KARAKALPAK STATE UNIVERSITY
NAMED AFTER BERDAKH

Aral Sea

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Proloque

- Plutarx (Greek historian) : Mare interbibere (lat.) — “Drinking a Sea” – which means “Making impossible”.

The name roughly translates as "Sea of Islands", referring to over 1,100 islands that had dotted its waters.

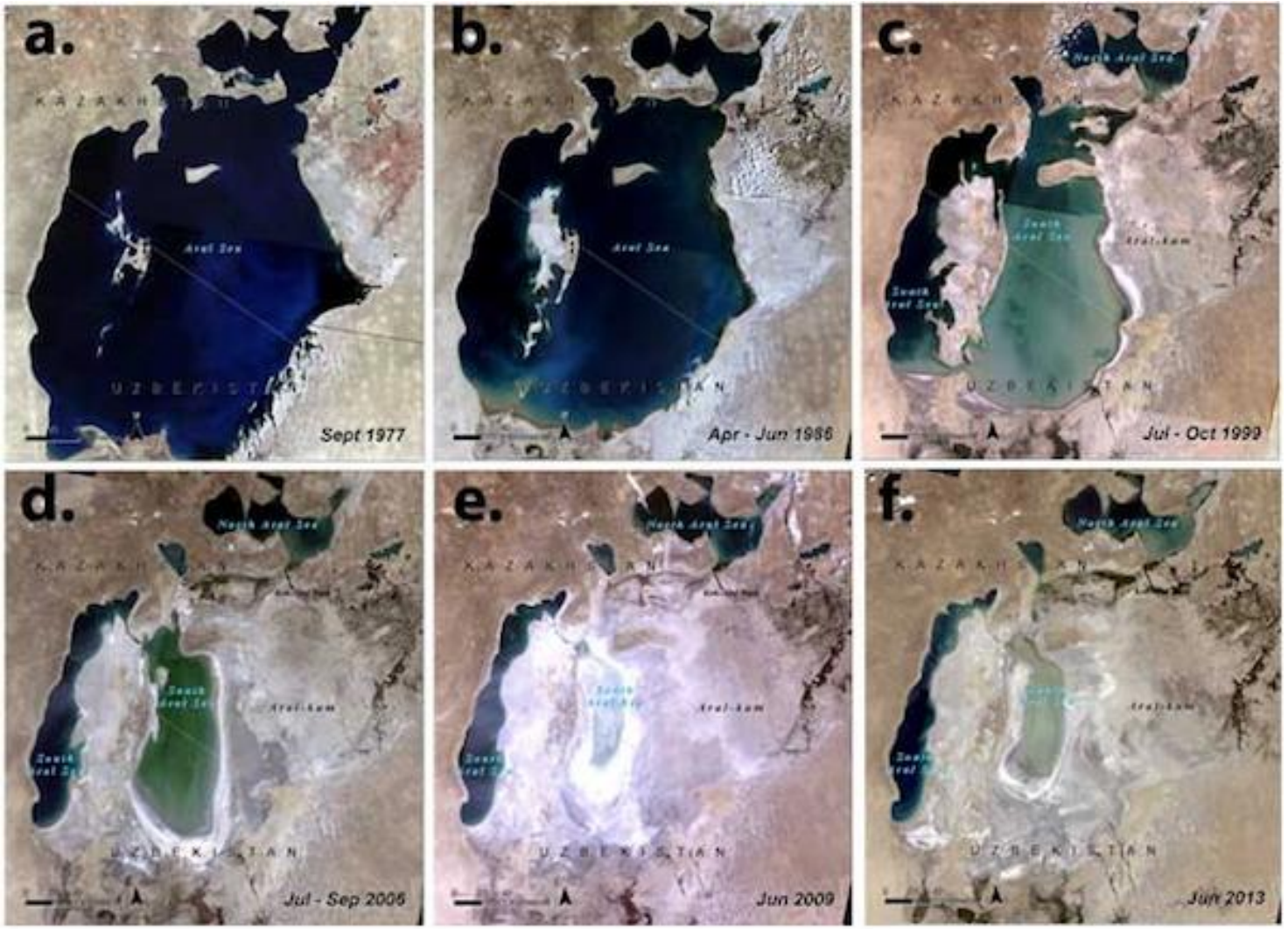
History of Aral Sea

- Appeared around 20 thousand years BC
- 17.6 - 15.3 thousand B.C.- a constant abundant inflow of river waters into the lake basin.
- 15.3 - 14 thousand a decrease in the inflow of river waters (the peak of salinization - 14.5-14 thousand .C.)
- 14-13 thousand years B.C. the water in the lake again became slightly saline.
- In the XV century, the Aral Sea as a whole did not yet exist. It became relatively full - flowing only after 1573
- From XIX till mid XX - the level of the Aral Sea has not changed;
- In 1950: 68 000 km^2; length - 426 km; width - 284 km; h-68 m

For comparision:

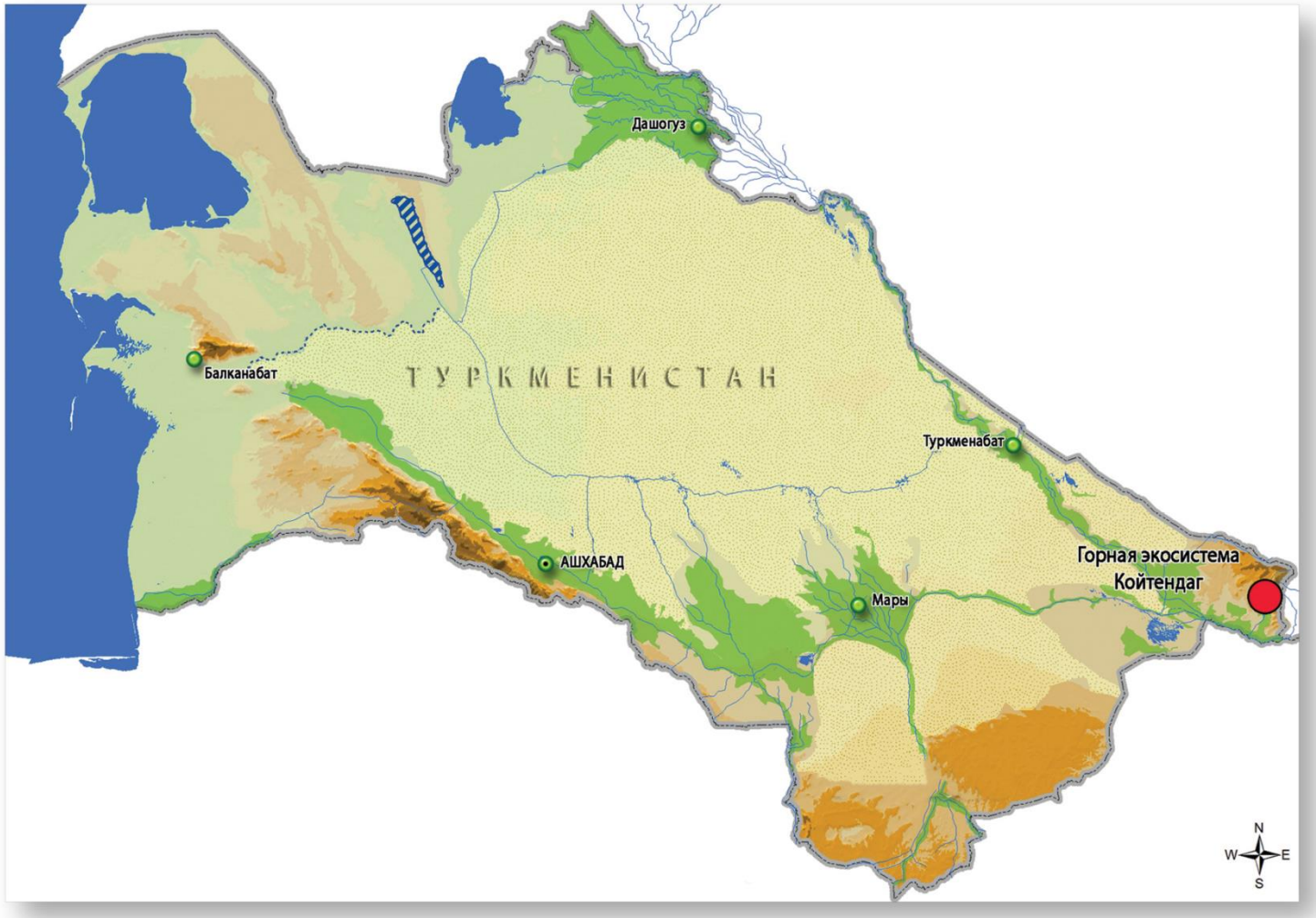
- Caspian Sea - 372,000 km^2
- Lake Michigan — 58 016 км^2
- Lake Huron - 59 600 км^2
- Lake Superior - 82 100 км^2
- Aral Sea (formerly)– 68 000 км^2
- Uzbekistan – 448 900 км^2
- Sweden - 447 435 км^2

Formerly the fourth largest lake in the world with an area of 68,000 km^2



1-Approach: mismanagement of water resources

Karakum Channel



The Great Ferghana Channel

Both cotton and wheat are watered along the irrigation ditches. Yes, even wheat does not grow here without watering

Cotton, wheat and Rice Fields

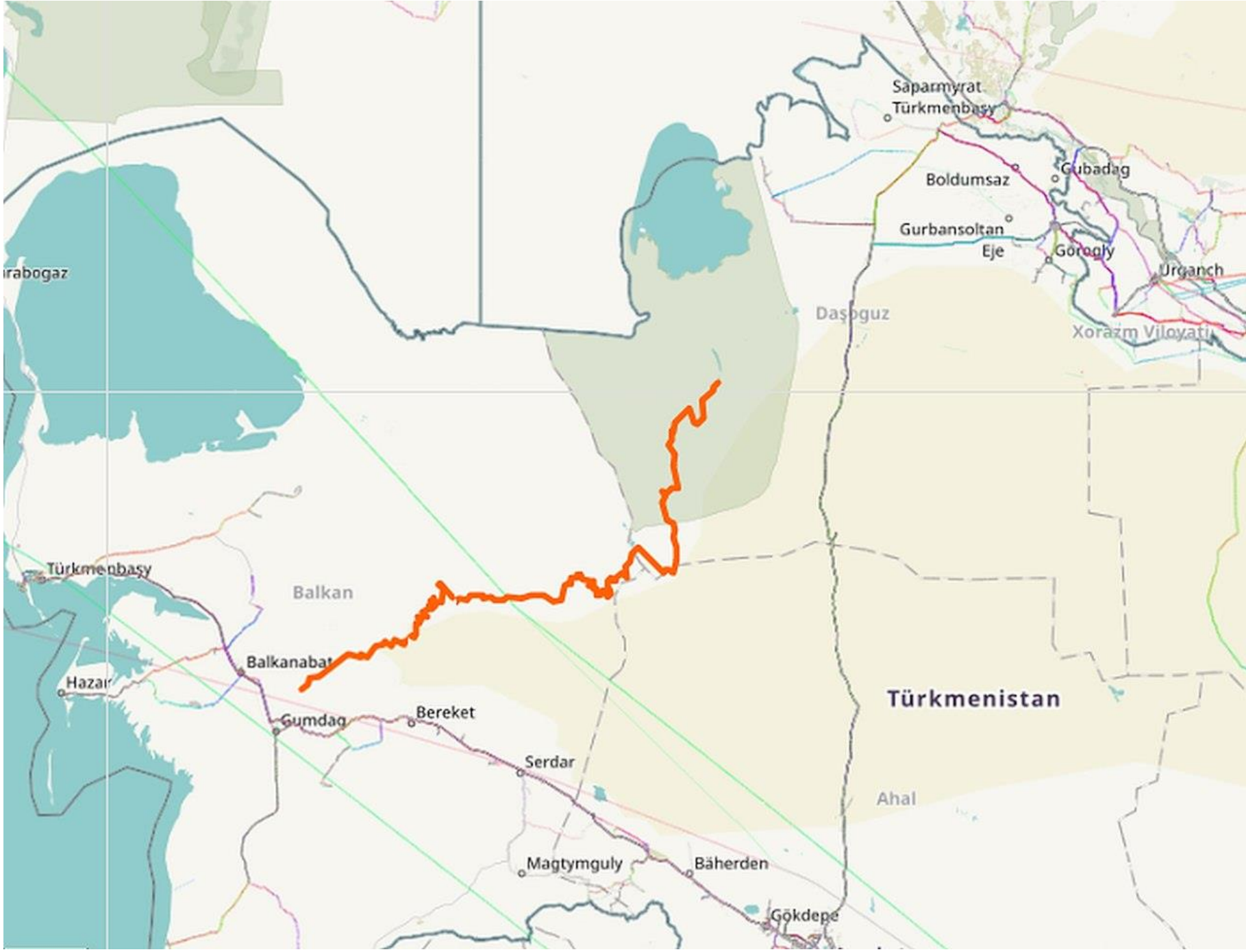
Production of cotton and especially rice demands a lot of water

Year	H, m BS	Volume, km^3 LAS/NAS	Square, km^2	Salinity, g/l	Discharge (MCM) from Syrdarya river to:		
					Total	NAS	to LAS
1990	38.2/40.5*	280/22.5*	38,560/2,830*	32*	2,400	---	---
1995	36.5/40.5*	217/21.8*	30,040/2,750*	42*	1,600	---	---
2000	33.5/39.8*	140/19.3*	22,930/2,620*	63/17*	3,865	---	---
2005	---/40.4	---/22.2	---/2,940	98/10.3*	9,888	4,318	5,570
2015	---/41.9	---/25.1	---/3,246	>100/11	5,538	3,090	2,448
2018 *(1st June)*	---/42.05	---/25.2	---/3,306	>130/11	5,943	2,814	3,129

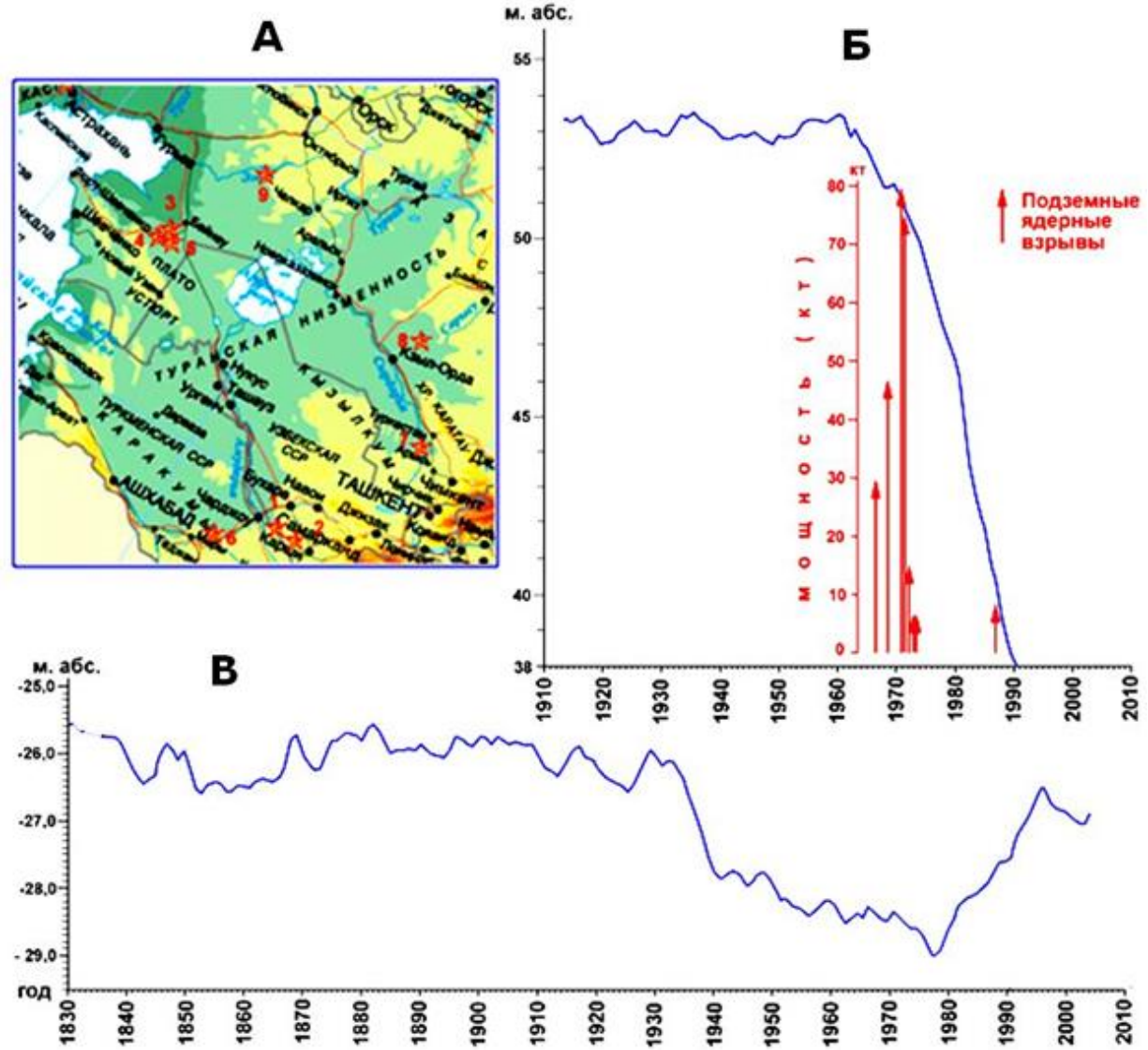
Причины и динамика усыхания [править | править код]

Показатели[1][2]	1960	1965	1970	1976	1982	1989	1992 (БА/МА)	2002 (БА/МА)	2005 (БА/МА)	2009 (БА/МА)	2014 (БА/МА)
Уровень воды, м	53	52,3	51,5	48,3	44,6	39,1	37,2 / 40,2	32 / 39,3	30,33 / 41	26,87 / 42,5	26 / 43
Площадь, км²	68900	62380	58920	54670	47130	37760	31830/ 2710	18700 / 2580	15770 / 2860	6740 / 3290	4330 / 3400
Объём, км³	1089	1066	941,23	970	578,65	470	240,17 / 20,28	110,84 / 18,44	89,79 / 22,52	33 / 11,52	11,09 / 11,67
Солёность, ‰	10	10,81	11	14	18	30	35 / 30	60	>60	>100 / 10	>150 / 8-10
Речной сток, км³/год	120	106	7,9	47	10	3	3	10	13	27,95	9,2

2-Approach:


Saparmyrat
Türkmenbaşy
Boldumsaz
Gubadag
Gurbansoltan
Eje
Görogly
Urganch
Daşoguz
Xorazm Viloyati
Türkmenbaşy
Balkan
Balkanabat
Hazar
Gumdag
Bereket
Serdar
Türkmenistan
Ahal
Magtymguly
Bäherden
Gökdepe

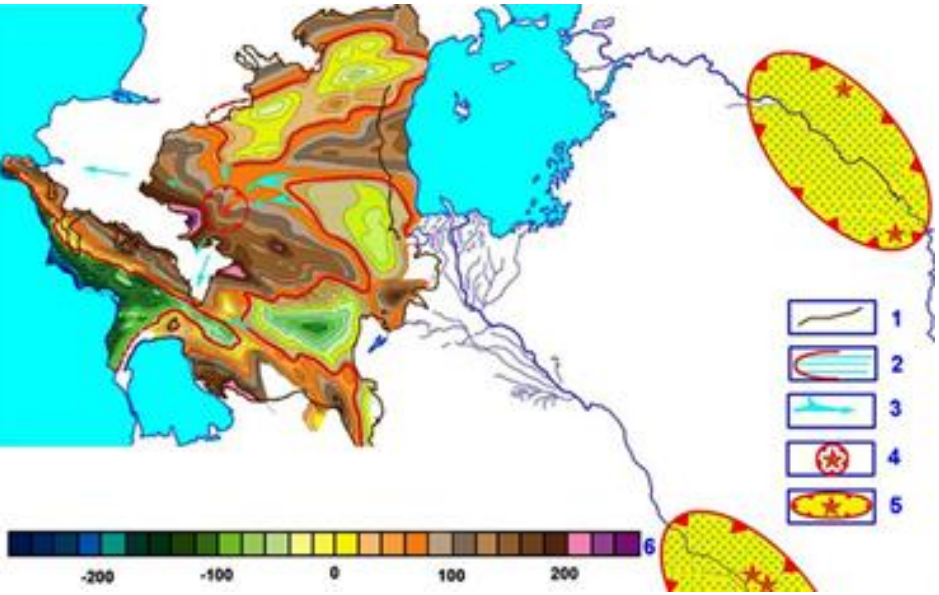
The layout of underground nuclear explosions (А) and graphs of fluctuations of the Aral (Б) and Caspian (В) seas



Underground nuclear explosions in the Aral-Caspian region

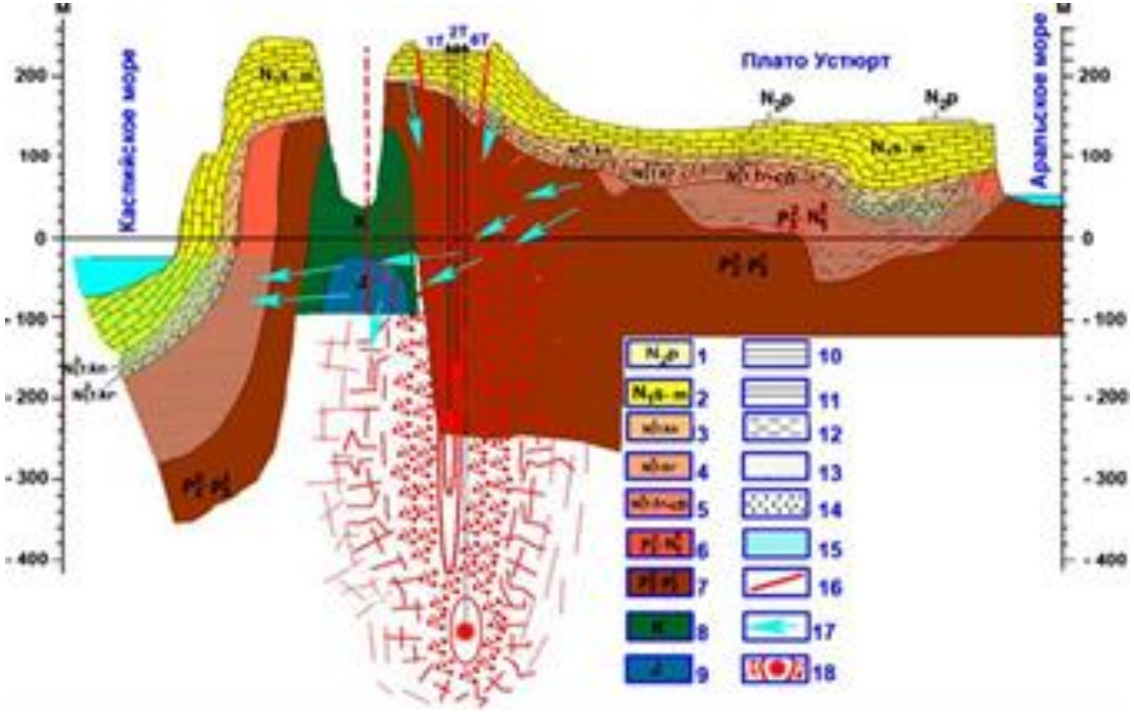
№	Name of the explosion	Date of explosion	Coordinates of the explosion	Depth, m	Explosion power, cT	Magnitude, points
1	UrtaBulak	30.09.66	38,8N; 64,5E	1532	30	5,1
2	Pamuk	21.05.68	38,916N; 65,159E	2440	47	5,4
3	Mangishlak-2T	6.12.69	43,8S2N; 54,783E	407	30	5,8
4	**Mangishlak -6T**	12.12.70	43,851N; 54,774E	740	80	6,1
5	**Mangishlak -1T**	23.12. 70	43,827N; 54,846E	470	75	6,1
6	**Krater**	11.04.72	…..	1720	15	4,9
7	**Meridian-3**	15.08.73	42,711N; 67,410E	600	6,3	5,3
8	**Meridian-2**	19.09.73	45,635N; 67,850E	400	6,3	5,2

Scheme of technological intercept



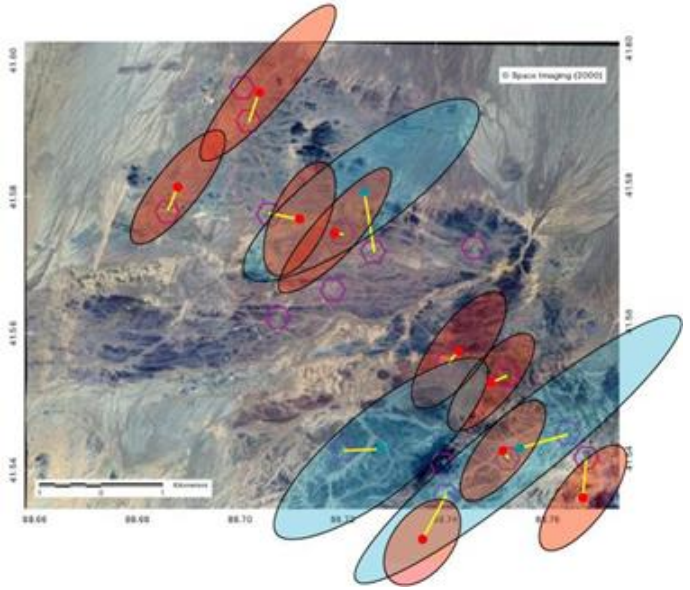
groundwater inflow to the Aral-Caspian region in terms of: 1 — chink of Ustyurt plateau; 2 — implementation of the waters of the Aral sea and the Caspian sea in the void space of the sediments of the Miocene; 3 — way drainage of groundwater; 4 — zone failure funnels UNE "Mangyshlak — 1T, 2T, 6T"; 5 — absorption of surface water and groundwater in the valleys of the Amu Darya and Syr Darya in the areas UNE; 6 — the depth of the roof waterproof clay Paleogene

Scheme of technological intercept



underground runoff on the Ustyurt plateau in the section: 1-9 - deposits of different ages; 10-14 - lithological composition of rocks; 15 - areas of introduction of the waters of the Aral and Caspian Sea into the void space of Miocene sediments; 16 - discontinuous disturbances; 17 - ways of drainage of groundwater; 18 - zones of UNE

Lobnor Lake in the Xinjiang Uygur Autonomous Region of China dried up because of the same underground nuclear explosions



Lake Chagan has dried up at the Semipalatinsk test site of nuclear explosions

Consequences

Consequences

Consequences

Dried bottom of the Aral Sea

This is not snow

Nukus, 5/04/2022


© MMG 2005

Negative influence to construction

Influences of the underground salty water to the constructions

Воздействие грунтовых вод на здание и строение

Характер разрушения здания по ул. А.Шамуратовой г. Нукуса (2018 г)

Характер разрушения железобетонного ограждения по ул. Мукимий г. Нукуса (2015 г)

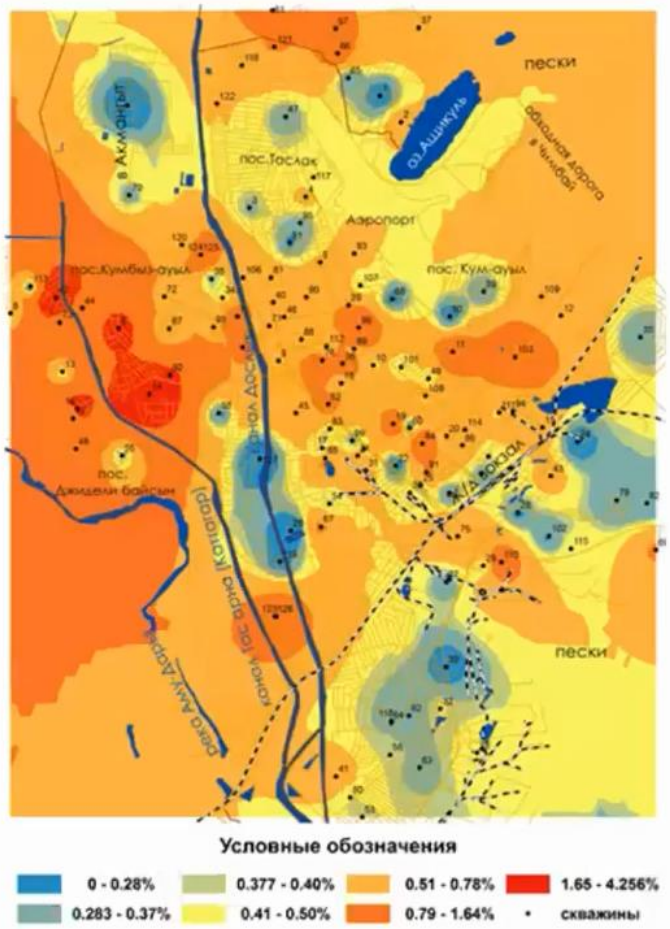
Influences of the underground salty water to the constructions

Характер разрушения зданий г. Нукуса (ул. Пушкина, фото 1990 г)

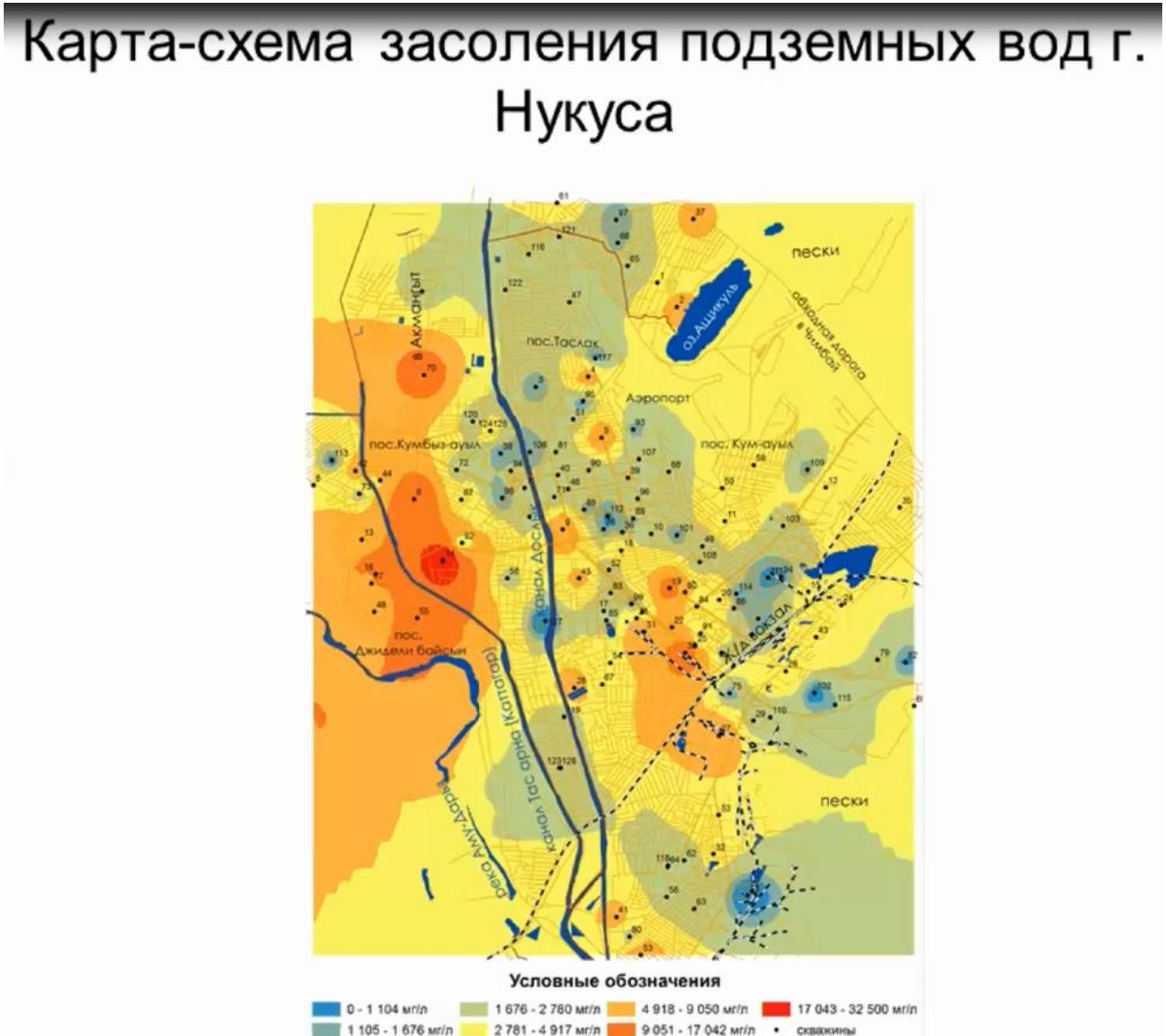
Aggregate underground water level in Nukus

Map of saltness of the Soil of the Nukus

- Карта-схема засоления грунтов до уровня подземных вод. г. Нукуса.



Map of saltness of underground water of the Nukus



The salt “eats” the concrete

Разрушение бетонных железобетонных столбов (23 микрорайон г. Нукус)

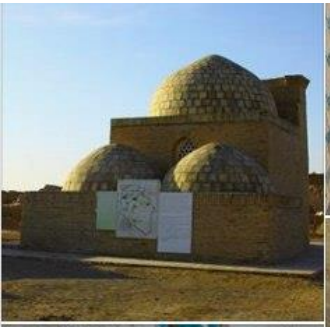
Просадки зданий пос. «Елабад» (Плато «Устюрт»)

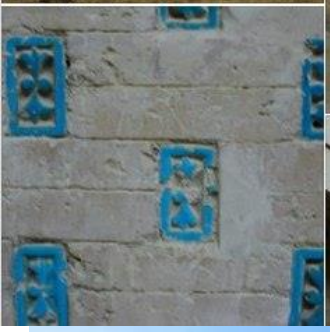
Характер образования трещины в стене кинотеатра (2014 г.)

Характер разрушения внутренней стены поселковой поликлиники (2014 г.)

Qoy qirilgan qala

Mizdakhan and Ayaz qala





What is going on now…

- In an ongoing effort in Kazakhstan to save and replenish the North Aral Sea, the Dike Kokaral dam was completed in 2005. By 2008, the water level had risen 12 m above that of 2003. Salinity has dropped, and fish are again present in sufficient numbers for some fishing to be viable. The maximum depth of the North Aral Sea was 42 m.

What is going on now…

- In 2008, geological exploration (search for oil and gas fields) was carried out in the Uzbek part of the sea. The contractor is PetroAlliance Company, the customer is the Government of Uzbekistan

What is going on now...

- The remains of two settlements and mausoleums were found on the shallow bottom of the Aral Sea. The mausoleum of Kerderi dates approximately from the XI-XIV centuries. For a long time he was at a depth of about 20 m . The remains of the 14th century settlement of Aral-Asar have also been found.

Remainings of Kerder settlement on the bottom of dried sea

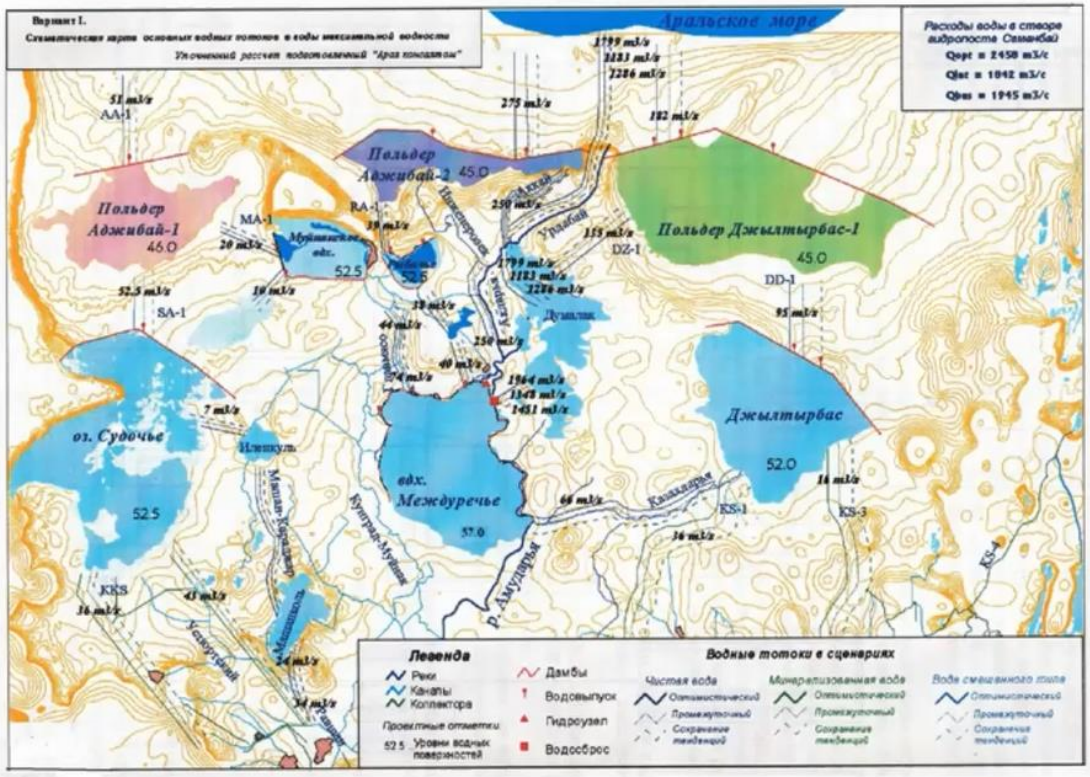
На раскопках мавзолея Кердери, дно Аральского моря


05/02/2019 09:53


21.06.2006 17:01

Water saving technologies

Проект «Восстановление увлажненных земель Аральского моря в Республике Узбекистан»



Плотина Междуреченского водохранилища

Projects on saving the Aral Sea

- Soviet Programm (1980-th);
- Tadjikistan Project;
- Kazakhstan Project;
- Uzbekistan Project.

Questions for discussion:

- Which approach do you tend to believe was crucial on drying up of the Aral Sea?
- Which one of the four projects on saving the Aral Sea do you think is more feasible from a sustainable development viewpoint?

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Thank you for your attention