is no longer freely accessible.

Conducting workshops, dialogues, seminars, and discussions

These were conducted at various levels with actors outside the 'water box'. National coordination groups with representatives of key national ministries and agencies were formed in which IWRM issues were discussed in the broader context of national development. In Uzbekistan, for example, the Cabinet of Ministers actively participated in the activities of these groups. Special training on IWRM for representatives of all sectors is also important. In the Fergana Valley more than 16,000 people have been trained on the principles and mechanisms of IWRM in the last 5 years. IWRM-related information and knowledge dissemination was expanded well beyond the project areas.

Understanding the 'bottom-up' push and endeavours to expand the impact of IWRM helped to cultivate the process and achieve tangible results well beyond the boundaries of the immediate intervention. This was proven in the Fergana Valley when achievements in the pilot zones were compared with the overall performance in the provinces. Overall growth of productivity in the provinces lagged behind the pilot zones yet displayed similar positive patterns (Figure 20).

Figure 20. Comparative evaluation of changes in gross agricultural output value per capita in the pilot areas and outside the pilot areas in the Andijan and Fergana provinces



These comparative assessments are instrumental in demonstrating the impact of IWRM for stakeholders and decision-makers. Although decision-makers are not easily convinced they nonetheless can contribute to creating a critical mass of driving forces for change.

5 Transboundary dimensions

The nexus thinking and IWRM principles are aligned, both advocating for cross-sector integration and coordination. It is particularly useful to harvest the opportunities of coordinated and integrated actions between water, energy, food, and ecosystems from local to transboundary levels. However, establishing a sound IWRM approach across multiple levels and at the interstate basin level is the most difficult task. At the national level, IWRM direction is more or less straightforward and for all its complexity it is aimed at improving the efficiency of water use and the associated natural, social, and economic resources. Largely based on this, it is possible to assess whether or not IWRM achieves its goals and objectives. It is also easier to get political support for IWRM implementation within a single country. With political support, cross-linkages and coordination become a daily task for professionals and practitioners from various sectors as well as the main responsibility of a coordinating body. Therefore, the nexus approach built on IWRM can be achieved at the national level.

But it is quite another matter to deal with the transboundary nexus, where the divergent sector interests of two or more riparian countries have to be accommodated. GWP suggests that establishing basin organisations can provide a mechanism to overcome barriers in water allocation and water use and bring about change. However, experience of the Aral Sea Basin shows that this is not the only criterion. Political will, for example, is essential if change is to occur.

Immediately after the collapse of the Soviet Union, Central Asian countries established the Interstate Commission for Water Coordination (ICWC) with executive bodies – BWO Amudarya, BWO Syrdarya, the Secretariat, and SIC ICWC – to coordinate and strengthen cooperation in jointly managing transboundary water resources in the Aral Sea Basin. The agreements of 1992, 1993, 1994, and the 1995 Nukus Declaration, signed by the Heads of State, consolidated a number of provisions that would ensure the effectiveness of this interstate mechanism (IFAS, 1997). It would enable conditions for the implementation of joint commitments and guarantee the sustainability of water supply for national and sector interests. However, as Patricia Wouters (2012) rightly notes:

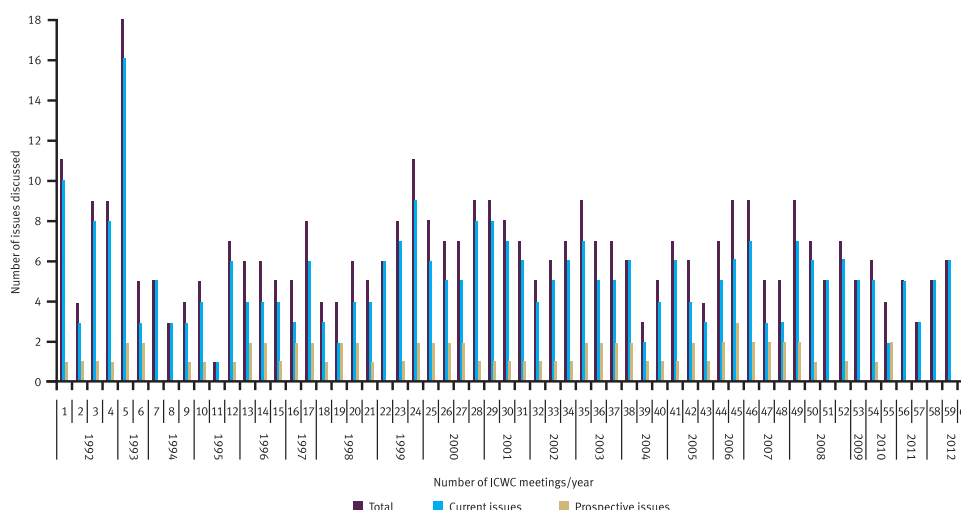
While most of the region's shared waters are managed on the basis of international treaties, cooperation across such vast basins with diverse political and economic interests continues to be a real challenge. The numerous agreements concluded in the Aral Sea Basin suffer from inadequate implementation, although regional institutional mechanisms play an important role in promoting joint activities. The ongoing controversies over hydropower projects between upstream and downstream State, and external involvement in transboundary water issues significantly influence the way in which the water resources of the basin are managed.

This is exactly to the point. In the first years of independence, while the forces to cooperate prevailed, ICWC and its executive bodies formalised some IWRM principles in agreements among the countries. This was also when the 'Main Provisions of Regional Water Strategy', incorporating IWRM principles, were developed (accounting for and linking the needs of all

sectors and establishing a unified information system with a focus on water saving, damage prevention, and consideration of environmental requirements).

Later on, the forward-looking activities of ICWC and other regional bodies began to wane, facing growing contradictions with the commercial interests of the owners of hydropower facilities controlling releases from reservoirs and giving unconstrained priority to hydropower generation over all other uses. Only the Andijan and Tyuyamuyun hydro facilities, which are in the hands of Uzbekistan, and the Chardara Reservoir, owned by Kazakhstan, operated with irrigation in mind. Other hydro facilities gave priority to electricity generation, and irrigation and the environment were supplied with the leftovers. The growing competition over water and loyalty to the doctrine of absolute sovereignty had a negative effect on regional water cooperation – some countries were reluctant to participate in regional projects and to support a regional information system and training activities. The ICWC meetings were dominated by operational water allocation issues, leaving aside prospective matters (Figure 21). The deterioration in interactions among the countries of the region is well documented and is available at www.sic-icwc.uz.

Figure 21. Operative and prospective issues discussed at ICWC meetings during 1992–2012



Several lessons can be learned from the 20 years of transboundary water interactions in the Aral Sea Basin.

The availability of interstate bodies and agreements, common information systems, and common approaches to addressing technical issues do not guarantee lasting cooperation between countries if serious political and economic controversies exist.

Nonetheless, it was possible to maintain contacts between lower and middle level professionals through joint activities, such as regional training, information exchanges, regional projects to improve water use efficiency, and sharing best practices. These sustained contacts and interactions helped to bring about joint solutions in planning, operational control, and execution of works in extreme situations.

Attempts to link long-term political solutions and short-term commercial deals based on market prices for energy and electricity have failed. The 1998 Syrdarya Agreement illustrates this. Long-term commitments on river regimes and water allocation among riparian countries need to be separated from commercial arrangements that reflect fluctuations in market prices. The desire to make water supplies available to hundreds of thousands of water users on a commercial basis can blur the national concerns over the desire for water and food security across the countries of the region.

Regional organisations provide a platform for institutionalised interactions on transboundary waters in a basin, but existing institutional structures need to be strengthened to ensure better inter-sector coordination and public involvement. Intentions to establish a basin-wide advisory body, which brings together all stakeholders for each river basin organisation, were incorporated into a new draft agreement for the organisational structure for the region, but all parties have yet to sign up to this.

Donors play a crucial role in supporting the efforts of governments for cooperation in the region. The Dutch government with the UNESCO-IHE Institute for Water Education jointly funded a regional capacity-building project to train national trainers, to prepare educational materials (curricula) for all countries, and to develop a tool to assess scenarios of possible regional and national development. From 2004 to 2010, the Asian Development Bank supported a regional dialogue among the countries to strengthen the legal framework of cooperation and develop drafts of new water agreements. The German Society for International Cooperation (GIZ) supported the development of projects to improve the environmental situation in river deltas. In addition to the IWRM-Fergana project, SDC funded the establishment and maintenance of the Central Asian Regional Water Information Base and Portal and the automation of the main hydro unit structures along the Syrdarya River. Some other international agencies and donors provide fragmented contributions to capacity building. Of these, the EU, UNDP and World Bank are the most active.

However, the recent trend in donor assistance was to move away from implementing regional projects focusing on main rivers to local and bilateral projects on small rivers, such as the Chu, Talas, Khojabakirgan, and Isfara. Donors have significantly decreased their support to regional organisations and regional projects and have preconditioned their assistance with the requirement that all countries of the region have consented to their implementation. There is growing concern that donors now only support national projects rather than working with regional organisations to support projects which benefit the region as a whole. The consequence of this is to discourage regional interactions and cooperation across national boundaries.

How to break through the impasse?

Wouters (2012) calls for supremacy of the rule of law. However, the ambiguity and elasticity of international water law and its key substantive rules – equitable and reasonable use – provide no easy and concrete answers for the riparian countries. Often riparian countries self-assess their unilateral actions as equitable and reasonable, without due regard to other riparians' claims and concerns. Even when there is a decision of the International Court of Justice prescribing riparian countries to agree on equitable and reasonable arrangement for their particular circumstances – such as in the *Gabcikovo–Nagymaros* case, for example – countries are reluctant to do so.

However, international water law has the potential to serve as a useful mechanism to promote peace and cooperation over transboundary waters. To do so, its three main pillars – equitable and reasonable use, no significant harm, and duty to cooperate – have to be made operational and thoroughly implemented.

The principle of equitable and reasonable use bears the greatest degree of uncertainty because the concepts of 'equity' and 'reasonableness' are rather subjective and their meaning and use are dependent on the position and criteria of each party. However, if considered jointly with the obligation 'not to cause significant harm' and 'duty to cooperate', equitable and reasonable use may be made more operational.

The term 'reasonable' is seen to refer to water requirements in terms of quality and quantity as well as to river regimes regulated by hydro facilities (intake and discharge of river water). These provisions represent the initial requirements of riparian countries on shared water courses. It would seem logical that if a riparian country asserts a new entitlement to water use and allocation or requires a change in existing uses it should prove the reasonableness of its claims. The next step would be to agree on the 'equity' of these claims in a basin-wide context, with the inclusion of an assessment according to the 'no significant harm' rule and other relevant factors. The duty to cooperate through a package of procedural rules, such as information exchange, consultation, notification, and environmental impact assessment, can provide a platform for this determination that should be shaped by evidence rather than a subjective understanding of equity and reasonableness. If equitable and reasonable use rules do not provide a single answer, then the duty to cooperate must serve as a basis to search for a solution and making it operational.

Wouters (2012) further states, "When rules are violated, legal consequences follow. In extreme cases, such as actions which threaten peace, breaches of the peace or acts of aggression, the UN Security Council is empowered to take action to maintain or restore international peace and security (Chapter VII, UN Charter)." It is yet to be contemplated whether or not threats to food and water security can be interpreted as threats to peace. But given the growing water stress around the world, it seems appropriate to protect the right to water as the collective right of billions of people at the global level through UN institutions, such as the Security Council and Human Rights Council. Currently, the UN involvement with water issues is largely limited to conducting conferences and assessments under the UN-Water umbrella. Meanwhile, news about threats to water security are coming also from the developed world, with Australia and the USA experiencing severe droughts, and from major river basins such as the Mekong Basin.

Under these conditions, attitudes to water at the global level need to be more clearly defined with specific mechanisms in place to address water security. Strengthened international water law actively promoted and used by global leaders will lay an essential foundation for IWRM implementation at the transboundary level to avoid the clash between national water and food security interests and commercial exploitation.

Is it possible to create a positive nexus among water, food, energy and environmental security?

Providing access to water for drinking and municipal purposes is defined as the top priority in the national legislation of most countries. Hence, inter-sector competition occurs over water for food, water for ecosystems, and water for energy and other industrial users.

In Central Asia, water for food production is mostly required in the summer growing season; and this use is consumptive. Changing to less water-consuming grain crops has helped to decrease summer water needs for irrigation. Along the Syrdarya River, this shift accounts for a reduction of more than 500,000 m³ when compared to 1990 water consumption. In contrast, water for electricity generation is required all the year round, but more so in the winter when demand for electricity can double. Water for ecosystems is also needed throughout the year. For rivers to keep up their natural capacity it is essential to provide at least minimum sanitary flows. For rivers in Central Asia this is a constant flow of 100 m³/s along the entire length of the Amudarya and Syrdarya Rivers in accordance with Schemes of Complex Water Resources Use and Protection. Sufficient flow of an acceptable quality of water is provided to delta ponds and wetlands to create favourable conditions for fishing, bird migration, and zooplankton. The challenge is to combine these interests and ensure that the water supply is stable.

The Syrdarya River provides an example of the interconnections between river flow regulation, hydropower cascade from reservoirs, and water allocation among different planning zones in different countries below the reservoirs (Figure 22). The Syrdarya River flows through the Naryn cascade, which is a series of reservoirs, the biggest of which is the Toktogul reservoir. The Andijan reservoir is on the Karadarya River, the Charvak reservoir on the Chirchik River, and two reservoirs – Kayrakkum and Chardara – are on the Syrdarya River.

During the Soviet period, the Syrdarya Basin was managed as an integrated economic unit. The federal Soviet Government conducted compensatory schemes to regulate trade-offs among republics concerning agriculture, energy, and other sectors. Economic priorities dictated that water was allocated to optimise agricultural production, and hydropower was a second priority. With independence, this integrated system broke down. Each country began to redefine its economic priorities and became acutely aware of their resource inputs and outputs. It was evident that their respective goals were in conflict regarding water use. Ownership of the Naryn cascade and Kayrakkum water reservoir was passed to the commercial energy authorities of Kyrgyzstan and Tajikistan. This significantly affected irrigation water management as the companies focused only on power generation and giving priority to water releases in the winter (Figure 23).

Table 6 compares the changes in river water regime along two principal sections of the Syrdarya River between Uchkurgan, that stands at the end of the Toktogul cascade, and the Kayrakkum reservoir, and between the Kayrakkum and Chardara reservoirs for 1991 (Soviet times), and 2004 and 2008 (post-independence) – all water scarce years.

Table 6 shows not only the reduction in the availability of water for irrigation during the energy mode (the regime where water accumulated during the summer is released in the winter), but also shows the instability of the water delivery process. In the dry year of 1991 the minimum 10-day irrigation water withdrawals along the Toktogul–Kayrakkum section was 83.1 percent in Kyrgyzstan, 96.9 percent in Tajikistan, and 80.4 percent in Uzbekistan. The same picture was seen along the Kayrakkum–Chardara section: 97.5 percent in Kazakhstan, 104 percent in Tajikistan, and 78.2 percent in Uzbekistan. Thus, water withdrawals did not fall below 78 percent of the normal flows. During 2008, however, fluctuations during the ten-day periods along the first section were nearly 40 percent, and 17.5 percent along the second section. This instability was attributed to the lack of willingness of the hydropower infrastructure owners – Kyrgyz Energy and the Ministry of Energy of Tajikistan – to reconsider hydropower production priorities.

Figure 22. Schematic diagram of the Syrdarya River Basin

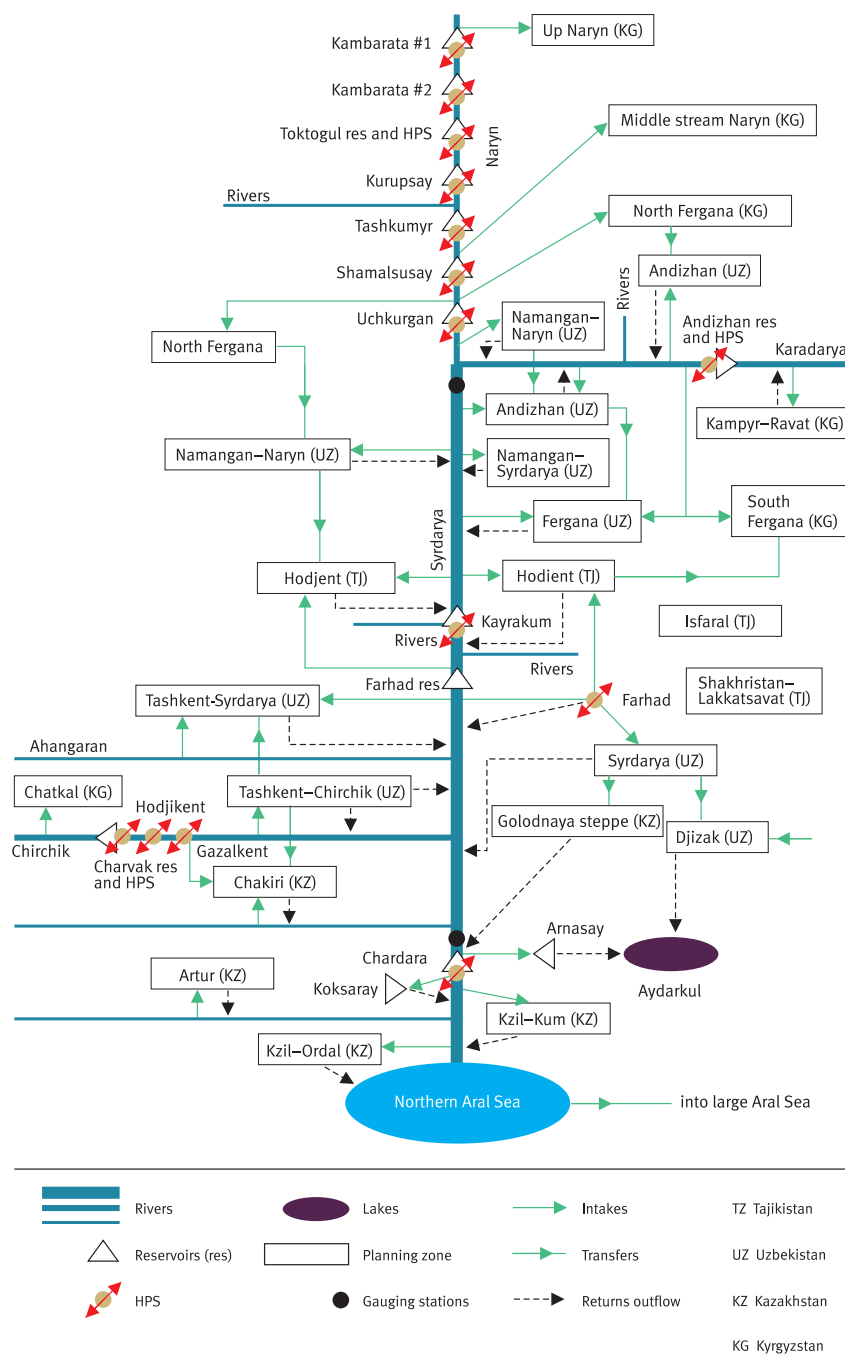
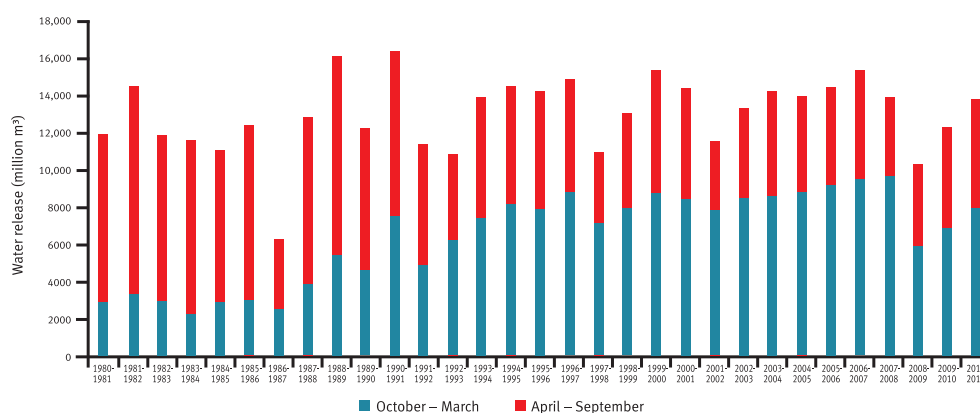


Figure 23. Water releases from Toktogul reservoir by season

The productivity of irrigated lands depends on stable water supplies. But the requirements for hydropower cause fluctuations in river flows that are difficult to manage downstream for irrigation. For example, Kyrgyz Energy regulates energy generation through the operation of the Uchkurgan hydropower station located at the end of the cascade. They manage water releases every hour through the turbines and this means that river flows downstream from Uchkurgan dam fluctuate hourly by as much as 150 to 200 m³/s. There are also times when, for a few hours each day, there is practically no water flowing in the Naryn and Syrdarya Rivers. Such uncertainties make it very difficult to regulate flows into the three main canals located downstream from Uchkurgan which serve 500,000 hectares of irrigated land in the Fergana Valley. Attempts to reach an agreement with Kyrgyz Energy on this matter have so far failed. So at present the priority given to hydropower generation is preventing the creation of a positive nexus among water, food, energy, and environmental security.

It is possible to regulate the Naryn-Syrdarya cascade in a way that satisfies the needs of hydropower, food, and ecosystems. The rules and regulations are already drafted, but have not been put into practice. Only if there is political will and an adherence to international law will this happen.

Table 6 Comparison of water availability in the Syrdarya during growing season

Toktogul–Kayrakkum section					
Indicator	Year	Volume (million m ³)	Water availability (%)		
			Average	Maximum	Minimum
Total delivery	1991	5,405.2	103.03	122.9	84.1
Wet year	2004	4,952	103.1	137.7	75.1
Dry year	2008	4,152.2	83.4	95.2	57.0
Kyrgyzstan	1991	178.0	93.5	121.3	83.1
Wet year	2004	164.9	66.9	76.7	57.4
Dry year	2008	132.7	66.4	70	52.3
Tajikistan	1991	756.6	130.5	165.7	96.9
Wet year	2004	763.0	88.7	114.1	69.2
Dry year	2008	524.4	76.5	105.2	67.8
Uzbekistan	1991	4,470.5	100.2	122.2	80.4
Wet year	2004	4,025	103.7	158.1	70.5
Dry year	2008	3,495.1	85.4	101.8	53.9
Kayrakkum–Chardara section					
Total delivery	1991	6,907.8	89.8	104.0	78.2
Wet year	2004	6,750	101.4	107.9	52.8
Dry year	2008	4,535	67.5	71.5	50.3
Kazakhstan	1991	804.3	104.3	146.6	97.5
Wet year	2004	640.9	88.3	135.3	42.0
Dry year	2008	673.1	84.15	140.0	29.9
Tajikistan	1991	1,292.2	115.4	158.9	104.0
Wet year	2004	1,014.2	83.1	100.5	56.0
Dry year	2008	738.1	60.6	76.5	43.5
Uzbekistan	1991	4,811.4	82.2	100.7	78.2
Wet year	2004	5,094.0	108.2	170.7	72.9
Dry year	2008	3,124	66.4	82.1	46.5

6 Conclusion

The development of IWRM, especially in the IWRM-Fergana project, is recognised internationally, thanks to the wide dissemination of this experience in publications and at numerous forums and conferences.

With hindsight, much of the practical success of introducing IWRM into Central Asia was because of water scarcity and a long understanding among water professionals of the need to make better use of available water resources. Generating driving forces was important to provide triggers for change and to help to promote further development and progress. Political support was also a vital element as officials became aware of the visible benefits of IWRM reforms.

'Water management champions' were a key success factor. Since the inception phase of the IWRM-Fergana project, a team of like-minded promoters of the IWRM approach was formed and included principal partners from GWP CACENA – SIC ICWC, IWMI, and SDC – and officials from water authorities at the national and provincial levels. Highly qualified professionals on the ground and respected leaders of local communities with rich experience in social and agricultural activities were also engaged.

The challenge for further IWRM implementation in Central Asia is to form a critical mass of driving forces at different levels. The involvement of stakeholders at all levels and increasing the number of IWRM adopters is crucial in achieving this. It would involve incentives, motivation, and stimulus to ensure that IWRM is self-sustaining. It is estimated that if 25 to 30 percent of all stakeholders engage with IWRM principles this would produce the critical mass to sustain and create further growth. Currently, IWRM is adopted on only 5 percent of the total irrigated area in the region. Thus, the need is to engage another 20 to 25 percent of IWRM adopters to reach the stage where the process will be self-sustaining without strong external support and promotion. As the drive to implement IWRM increases the following outcomes are expected in the years up to 2017:

- IWRM to be fully understood and accepted by almost all Central Asian governments (National Water Authorities) and key stakeholders
- IWRM procedures fully documented and presented in the form of know-how packages, applicable to different stakeholders at all levels of water management
- an IWRM knowledge chain created to support the process of capacity development.

Driving forces will help to increase capacity and the ability to use the power of IWRM for sustainable development and increased water security. This will include:

- satisfying household water and sanitation needs in all communities
- supporting sustainable economic productivity in all sectors of the economy (including irrigation and energy)
- sustaining development of urban zones and cities
- maintaining healthy rivers and aquatic ecosystems
- adapting to change to deal with issues such as climate change, and natural and man-made disasters.

Finally, a word about the importance of an ethical dimension of water governance and the wider acceptance of IWRM in the region. The main ethical rule proposed is: *do not hold water resources at the expense of others' rights to hold the same water resources*. A code of practice for IWRM implementation in arid zones would help to set the benchmark and establish written rules for ethical behaviour in water use and management. This would not be legally binding and is not intended to replace the provisions of national laws or regulations, but it could provide practical (heuristic) guidance and set out professional standards of behaviour. The working definition for an IWRM Code of Practice may be:

Principles, values, standards, or rules of behaviour that guide the decisions, procedures, and systems of water management organisations in a way that (a) contributes to the welfare of key stakeholders, (b) respects the rights of all constituents affected by its operations, and (c) fosters the realisation of the collective goals of public interest.

It is recognised that IWRM is a concept that is constantly being adapted to change. But it has to be fully supported by a critical mass of adopters to give it a chance to truly succeed.

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UZWATER

This compendium is produced for a master level course in the UZWATER project. It consists of some newly written material as well as previously published texts extracted from freely available books, reports and textbooks on the Internet, dominated by publications from the Baltic University Programme. The sources used for each chapter is listed at the end of the chapter. The compendia of the Uzwater project are produced exclusively for Master students free of charge at the participating Universities and is not to be sold or be freely available on the Internet.

The UZWATER project is an EU TEMPUS project. It includes 8 universities in Uzbekistan and deals with university education for sustainable water management in Uzbekistan. Uppsala University and Baltic University Programme is one of the six EU partners in the project. Lead partner is Kaunas University of Technology.

The main objective of the project is to introduce a Master level study program in environmental science and sustainable development with focus on water management at the eight partner universities in Uzbekistan. The curriculum of the Master Programme includes Environmental Science, Sustainable Development and Water Management.

The Sustainable Development unit will include the basic methods used in Sustainability Science, in particular introduce systems thinking and systems analysis, resource flows and resource management and a series of practical tools for good resource management, such as recycling, and energy efficiency.

The specific objectives of the project are:

- to establish study centers at the partner universities in Uzbekistan
- to improve the capacity to train master students with expertise to address the severe environmental and water management problems of the country;
- to support the introduction and use in Uzbekistan of modern education methods, study materials, and e-learning tools;
- to encourage international cooperation at the partner universities;
- to strengthen capacities to provide guidance to authorities and the Uzbekistan society at large;
- to ensure the visibility and promotion of the Master Programme through web pages, printed material and cooperation with society;
- to ensure continuity of the Master Programme and long-term support of the project outcomes at partner universities beyond Tempus funding.

<http://uzwater.ktu.lt>