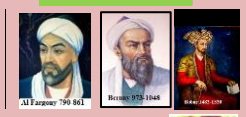
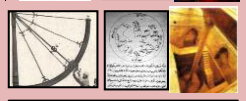
UZBEKISTAN

HISTORY

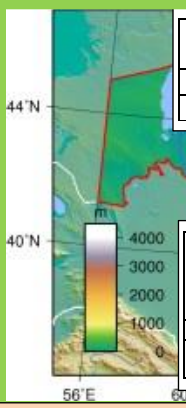




Location: The Royal Geographic Society(mr.Asis Div.464) and in the British Library(Maps, King Topographical Collection,114,53.4). London, 1772

Irrigation, melioration, mapping and positioning.

Capital: **Tashkent**
Area: **448 900 sq.km**
Population**32500000 people**
Density: **72.5 people/sq.km**



Rivers	Length, km	Catchment area,km^2
Amudarya	1415	230900
Syrdarya	2212	219000

Territory	Number of a measurement stations			
	1975	1985	1995	2005
Uzbekistan	145	155	119	130
Central Asia	455	559	399	277

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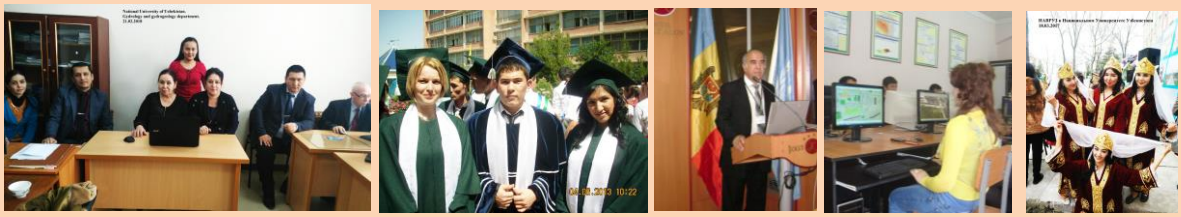


Some recommendations for monitoring the level of the Syrdarya and Amudarya rivers based on the GNSS

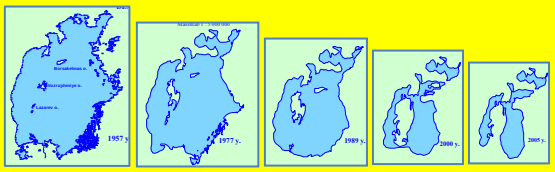
Mirmakhmudov E., Adenbaev B., Turgunov D

The main sources of the water resource are the Amudarya and Syrdarya river basins. Reserves of the Syrdarya and Amudarya rivers have an important role for irrigation and land reclamation in Uzbekistan. More than 90% of the sources of Central Asia's water resources are concentrated in Kyrgyzstan and Tajikistan. Uzbekistan accounts for more than half of the consumed water resources. Since the 1960s, the Aral sea level (and the volume of water in it) is rapidly declining due to the withdrawal of water from the main feeding rivers of the Amudarya and the Syrdarya. The drying Aral Sea is 100 km from its former coastline near the city of Muynak in Uzbekistan. The level of the Aral Sea has decreased by 25 meters in the last 50 years. In 1980 the water level fell so much that the whole sea was divided into two parts: the northern Small Aral and the southern Great Aral. For the last 5 years the area of irrigated land in the Central Asian region increased by 7%. Indicator of water balance in Central Asia is the Aral sea level fluctuation. The deepest point of the Aral Sea is 29.6 meters. In 2006 the Aral sea depth amounts to 8 meters. From 1960 to the present, classical measurements of the water level of the rivers are conducted, where 10 water stations of the 1st and 3rd class are installed.

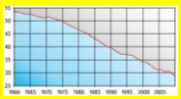
Using of space technologies is more efficient and mobile. Therefore, it is proposed to use space technologies such as space imagery, remote sensing GOSE, GPS, DORIS and DRONS. Knowing of variability laws and long-term fluctuations of river flow leads to an adjustment of hydraulic structures construction. Values of the variation coefficients of the water flow for the Amudarya and Syrdarya rivers were calculated for the interval 1950-1995. Root mean square error of the variation coefficient (σ_{cv}) for the studied rivers amounted is ±0.029. The Aral sea level measurement with the use of satellite technologies have allowed to reveal the short-term variations runoff of the investigated rivers.

In the future, it is necessary to install permanent GPS stations near the classical level stations to monitor the processes of changing terrain and water balance in real time. This will allow us to analyze the dynamics of water balance in the Aral Sea. The combination of classical and modern methods of measurement variability of river flow will give a more correct of the Aral sea level.

Aral sea



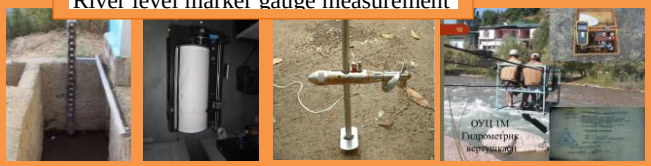
Change of Aral sea level

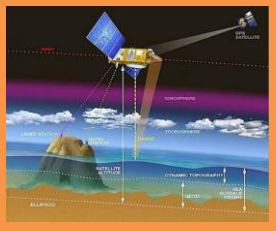


Comparative table of decrease in indicators by years

Indicators	1960	1990	2003	2004	2007	2008	2009	2010
Water level, m	53,4	38,24	31,0	30.9	30.2	30.0	29.0	27.5
Volume, km^3	1083	323	112,8	103,4	75	55	30	20
Area, thousand.km^2	68,9	36,8	18,24	17,2	14, 2	10,6	11,8	13,9
Mineralization, ‰	9,9	29	78,0	86,4	95,5	97,6	102	106
Effluent, km^3/y	63	12,5	3,2	3,0	2,5	2,0	1,3	0,9

River level marker gauge measurement





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Amudarya and Syrdarya rivers

4th United Nations/Pakistan/Prince Sultan Bin Abdulaziz International Prize for Water International Conference on the Use Space Technology for Water Management, 26 February-2 March 2018, Islamabad, Pakistan