SVENSKA ARALSJÖSÄLLSKAPET
Swedish Aral Sea Society

Swedish Aral Sea Society - Karakalpak State University
on-line Conference
Implementing Education for Sustainable Development in Higher Education

The Aral Sea Disaster

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Head of Agency for Project Implementation of the International Fund for Aral Sea Saving in Uzbekistan

23 January 2025

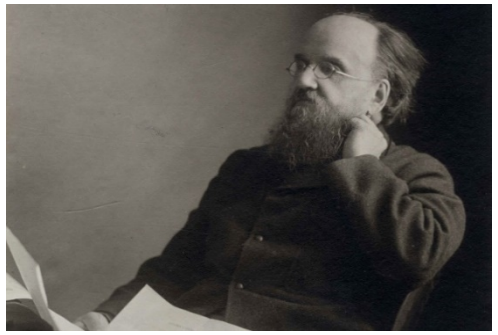
The origins of the Aral Sea ecological crisis

Irrelevant human behavior based on loss of morality and ethics, along with an underestimation of Natural potential and started climate change, is the main cause of environmental tragedies - such as the Aral Sea disaster in Central Asia, the Salton Sea crisis in the United States and Lake Urmia in Iran, and many other aquatic ecosystems on the Earth.



Until mid of the 20th century, there was a theory that potential of nature is unlimited, people can and should take from nature as much as possible - bacause Humanity has always believed that nature is basic for human society in the form of assistant to live better, create socio-economic benefits.

The environment was declared to be property of society, and in the same time humanity followed the economic (commercial) interests of political elite of society, therefore, priority for developments was the economic benefit and ignorance of ecosystems' needs



Alexander Ivanovich Voeikov (1842-1916) - an outstanding Russian climatologist, geographer, traveler, Member of the St. Petersburg Academy of Sciences (Russia)

Here is the quote from His book **“Essays on Turkestan”,** published by Printing house "Selsky Bulletin". Saint Petersburg. 1913, pages 9-11:

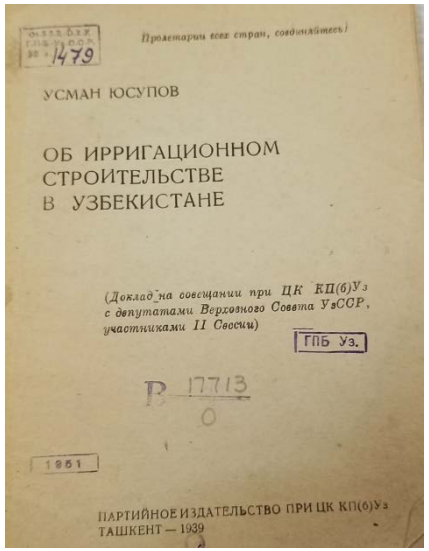


“In view of huge amount of water in the Aral Sea and its numerous tributaries, especially in the Amu Darya river, there is no doubt that irrigation can and should be increased over the region . As we increase irrigation, evaporation from cropping surface will increase and less water will reach the Aral Sea. Then we will have to deal with a decrease in its waters and a reduction in its area, but no longer depending on natural conditions, but depending on activity of humanity which will be able to use water in the best possible way, that is, make it evaporate from irrigation surface that provide products useful for people, instead of uselessly evaporating from surface of the Aral Sea. Such a reduction in the area and a decrease water of the Aral, in any case, will have to be welcomed as a victory for human knowledge and wisdom”.

Of course, while developing the Central Asian region in the 1930s-80s, the leadership of the republics and the entire Soviet Union understood that the Aral Sea would disappear if all the waters were taken from the rivers

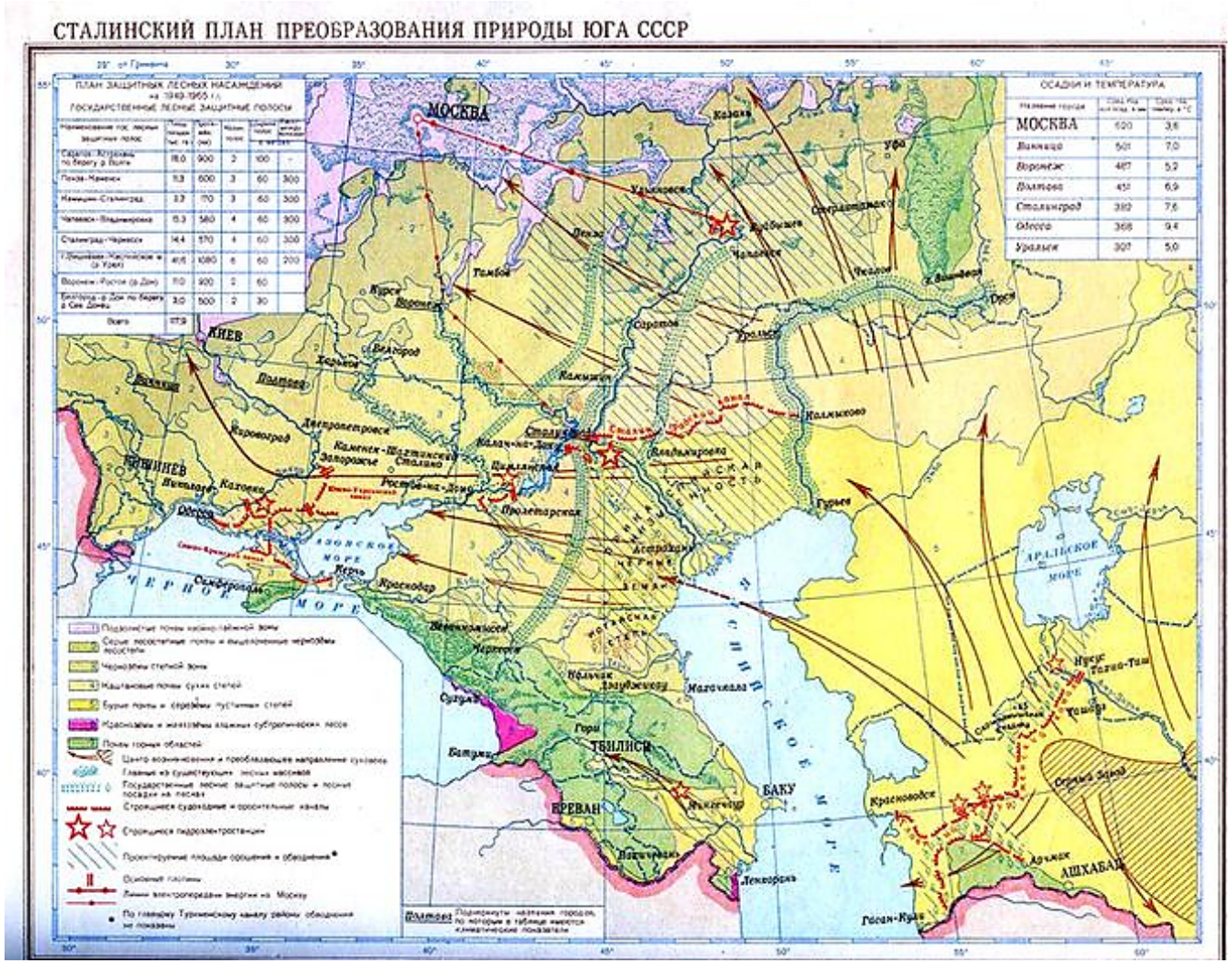


An example is report of the First Secretary of the Central Committee of Communist Party of Uzbekistan **Usman Yusupov** during meeting at the Central Committee of Communist Party of the Uzbek SSR with deputies of the Supreme Soviet of the Uzbek SSR in Tashkent in 1939:



"We cannot watch the Amu Darya uselessly carrying its waters to the Aral Sea, when our lands in the Samarkand and Bukhara regions are insufficiently irrigated. And our task, as true Bolsheviks, is to change the existing situation, smashing to pieces all kinds of harmful theories, to catch the Syr Darya and Amu Darya, to hold them firmly in our hands, to make their waters serve the interests of socialism, the growth of the population's standard of living and the development of the country."

Stalin’s plan for the transformation of nature
(approved by the USSR Council of Ministers on October 20, 1948)



Decree of the Council of Ministers of the USSR and the Central Committee of the All-Union Communist Party of Bolsheviks of October 20, 1948 No. 3960 “On the plan for field-protective afforestation, the introduction of grass-field crop rotations, the construction of ponds and reservoirs to ensure high sustainable yields in the steppe and forest-steppe regions of the European part of the Soviet Union”
URL: http://istmat.info/node/17970

The construction of the world's largest artificial canal - the Karakum canal and the creation of huge irrigated areas throughout Central Asia - in accordance with **Stalin’s plan for the transformation of nature** - was proclaimed as a victory over the desert!

However, 40 years later, nature took revenge - and instead of the conquered desert there was created a new one – **the Aralkum.**

For the first time, it was loudly announced about the possible death of the Aral Sea in 1949



Full member of the Academy of Sciences of the Uzbek SSR Alexander Askochensky in the jubilee collection dedicated to the twenty-fifth anniversary of the Uzbek SSR he wrote about "the grandiose tasks of the radical redistribution of water resources in space and time":

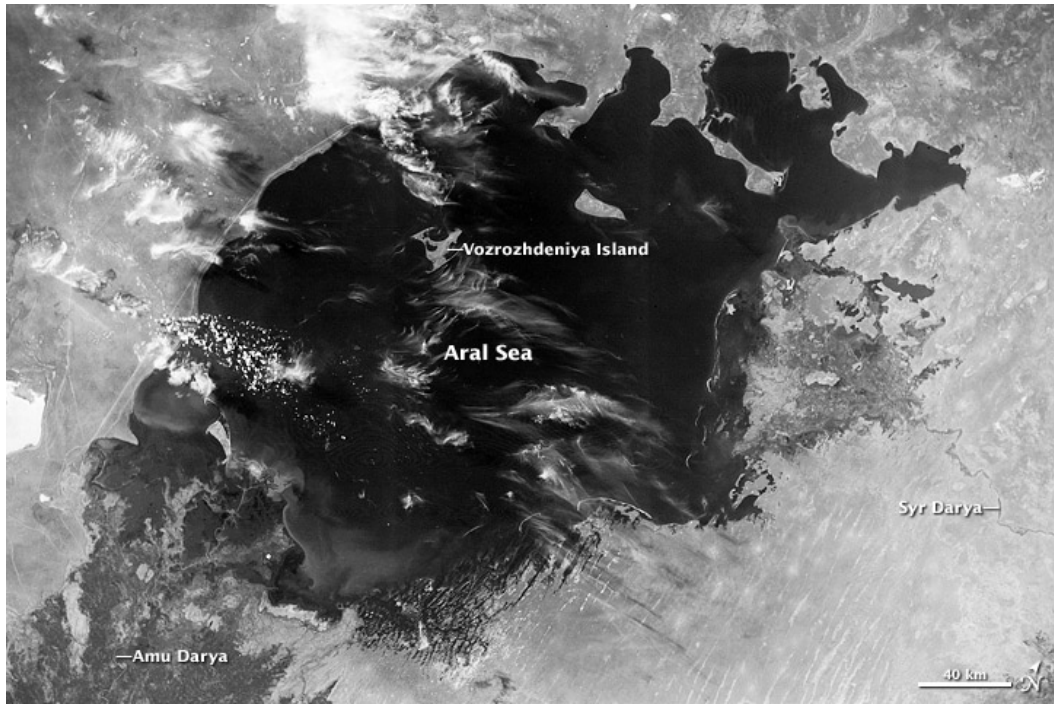
"*As a result of such redistribution of water across the Aral lowland, over time**, the Aral Sea will disappear** and be replaced by huge irrigated areas. The sea mirror, which has uselessly evaporated water in the western part of the lowland, will move to the east, closer to the mountains, which should undoubtedly humidify the climate of the foothill zone.*

The regime of water sources will also be changed with the help of reservoirs, which, located in the upper and middle reaches of rivers, will have a positive effect on the climate.

As a result of those largest hydraulic engineering works, the geography of Central Asia will be changed".

The Aral Sea – What it was?

The area of the Sea surface in 1957 was 67,499 km^2
Water volume 1089 km^3
Water level - 53.4 m
The maximum depth reached 69 m
The transparency of the water was up to 25 m



First Image of the Aral Sea by NASA Reconnaissance Satellite 22 August 1964
https://earthobservatory.nasa.gov/images



Role of the Aral Sea for Economy and Nature in the Past



Having a significant water surface and volume of water, the Aral Sea served until the mid-1960s as a climate-regulating water body and softened severe weather fluctuations in the Central Asian region

The Aral Sea zone was well-known by a unique diversity of flora and fauna, only the number of Saigas reached 1 million heads, the floristic composition was 638 species of higher plants





Until 1960s, the Aral Sea was the largest fishery basin in Central Asia with an annual catch of up to 40 thousand tons of fish (mainly Carp, but also Sturgeon). The Aral Sea was used as a transport corridor from Central Asia to Russia and farther to the Europe

Products of the Fish factory in Muynak



Salt mining in the Aral region in Kazakhstan



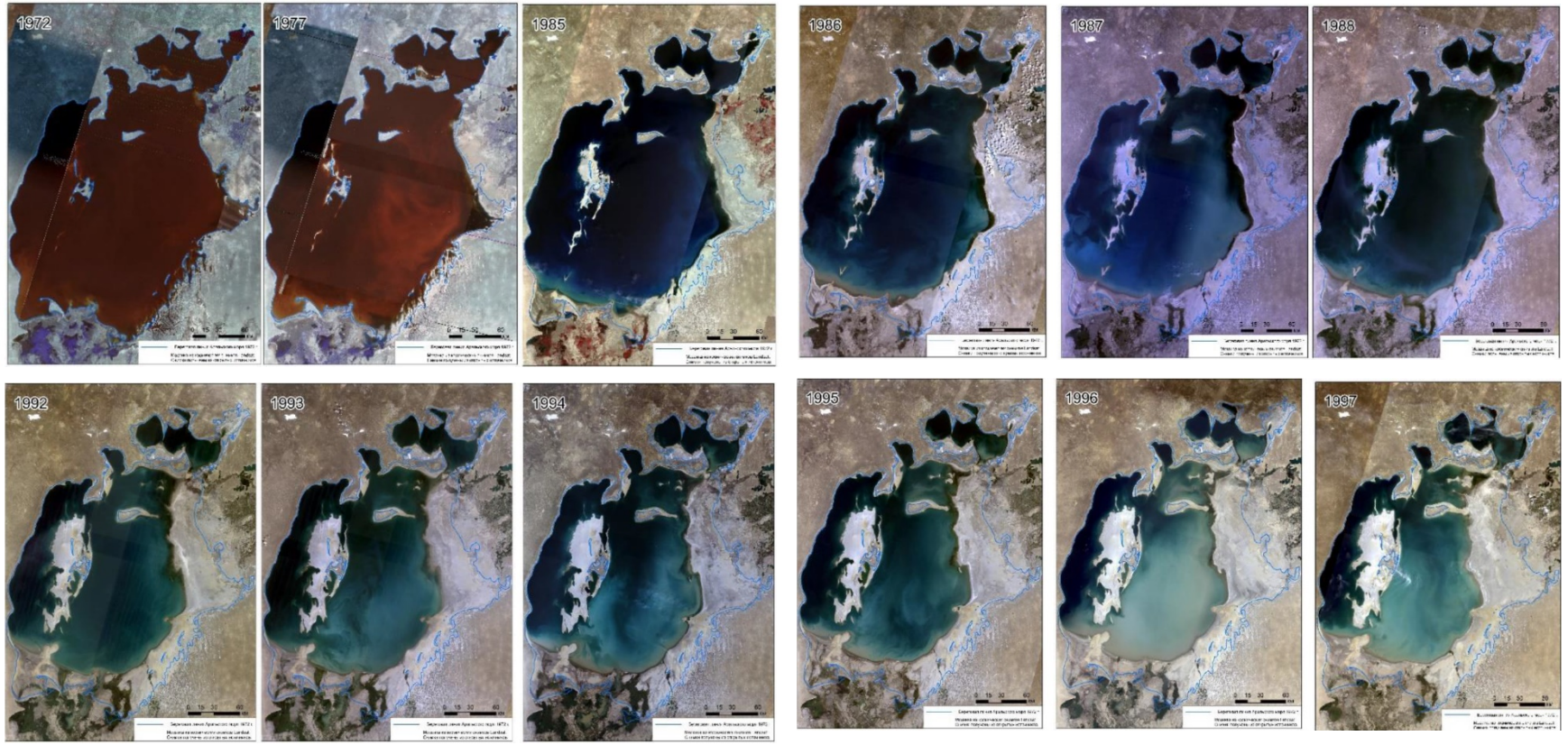
Port in the city of Aralsk



Fishing boat "Buiny".
Now it is located on a pedestal in the city of Muynak

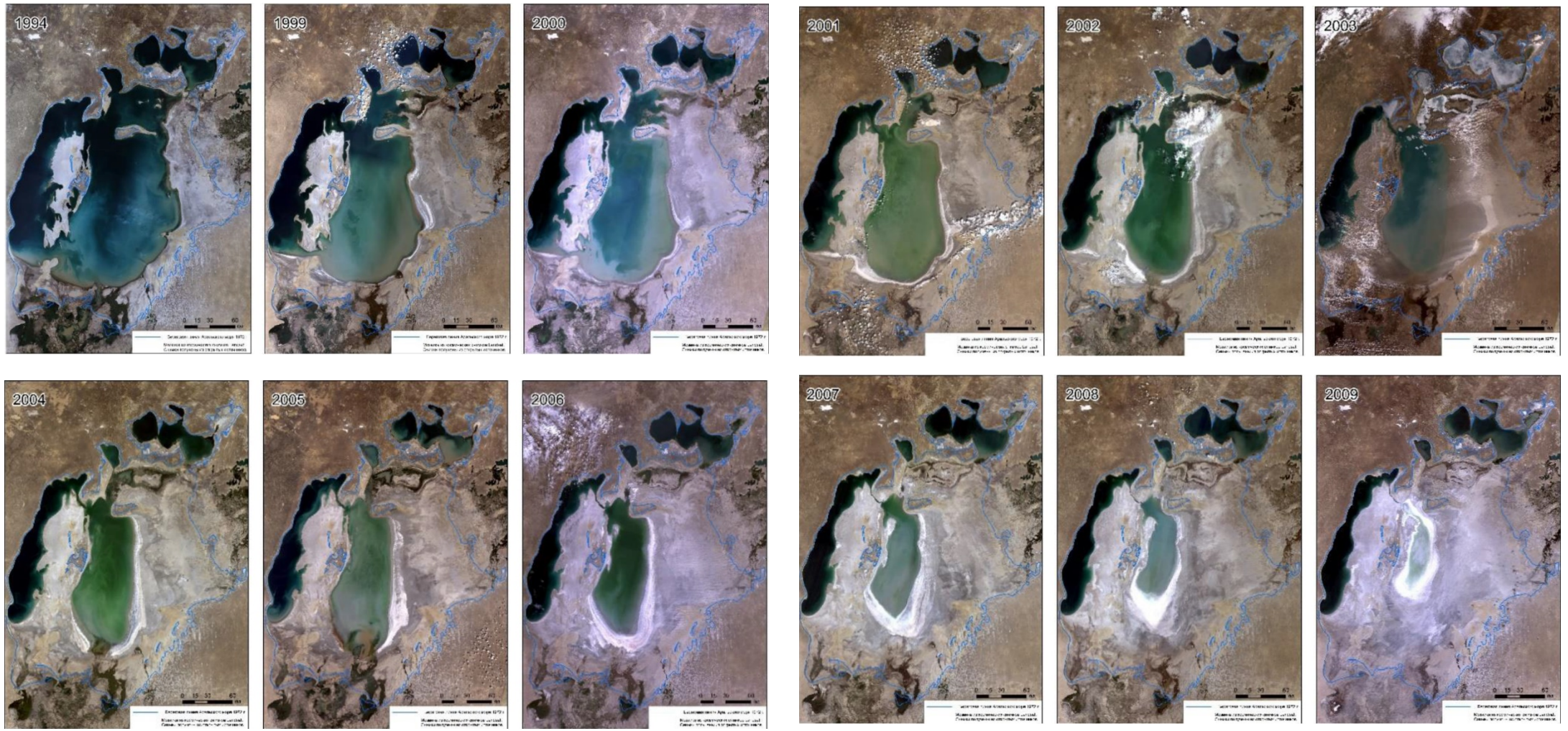
HOW the ARAL SEA DRIED

Anthropogenic factors (the main of which are intensive industrial, irrigation and hydropower developments) together with natural factors (climate aridity - a combination of high air temperatures, high evaporation and significant small amount of precipitation) led to the death of the Aral Sea. The less water flowed into the sea along the Amudarya and Syrdarya rivers, its depth and volume of water became less, the faster it warmed up - evaporation was bigger, which accelerated its drying.



The Aral Sea was divided into North and South in 1989 as a result of a decrease of water levels and drying up of the Berg Strait. By the end of the 1990s, the Big (Southern) Aral Sea turned into a hyperhaline (saline) body of water. Salinity in 1997 was 57 ‰ (ppm). In 1997 the island of Barsakelmes merged the coastal land, in 2001 - the island of Vozrozhdenie also stopped to be an island.

In 2003, the South Aral Sea was divided into Eastern and Western parts, which are connected by the narrow Uzun-Aral strait, located at an altitude of 29 m above sea level. This configuration does not allow water of those two bodies to mix. In 2004, a small lake Tushchibas, which was previously the bay of the Aral Sea - separated from the Eastern part.



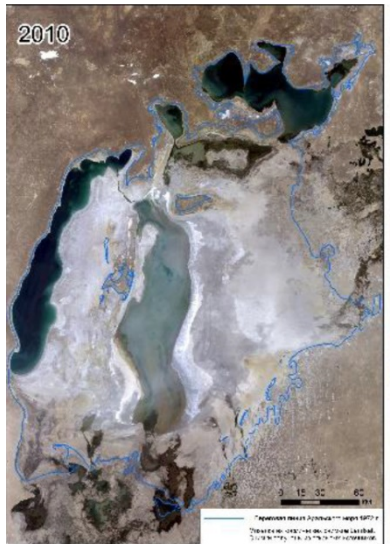
In 2005, the Small Aral Sea was cut off from the Big Sea by the Kokaral Dam - on the territory of Kazakhstan. Both Sea bodies were finally separated.

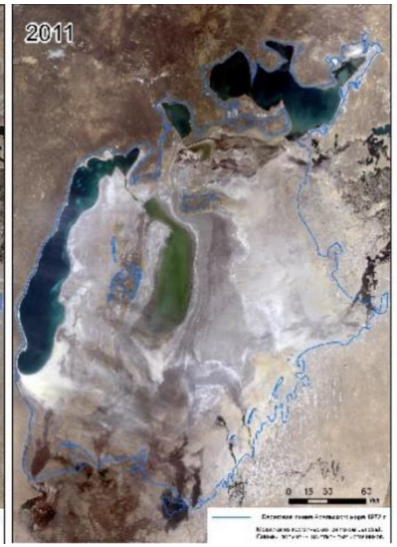
Kokaral Dam - a structure that crosses the Berg Strait between the North Aral Sea (Small Sea) and the South Aral Sea (Big Sea)



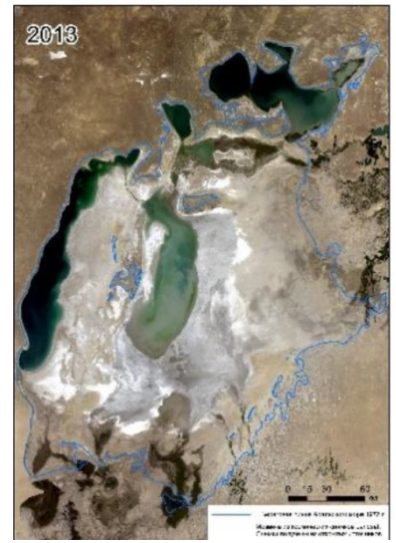


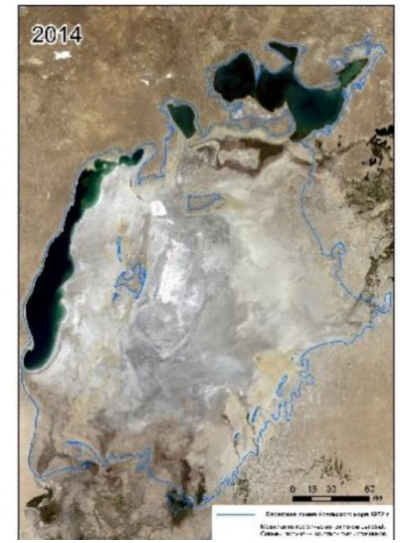
The dam was designed to regulate the water level in the Small Sea. The length of the dam is 13,034 m, the width is up to 100-150 m. The height of the top of the dam is 6 m (45.5 m abs), the level of the Small Sea is supposed to be up to 42.2 m abs. A duct was built on the dam with nine spillways with water discharge of 600 m^3 /sec, designed to protect dam against destruction by high water level in the South Aral

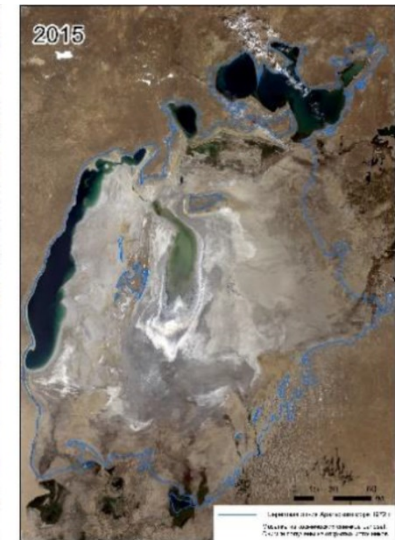

2010

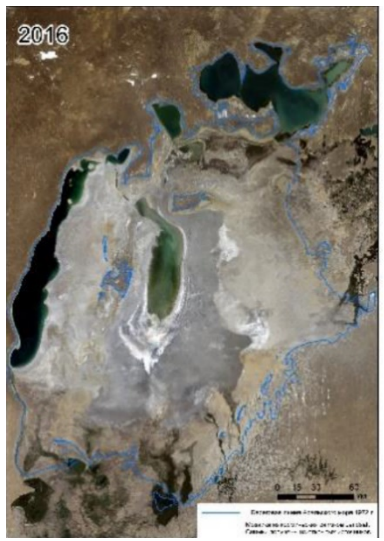

2011

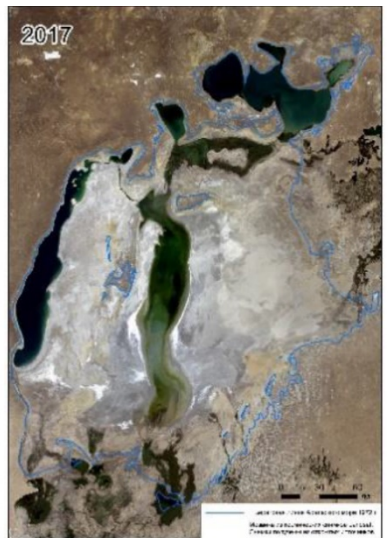

2012


2013

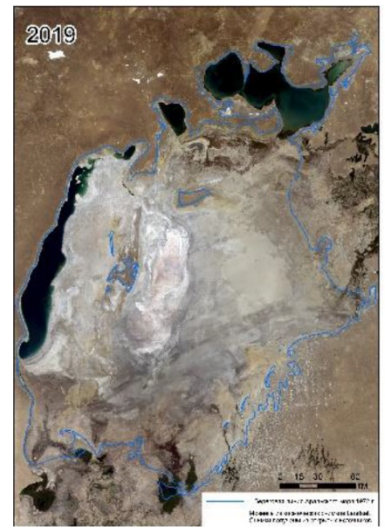

2014


2015


2016


2017

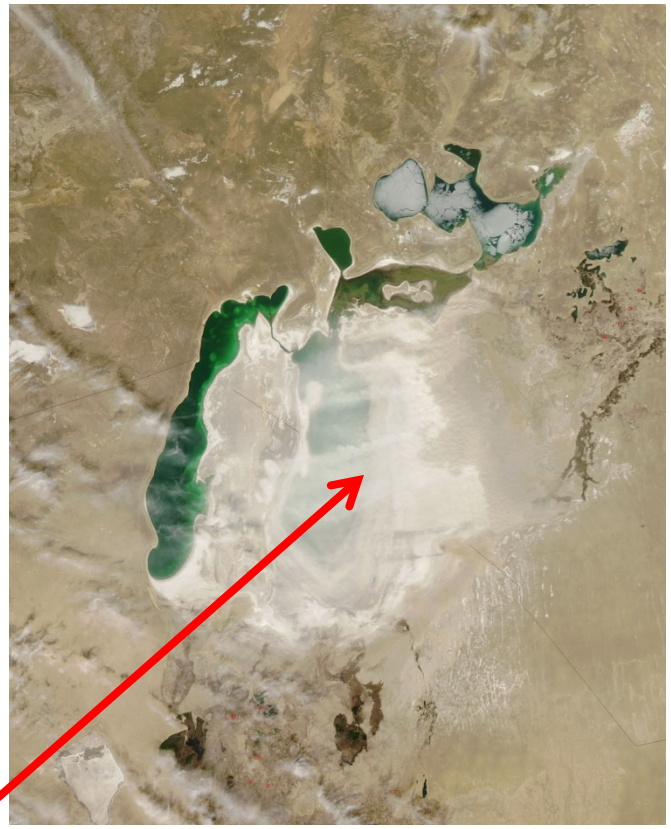

2018


2019

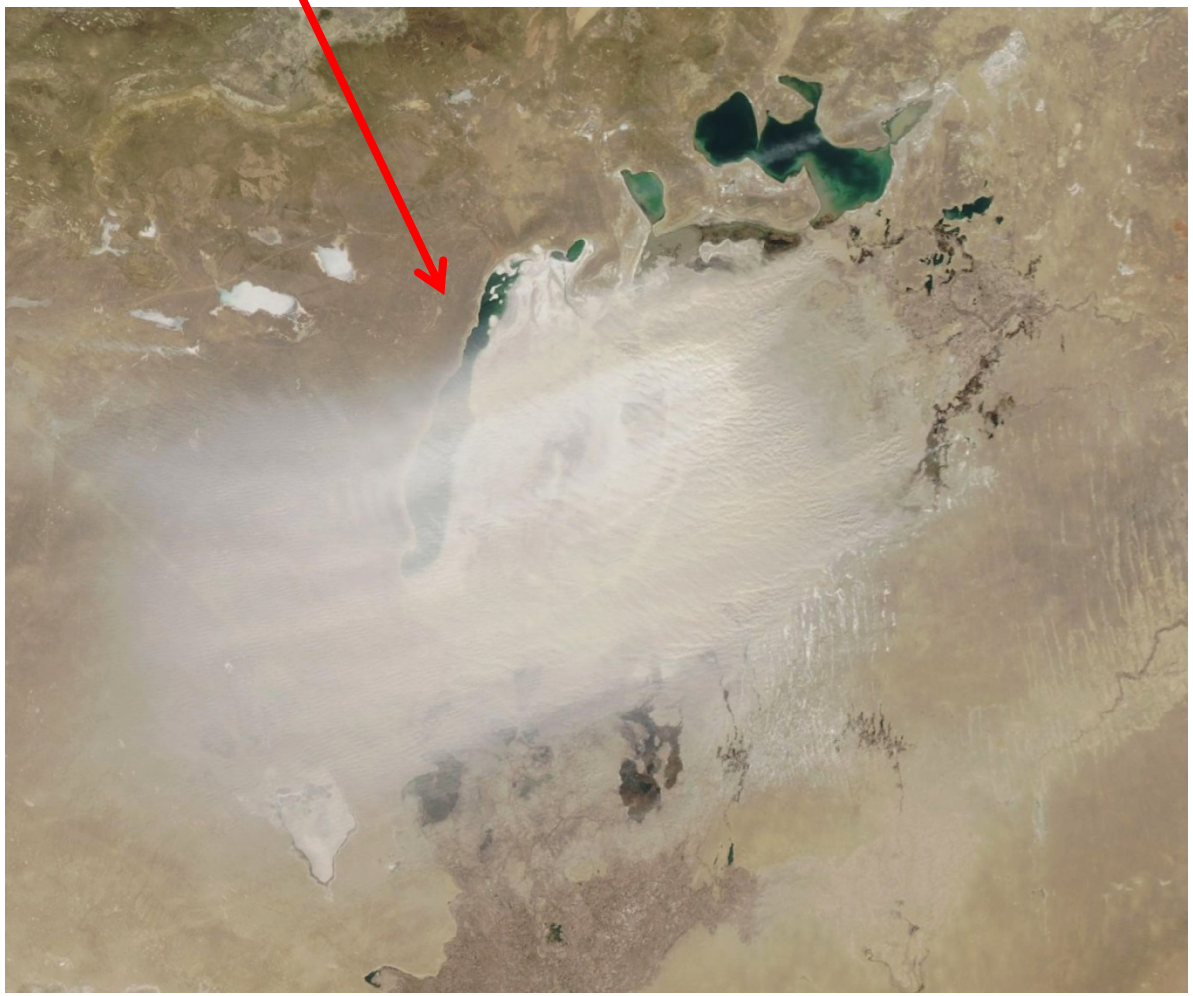

2020


2021

On March 24, 2020, the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Aqua satellite captured this natural-color image of a dust storm over the Aral Sea zone



Dust storms rose over dry lakes around the South Aral Sea on April 1, 2008. The Moderate Resolution Spectroradiometer (MODIS) on NASA's Aqua satellite captured this image on the same day. In this image, an off-white storm obscures the view of the eastern part of the South Aral Sea. The light color of the dust is characteristic of lake bottom sediments, which provide enough material for dust storms.

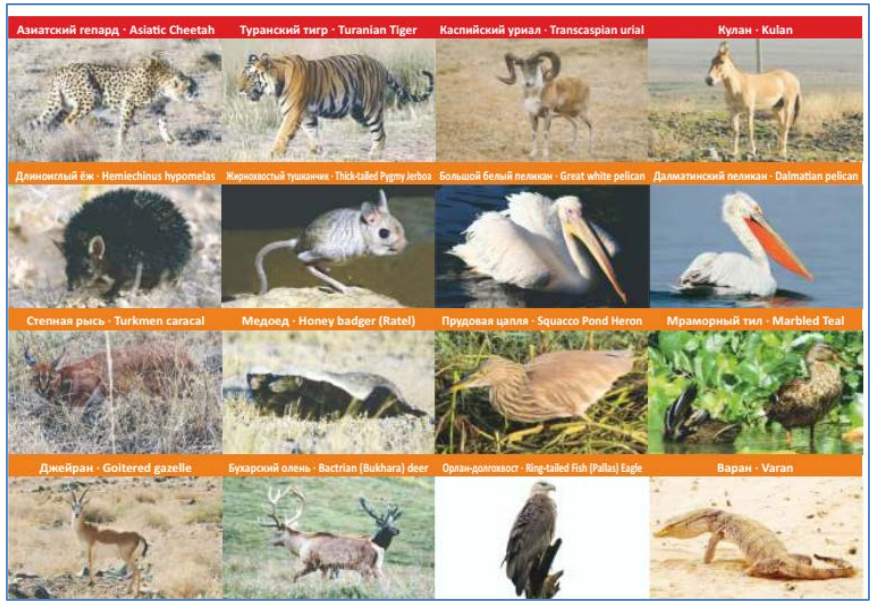


It should be noted that such storms occur when the wind blows from the northeast.

Consequences of a sand and salt storm that came from the Aral Sea to Khorezm on May 27, 2018



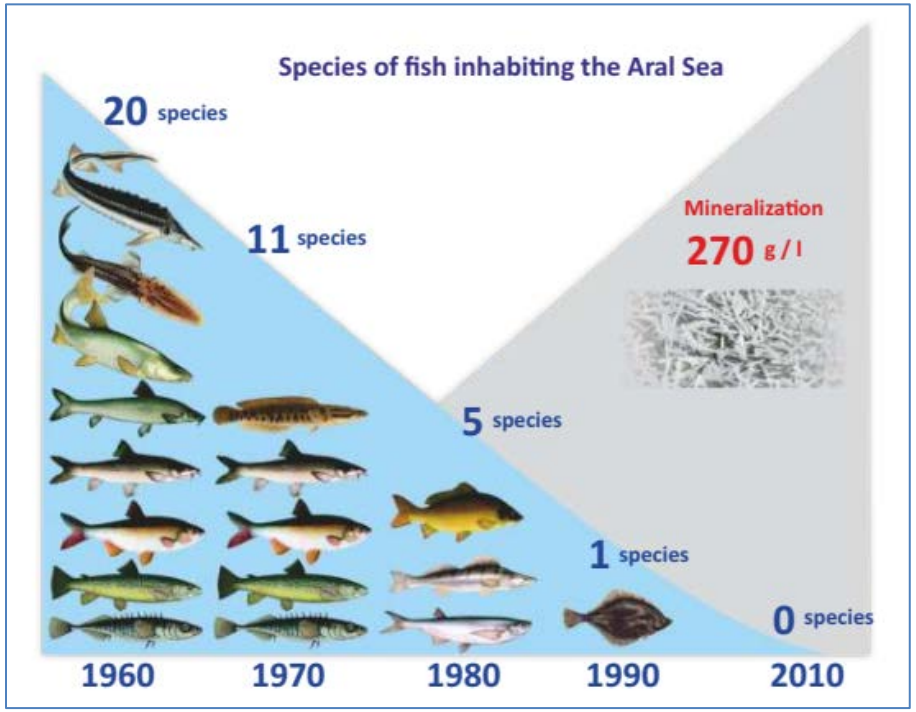




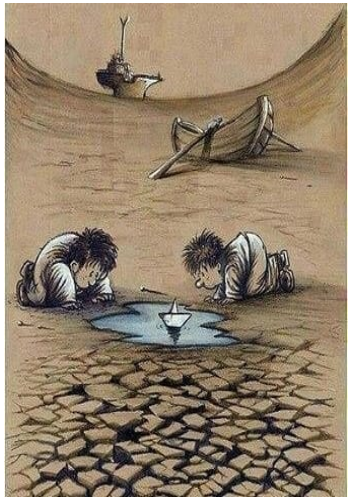
The number of plants growing here and population of wild animals are rapidly decreasing – we are observing bio-diversity degradation.



Since 1980, the Big Aral has completely lost its fishery worth.



As a result of loss of the transport importance of the sea, the decline of fishing, livestock and other types of farming, the reduction of pastures and decline in land productivity, many of thousands of people have lost their traditional sources of livelihood.

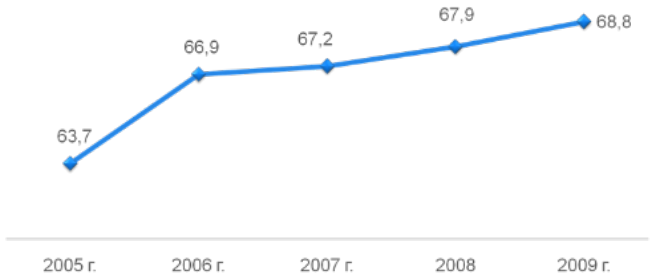


IMPACT TO HUMAN HEALTH AND ECOSYSTEMS

The drying up of the Aral Sea caused a process of desertification in the center of the belt of the great deserts Kyzylkum and Karakum, where another new desert, "Aralkum", was formed (over 5 million hectares, of which 3.34 million hectares in Uzbekistan). The danger of the Aralkum desert is in the fact that the dried bottom heats up like a frying pan, throwing into the atmosphere huge masses of salts and fine dust, which remained in the upper layers of the soil after the evaporation of the sea.



Dynamics of cancer (per 100 thousand population)



The effect is enhanced due to the fact that the Aralkum Desert is located on the route of a powerful air stream (mainly from west to east). This contributes to the formation of frequent dust storms (up to 100 days a year) and the spread of the Aral salt in the Earth's atmosphere.



Dynamics of lung diseases (per 100 thousand population)



Water pollution and a large amount of dust and salt carried from the bottom of the dried Aral Sea play a decisive role in the growth of human health in general and child mortality. They resulted in high rates of a number of diseases: anemia, kidney disease, gastrointestinal tract, an increase in the level of respiratory diseases, blood diseases, cholelithiasis, cardiovascular and oncological diseases.

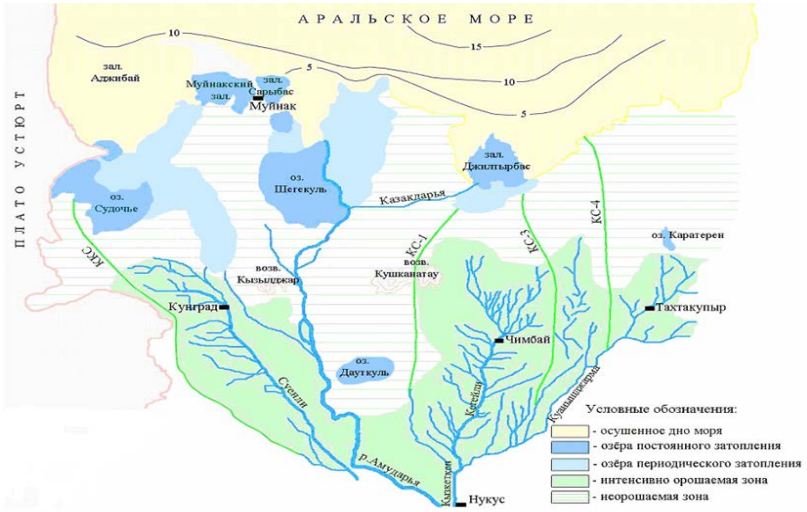
How the hydrographic situation in the Southern Aral Sea region changed as the Aral Sea dried up?



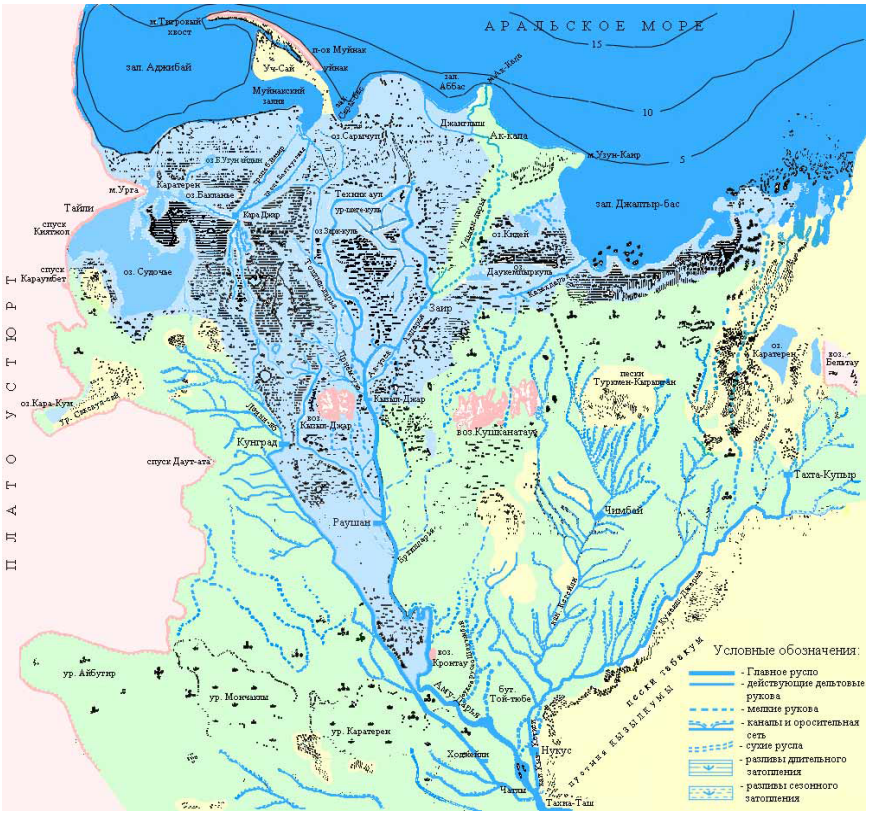
In the book: Kurbanbaev E., Artykov O., Kurbanbaev S. "Integrated Water Resources Management in the Amu Darya River Delta". Publication of the Global Water Partnership. Tashkent - 2010, the results of long-term studies of the Karakalpak branch of SANIIRI, data from Uzhydromet, SIC ICWC, NA BAIS and design institutes, as well as historical and archaeological studies of various authors are summarized and analyzed. The enormous changes in the delta part of the Amu Darya River are described in connection with a sharp reduction of river runoff and the drying up of the Aral Sea.
http://www.cawater-info.net/library/rus/gwp/iwrm_in_amudarya_book.pdf

During period 1963 - 65 years. a noticeable decline of the Aral Sea water level started, which led to draining of vast territories - both in the north (in the delta of the Syrdarya River in Kazakhstan), but especially in the South Prearalie (in the delta of the Amudarya River). Transformation of all ecosystems began due to changes in water inflow, new hydrogeological processes, changes in soil cover, and creation of deltaic lakes instead of sea bays

In 1968 - 70 years in the Republic of Karakalpakstan, development of new lands area for rice production (about100 thousand hectares) was started, which were mainly concentrated in the northern regions. Due to digression of the Aral Sea and falling groundwater level, reclamation conditions on irrigated areas began to change dramatically.



In this regard, construction of large drain collectors was started - **KKS** (irrigation system zone by the Suenli canal), **KS - 1** (irrigation system zone by the Kegeyli canal), **KS - 3** and **KS -** 4 (irrigation system zone by the Kuvanishzharma canal). The diverted water along these collectors enters, mainly, into the remaining water bodies in the Amudarya delta.

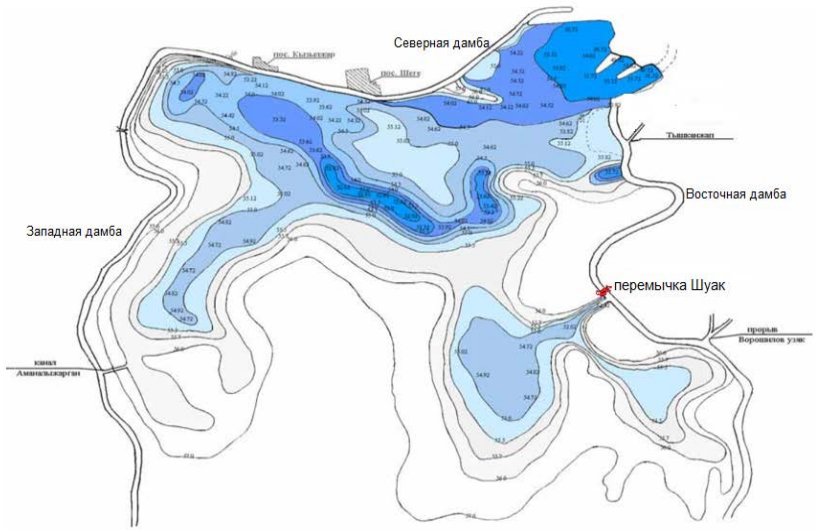


The diagram shows the South Aral Sea zone in 1963

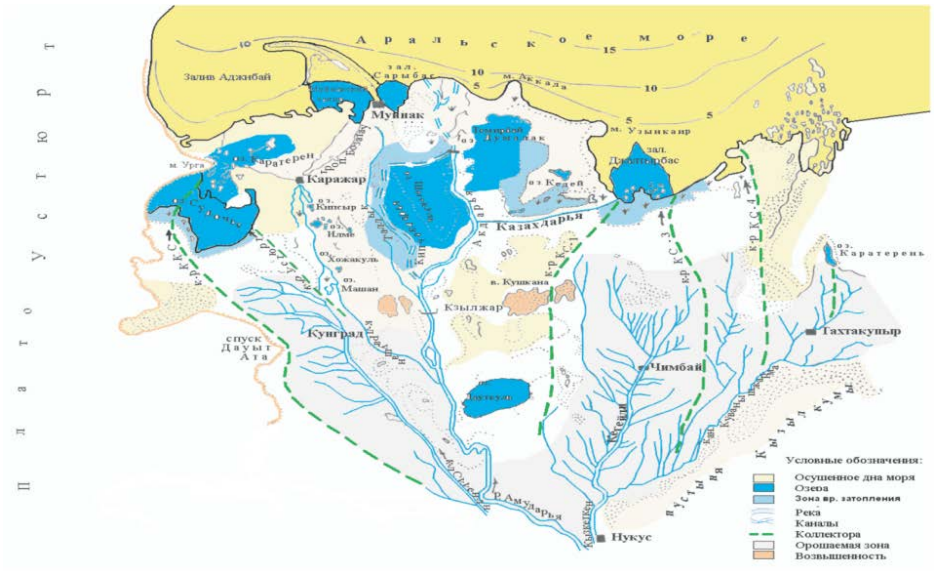
Name of drainage collectors	Water availability, million m^3		
	Wet year	Average year	Dry year
KS – 1	498,1	430,0	93,8
KS – 3	303,1	258,0	89,0
KS – 4	309,1	63,5	15,1
KKS	760,0	410,0	23,4

In 1969-1972, major changes began in central part of the delta, along main channel of the Amu Darya River. Due to decrease in water flow of the river itself, previously active large channels such as Shortanbay, Yerkindarya, Raushan and several others dried out. Only in high-water years (floods) water periodically appeared into these channels. Due to silting of the main left-bank channel Kipchakdarya also dried up. A small flow of water passed along the channel Kazakhdarya (60 m^3/sec.). Large channels Ulkendarya, Taldykdarya, Priemuzyak and others completely dried up. The main volume of water flowed through the right channel of Akdarya and then through Inzheneruzyak and Akkay and entered the Aral Sea zone. As water level in the sea decreased, an erosion process began along bottom of the Akai and Inzheneruzyak channels (in area adjacent to the sea).

At the end of 1970, based on project of the Uzgiprovodkhoz Institute, construction of the Mezhdurechie Reservoir began in center of the Amu Darya delta. The Shuak dam was built on the Akdarya channel, directing water from the Amu Darya along the Kipchak and Akdarya channels to the zone of small lakes Shegekul, Koksu, Koshpelyadin, Baltaketken, Autel, Nogai, Zhidelizyak. The western and northern dams were built along the Kichakdarya channel, and eastern dam was built along the Akdarya channel, **which is how the Mezhdurechie Reservoir construction was started (in 1978).**



As a result of lowering water horizon of the Aral Sea coastline began moving out and draining of the territory increased every year. The former bays of the Aral Sea - Adjibay, Muynak, Sarbas, Zhiltyrbas by 1992 transformed into lakes cut off from the main sea.



The diagram shows the South Aral Sea in 1992
http://www.cawater-info.net/library/rus/gwp/iwrm_in_amudarya_book.pdf

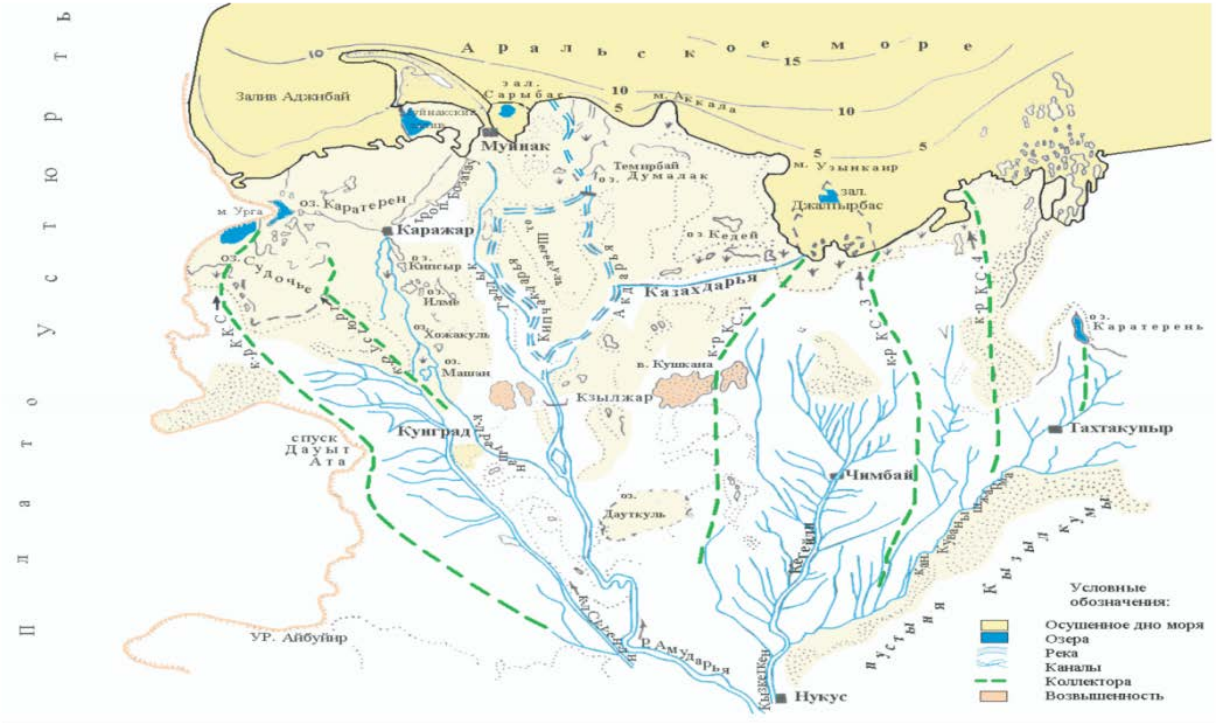
In the most dry year in history (2000-2001) there was a first drought - huge cropping areas in Karakalpakstan were dried out and by the end of 2002 discharge of water below the Takhiatash hydroelectric complex completely stopped. As a result, the Mezhdurechensk reservoir, Zhiltyrbas, Dumalak lake system, etc. were completely empty. Very small part of water remained in deep parts of the Muynak Bay, Rybachye and Sudochie Lakes.

Remote sensing data from space allowed us to estimate the actual change in the area of lakes in different years of that period with different water levels:

- in the average water level year of 1984, the area of lakes was 70.2 km^2
- in the high-water year of 1997, the area of lakes increased to 120.8 km^2
- in the low-water year of 2000, the area of lakes decreased to 26.0 km^2
- in 2001, the area of lakes decreased to 2.0 km^2

It was clear that such instability would not allow for the creation of sustainable water regulation in the delta.

Therefore, it was decided to intensify works on creation of small local reservoirs along coastline of the Aral sea in the Amu Darya delta. Engineering infrastructure on the key remaining reservoirs in the Amu Darya delta - for their stabilization - has been created by IFAS structures in Uzbekistan since 2001 and continued up to present days

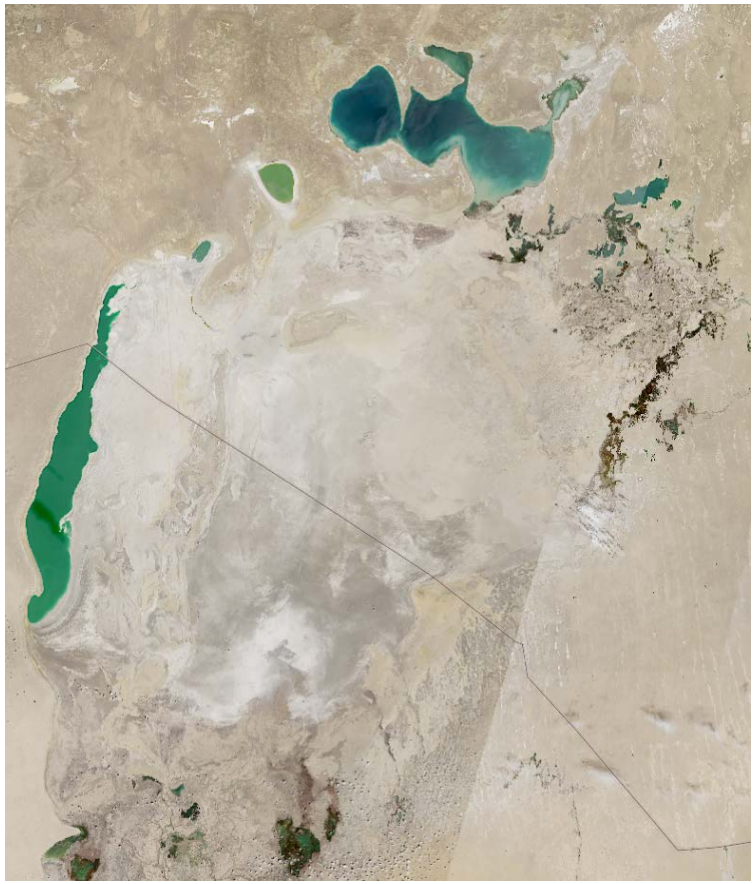


The diagram shows the South Aral Sea in 2002
http://www.cawater-info.net/library/rus/gwp/iwrm_in_amudarya_book.pdf

WHAT is the Aral Sea TODAY (2024)

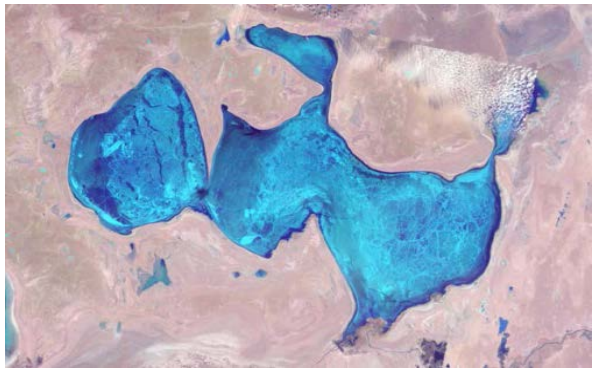
the Aral Sea as seen on **5 May 2024**,
captured by a Copernicus Sentinel-2 L2A satellite





Today, water surface area of remains of the Aral Sea is less than 10% of the 1960 level. The rest is distributed between few water bodies: Western Sea; Eastern (Central) Sea; Small (Northern) Aral and some lakes in deltas of the Amudarya and Syrdarya rivers.

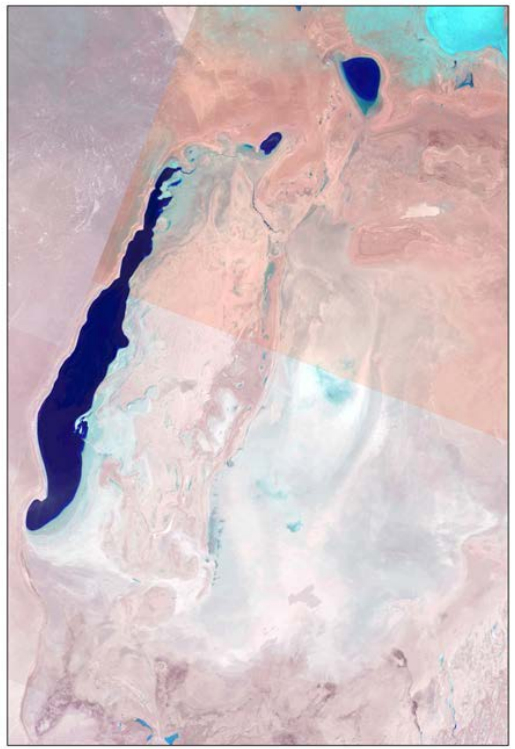
Основы мониторинга динамики изменения площади водной поверхности и ветландов Аральского моря и Приаралья (НИЦ МКВК) http://cawater-info.net/aral/data/monitoring_amu.htm



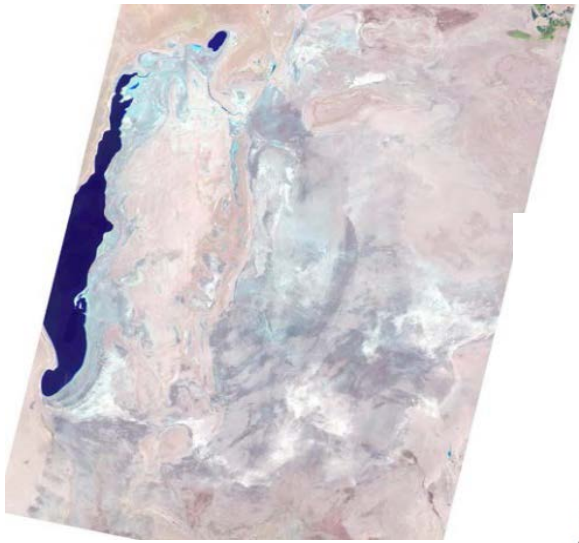
Малый Арал, на основе снимка Landsat-8. 25 марта 2024



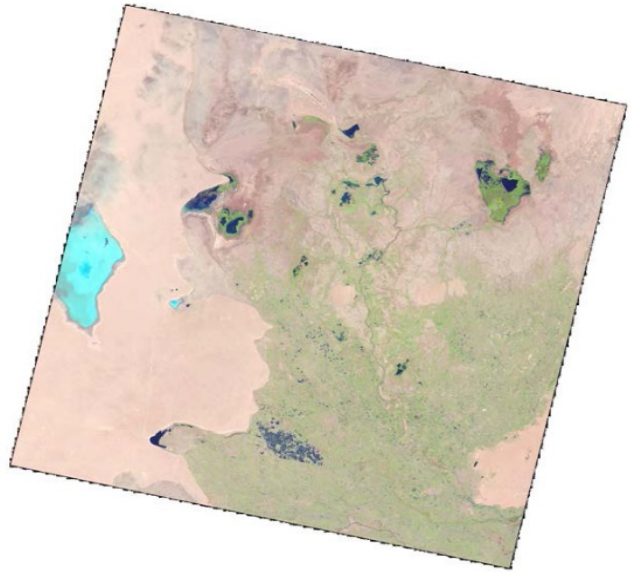
Малый Арал, на основе снимка Landsat-8. 6 июня 2024



Западное и Восточное Аральское море, на основе снимка Landsat 8. 1 марта 2024



Западное и Восточное Аральское море, на основе снимка Landsat 8. 6 июня 2024



Дельта реки Амударьи На основе снимка Landsat 8. 6 июня 2024

Parameters of the key remaining Water Bodies in the South of Aral Sea

http://www.cawater-info.net/aral/data/monitoring_amu

Date	Western Aral	Eastern Aral	System of the Sudochie lakes	Lake Rybachie	Lake Muynak	System of the Dzyltyrbas lakes
Water surface area, hectares						
November 2011	Not visible	Not visible	10948,9	3082,6	**3587,9**	**7682, 3**
October 2012	**369659,2**	215986,1	12002	**5231,8**	1161,9	4646,8
October 2013	361979	139963	10327,3	2673	1014	5920
November 2014	324003	96829	9183,4	1046,7	111,4	5509,8
October 2015	300707	313037	14645,5	3794,3	1698,9	7503,1
September 2016	291583	125457	**21987,3**	3137,2	1272,5	6247,3
October 2017	270788	**251351**	17466	3588,5	1018,4	6582,9
November 2018	268399,2	128291	9860	2740,6	395	5567
June 2019	264967	34965	12977	2332,9	295,5	5233,1
July 2020	255799	166507	14672,1	2601,2	606,2	5731,7
October 2020	253406	54962	12276,3	2186,2	431,3	6332,9
April 2021	291875	78369	13411	2383,7	602,5	6021,1
August 2021	241290	31469	9634,9	1263,3	151,3	5570
September 2021	235023	18113	8822	140	108	5125
6 October 2022	211800	Not visible	4325	0,18	5,31	213
18 January 2023	209 733	364	6906	1574	2754	451
26 May 2023	210294	2588	9473	1871	129	5300
13 July 2023	208318	406	3101	531	16	890
17 October 2023	200885	15	4981	0	12	2324,4
18 April 2024	199234	15	15293	1996	1382	**14247**
6 June 2024	199079	47	9521	1735	168	5522
3 октября 2024	Not visible	Not visible	5490	656	33	3289
Water Level (Baltic system, m) for West Aral data from Hydromet station Aktumsuk (45,0809,8; 58,1732,4)						
2011 (31 May)	27,74	27,8				
2021 (31 May)	21,13	N/A	51,06	50,62	50,77	50,83
2022 (31 December) Delta Dept	19,57 (29.12.22)	N/A	49,85	49,0	49,9	47,8
2023 (30 June) Delta Dept	19,26	N/A	49,85	49,61	49,9	47,8
2024 (25 December) Delta dep	18.59	N/A	49,85	49,0	49,9	50,82
Mineralization (2021), G/L	180	60,0	7,5	10,0	10,0	15,0

As seen from this table, conditions of remaining water bodies in the Southern Aral Sea region are very unstable - due to not stable inflow of water into this zone

On August 20-21, 2019, President of the Republic of Uzbekistan Shavkat Mirziyoyev visited the Republic of Karakalpakstan to get acquainted with progress of on-going reforms

Upon arrival in the Muynak district, President got acquainted with work being done to create small reservoirs in the Amu Darya River delta. Having positively assessed progress of the work, President gave instructions to work out issues of stable water supply for this zone through the Amu Darya River and drainage collectors. Also to give an assessment - how much water and where we need to stabilize ecosystems.



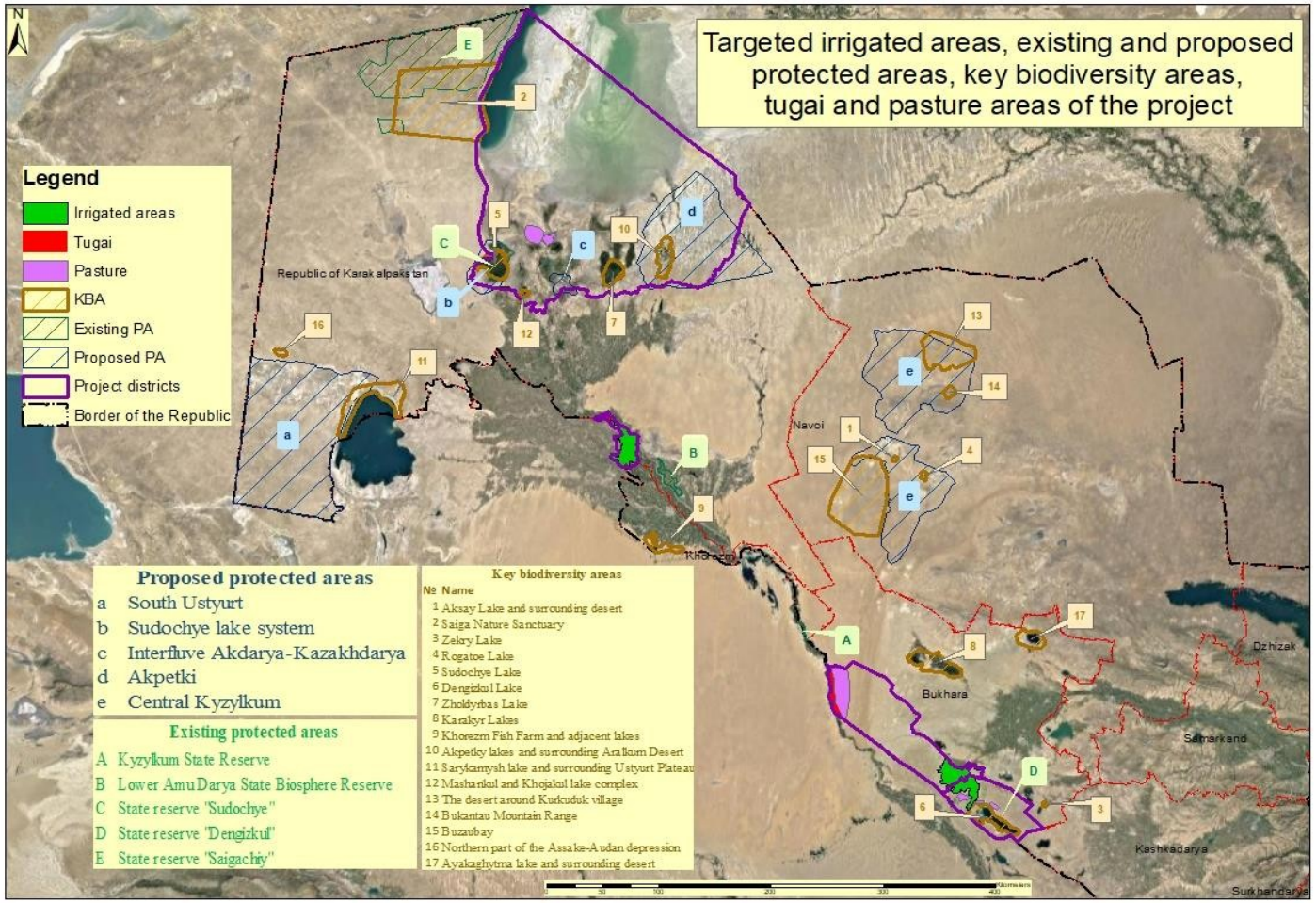


UNDP Office in Uzbekistan has started implementing the project with support from GEF grant "Conservation and sustainable management of lakes, wetlands, and riparian corridors as pillars of a resilient and land degradation neutral Aral basin landscape supporting sustainable livelihoods" (Aral – Wetlands)

The objective of the project is to increase sustainability of ecosystems in the Lower Amu Darya of the Aral Sea Basin (LABAM) through integrated land and water management compatible with land degradation neutrality (LDN). That is, to ensure sustainability of productive landscapes around protected natural areas and key biodiversity areas - water bodies and wetlands

Component 1 of this project. Coordinated water management as a basis for neutral land degradation and ecosystem conservation

Here the goals are practical implementation of ecologically and scientifically sound norms and timing of irrigation (and leaching) for key irrigated areas (Bukhara, Khorezm regions and Karakalpakstan) is expected, as well as determining the volumes and ensuring supply of water for key biodiversity zones

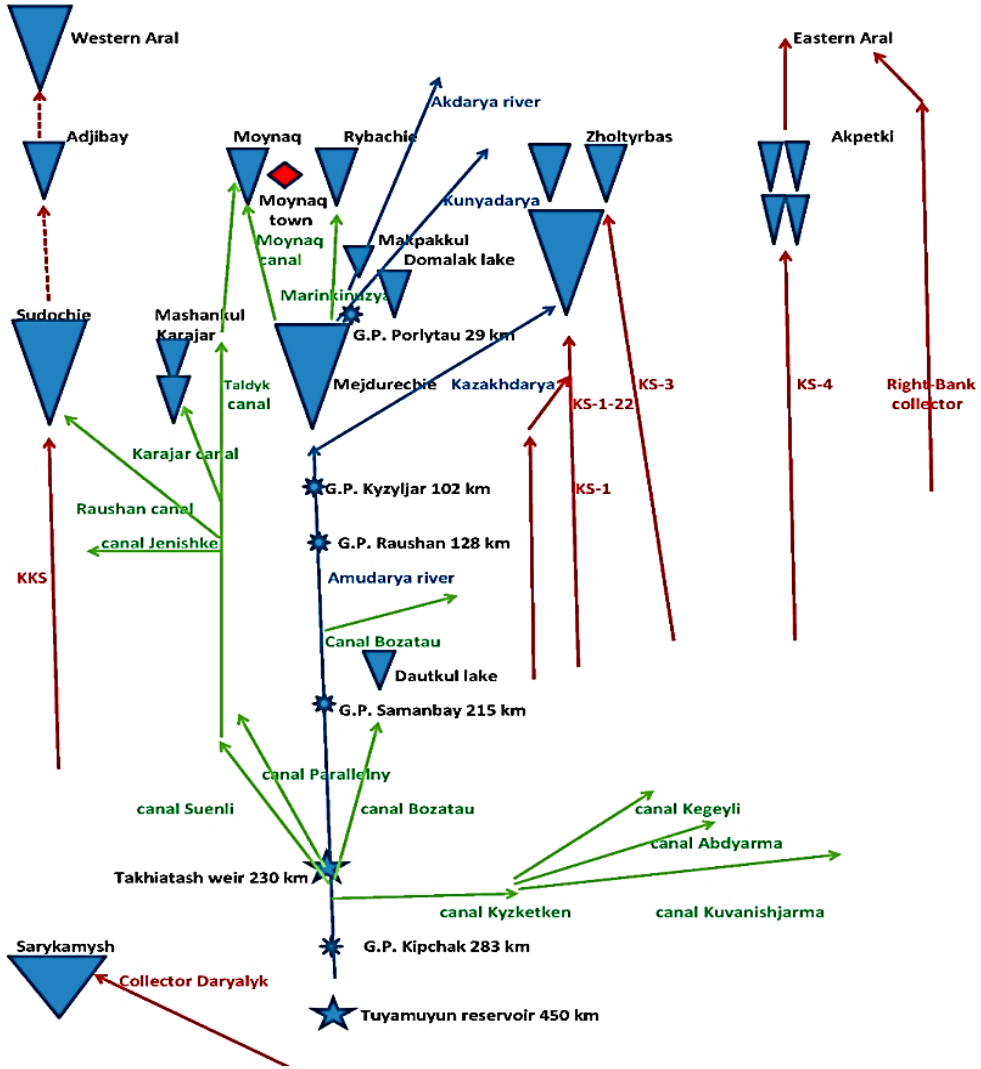


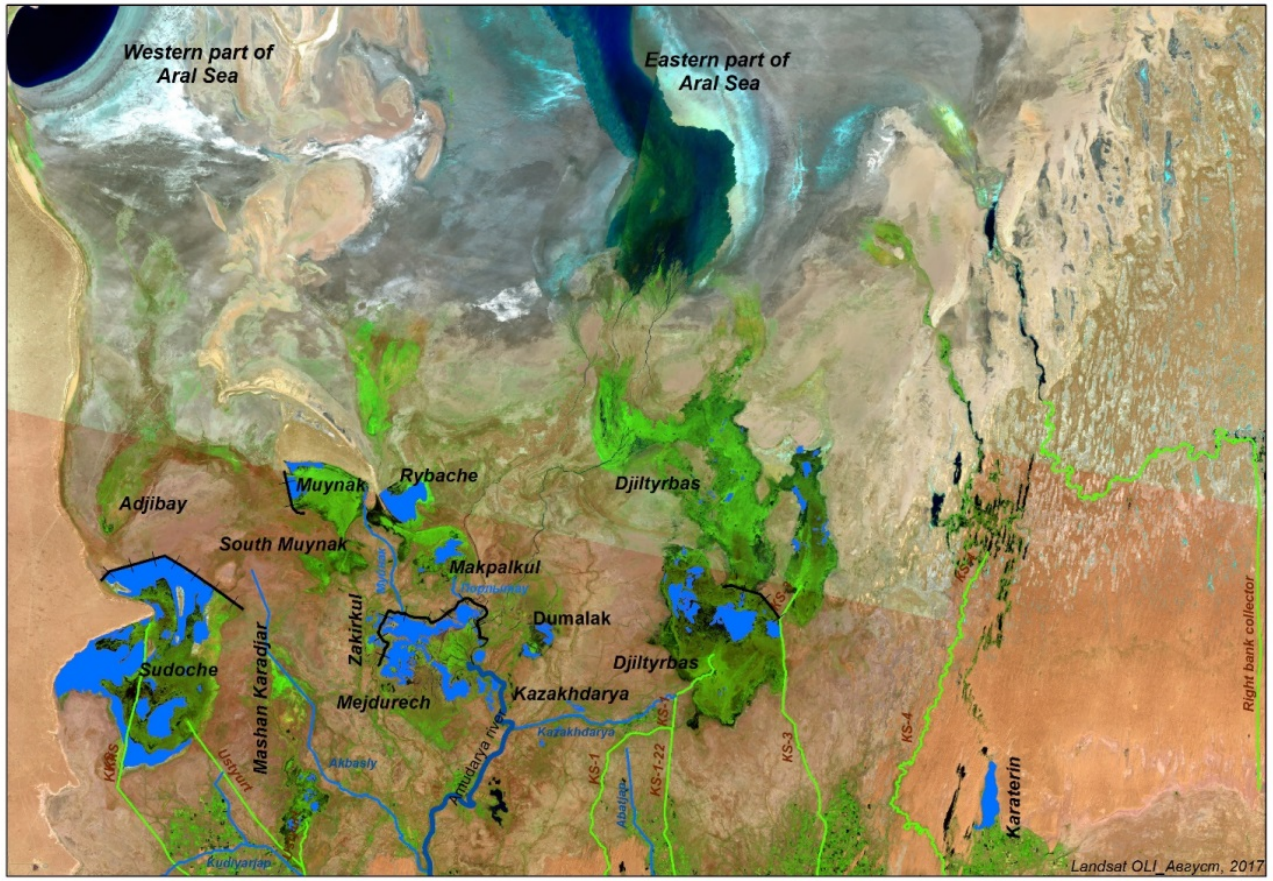
Assessment of real water demand for a stable conditions of water bodies in the Southern Aral Sea region

Name of Water Body	Water level (The Baltic Sea level system), m	Area of bio-diversity zones, km^2	Volume of water, million m^3	Water supply source	Required water inflow (preliminary assessment) (million m^3 per year)
West Aral, Lake Sarykamysh and surrounding Ustyurt Plateau area					
West Aral and the adjacent Ustyurt plateau	19,4	5110 (including water surface 2083)	43600	Ground water inflow from the Ustyurt plateau, in high water years discharge from the Small (Northern Aral) via Uzun-Aral channel	2000 -3500
Lake Sarykamysh and adjacent plateau Ustyurt	8,0	959,7	70000	Collector-drainage water from irrigated systems of Khorezm and Dashoguz along collectors Daryalyk and Ozerny	2000 - 2500
Amudarya River Delta					
Left-bank (western) zone					
Wetland system of Lake Sudoch'e	52,5	464,7	884	Raushan canal system, drainage collectors KKS and GK	600 - 800
Complex of Mashankul-Karajar lakes	53,0	50,7	440	Karajar and Taldyk canals from Raushan canal	500 - 600
Central zone (Amudarya delta)					
Mezhdurechenskoye water reservoir	57,0	320	420	Amudarya River	1000 - 1500
Lake Rybachie	51,0	64,0	136	Marinkinuzyak canal from Mezhdurechensky reservoir	200 - 250
Lake Muynak	51,6	97,4	163	Muynak canal (Glavmyaso) from Mezhdurechensky reservoir and Taldyk canal (Kungrad-Munak)	250 - 300
Lake Makpalkol	53,0	12,0	63,0	Marinkinuzyak canal from Mezhdurechensky reservoir	100 - 150
Right-bank (eastern) zone					
Dzhiltyrbas Lake (including left and right ducts)	52,0	297,2	477	Channel of the Kazakhdarya, drainage collectors KS-1, KS-1.22, KS-3	750 - 850
System of Lakes Akpetki	53,0	391,5	100	Drainage collector KS-4 and channel of Kokdarya	200 - 300
Total in the Amudarya Delta					**3600-4750**
Total in Sothern Aral Sea region		**1740,4**	**2730,8**		**7600-10750**

TOTAL WATER INFLOW to the Southern ARAL SEA ZONE

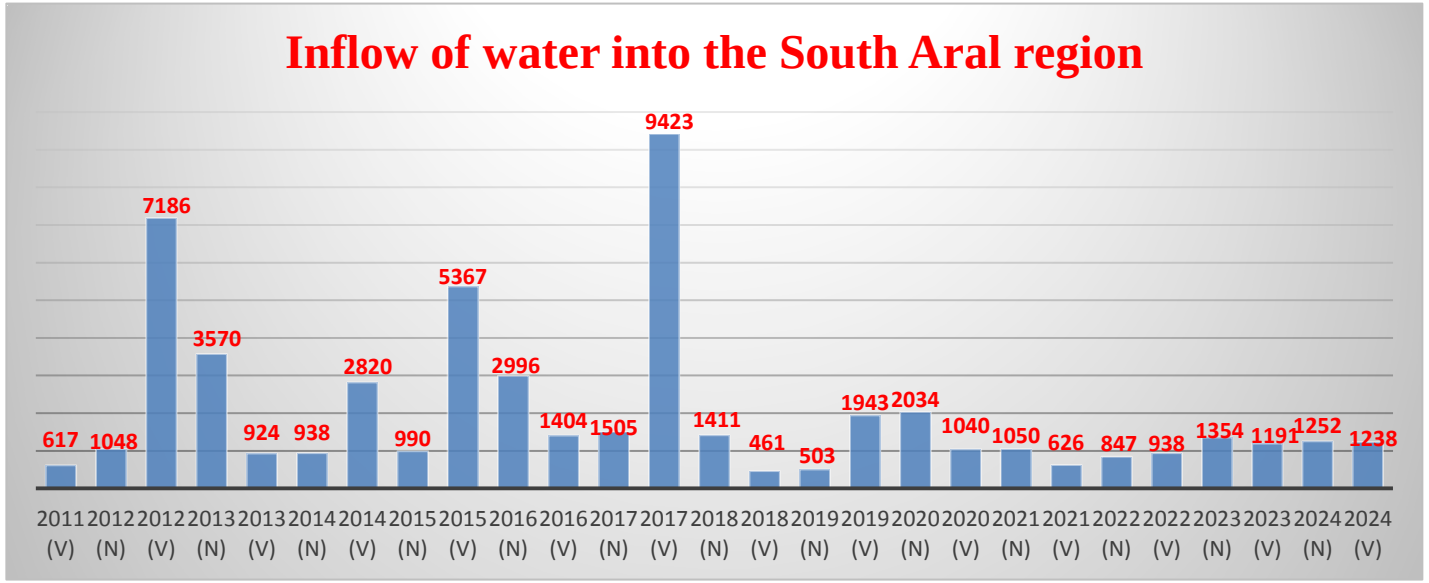
Includes the sum of the flow along the Amudarya river below Takhiatash, water intakes to the Suenli, Parallel and Kyzketken canals, flow through drainage collectors KKS (to Sudochye), KS-1, KS-1-22, KS-3 (to Dzhiltyrbas), KS-4 (to Akpetki, Eastern Sea) and Right-Bank collector to the Eastern Aral





Inflow of water into the South Aral region http://www.cawater-info.net/aral/data/index

Time period (hydrological year)	Total inflow Million m³
April - September 2011 (V)	617
October 2011 – March 2012 (N)	1048
April - September 2012 (V)	7186
October 2012 - March 2013 (N)	3570
April - September 2013 (V)	924
October 2013 - March 2014 (N)	938
April - September 2014 (V)	2820
October 2014 - March 2015 (N)	990
April - September 2015 (V)	5367
October 2015 - March 2016 (N)	2996
April - September 2016 (V)	1404
October 2016 - March 2017 (N)	1505
April - September 2017 (V)	9423
October 2017 - March 2018 (N)	1411
April - September 2018 (V)	461
October 2018 - March 2019 (N)	503
April - September 2019 (V)	1943
October 2019 - March 2020 (N)	2034
April –September 2020 (V)	1040
October 2020- March 2021 (N)	1050
April 2021 –August 2021 (V)	538
October 2021- March 2022 (N)	847
April – September 2022 (V)	938
October 2022 – March 2023 (N)	1354
April – September 2023 (V)	1191
October 2023 – March 2024 (N)	1252
April – September 2024 (V)	1238

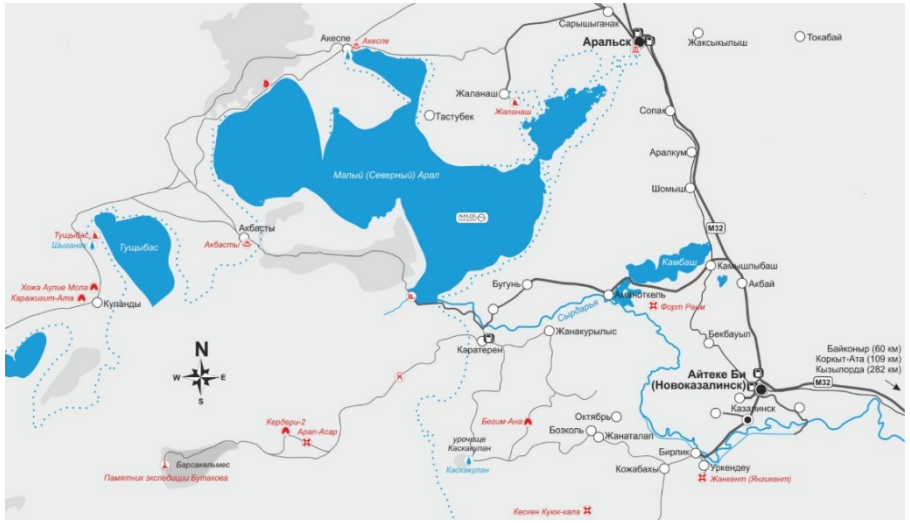


The total inflow of water into the South Aral Sea region for period 2011-2024 (12 hydrological years) amounted to 53.971 km³ or an average of 4.15 km³ per year. For individual years, the value varies from 0.96 km³ per year (2018-19) and 1.38 km³ per year (2021-22) to 10.75 km³ per year (2012-13) and 10.83 km³ per year (2017-18).

Such a large variation in annual inflow negatively affects hydrological stability of water bodies, which leads to destruction of ecology in the zone of individual water bodies, and violation of biodiversity.

Therefore, fish, fauna and flora of these water bodies are unstable due to instability of water-salt regime, which is formed without any control, under influence of random factors.

Unfortunately, still there is no regular, systematic, instrumental monitoring of both remaining water bodies of the former Aral Sea and entire zone of dried sea bottom.



Inflow into the Northern Aral

Hydropost Karateren (inflow to the North Aral Sea)
http://www.cawater-info.net/aral/data/syr_water_delivery_aral_nonveg.htm

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Non-vegetation	Vegetation	Year
	Water discharge m3/sec												Flow, Million m3		
2000-2001	20	139	252	240	190	210	264	66	12	5	5	10	2754	946	3700
2001-2002	27	68	247	210	98	109	261	265	213	161	205	272	1998	3623	5621
2002-2003	274	228	238	290	320	300	367	324	194	171	192	285	4317	4035	8352
2003-2004	307	366	376	400	380	477	486	514	181	158	151	179	6047	4398	10445
2004-2005	216	280	509	430	380	510	485	434	147	48	118	323	6106	4083	10189
2005-2006	355	418	420	360	370	450	550	291	66	23	41	136	6223	2899	9122
2006-2007	148	238	400	250	270	330	343	325	63	22	106	129	4292	2597	6889
2007-2008	268	300	297	300	300	373	290	154	33	9	5	6	4821	1303	6124
2008-2009	15	18	37	130	145	163	130	160	109	60	97	326	1321	2313	3634
2009-2010	293	114	125	196	241	300	335	301	281	306	198	267	3328	4443	7771
2010-2011	308	319	356	357	320	309	219	124	54	25	19	19	5162	1205	6368
2011-2012	33	97	133	182	301	238	323	142	54	21	96	155	2550	2074	4624
2012-2013	130	103	153	196	267	301	247	91	41	23	20	84	3003	1325	4328
2013-2014	64	116	220	220	220	291	206	138	59	78	79	154	2963	1875	4837
2014-2015	118	110	216	332	316	345	178	100	46	21	30	95	3757	1232	4988
2015-2016	51	132	298	358	265	170	77	47	53	79	70	246	3352	1500	4853
2016-2017	139	161	240	288	270	274	394	363	261	217	227	215	3591	4416	8007
2017-2018	216	420	353	284	241	259	220	76	34	11	15	86	4649	1150	5799
2018-2019	63	150	226	260	283	156	89	107	21	16	75	100	2960	1077	4037
2019-2020	78	67	165	200	161	71	134	113	70	75	26	66	1952	484	2436
2020-2021	49	70	107	158	150	170	134	116	11	23	17	20	704	321	1025
2021-2022	17	23	33	38	47	44	130	128	44	50	70	0	202	422	624
2022-2023	22	105	183	308	350	570	300	60	26	20	11	17	1538	434	1972
2023-2024	40	125	160	310	256	273	158	44	72	223	276	201	1164	974	2138

The territory of the former port in the city of Aralsk. Here from the south - from Uzbekistan, ships brought cotton, which was further exported by railway to Russia







(photo by V Sokolov in May2021)

Small Aral Sea - view from the Kokaral dam on May 19, 2018 (photo by V. Sokolov)



The structure on the Kokaral dam - view from the upper stream on May 19, 2018



Analysis of a water sample on May 24, 2021 showed a total salinity of 4.184 g / L

Down stream from the Kokaral dam May 19, 2018



Down stream from the Kokaral dam May 24, 2021





All shandors in the outlets are put down - to keep the level in the small Aral - there is no water release to the south

Fish factory in the city of Aralsk (photo by V. Sokolov May 2018)

Now from the city of Aralsk to the North Sea distance is about 17 km. The sea returns. People who once left are returning back. Now there are 23 species of fish in the Aral Sea and delta lakes. New jobs created



Members of the IFAS expedition with Chief Master of the Fish Factory Kulmariyam Kemalova (May 2018)



Fresh fish, cut and ready for processing
The factory processed more than 6 thousand tons of fish per year



Fresh fish cutting workshop



Final product - frozen pike perch fillet. Two thousand tons of products are delivered annually to Western Europe

Sunset on Lake Tushchybas (Kazakhstan) May 19, 2018 (photo by V. Sokolov)



Akbasty village 2018 (Kazkahstan)



Remains of a landing ship at the bottom of the Aral Sea (Kazakhstan)



Salt marsh at the bottom of the Aral Sea near Lake Tushchybas



The village of Akespe near Butakov Bay – impacted by moving sands

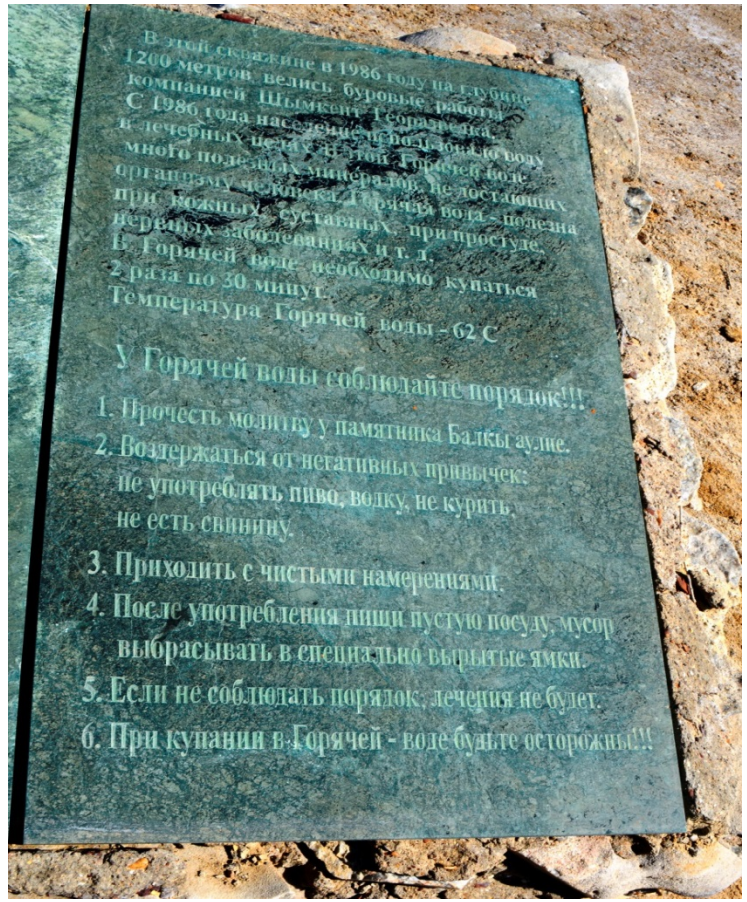


Artesian well on the former bottom of the Aral Sea (Kazakhstan)



Self-flowing well near village of Akespe





Instructions for bathing in well water.
Water temperature 62 degrees C

Butakov Bay (part of the Northern Aral - on May 22, 2018

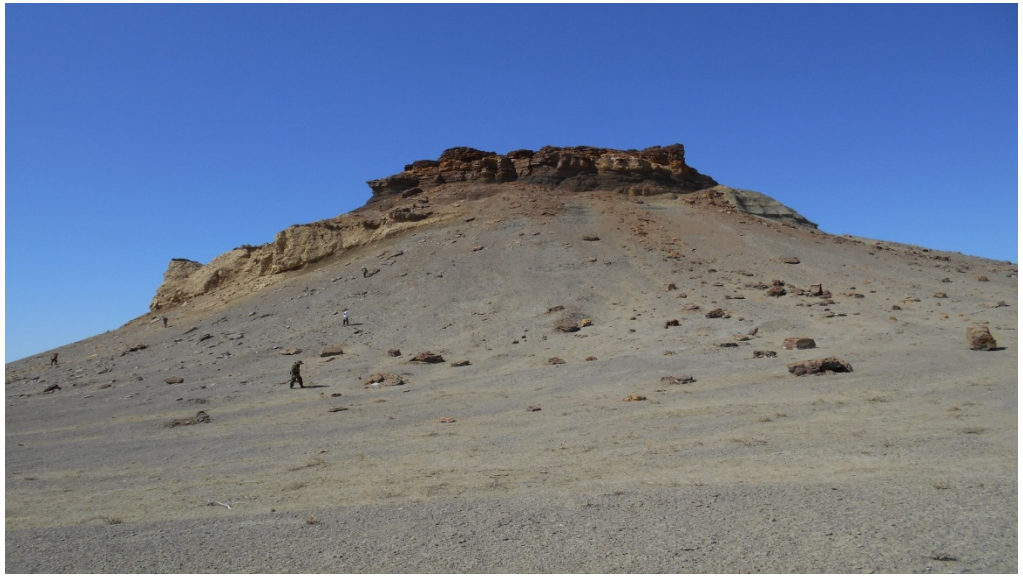


Traces of prehistoric creatures can be found on the Northern Chink of Ustyurt near Butakov Bay

In prehistoric times, there was a single Aral-Caspian-Balkhash water system, connecting with the Arctic Ocean. Evidence of this - fossilized sea shells, and shark teeth







Western Sea - view from the Ustyurt plateau and to the Ustyurt plateau (Uzbekistan)





Views of the Western Aral Sea









Southern coastal zone of the Western Aral - annually retreats to the north at a speed of 0.5 km
Photo by Sokolov in November 2018



Uzbekneftegaz settlement on the dried seabed in the area of Surgil (about 45 km from the city of Muynak)



Saxaul bushes at the bottom of the sea in the Surgul region (photo by Sokolov November 2018)



Dirt road on the drained seabed - about 85 km from the city of Muynak towards the western Aral



Self-flowing well on the dried seabed - about 30 km from the Uzbekneftegaz settlement on Surgul towards the chink of Ustyurt (photo June 6, 2021)



The ship cemetery in the city of Muynak is a symbol of the lost Aral Sea



Thank you for attention!
We are looking for productive cooperation





Savitsky Museum in Nukus:
The Art that Makes Us Better



«Viam supervadet vadens cunctim»

Walk together and you shall reach

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