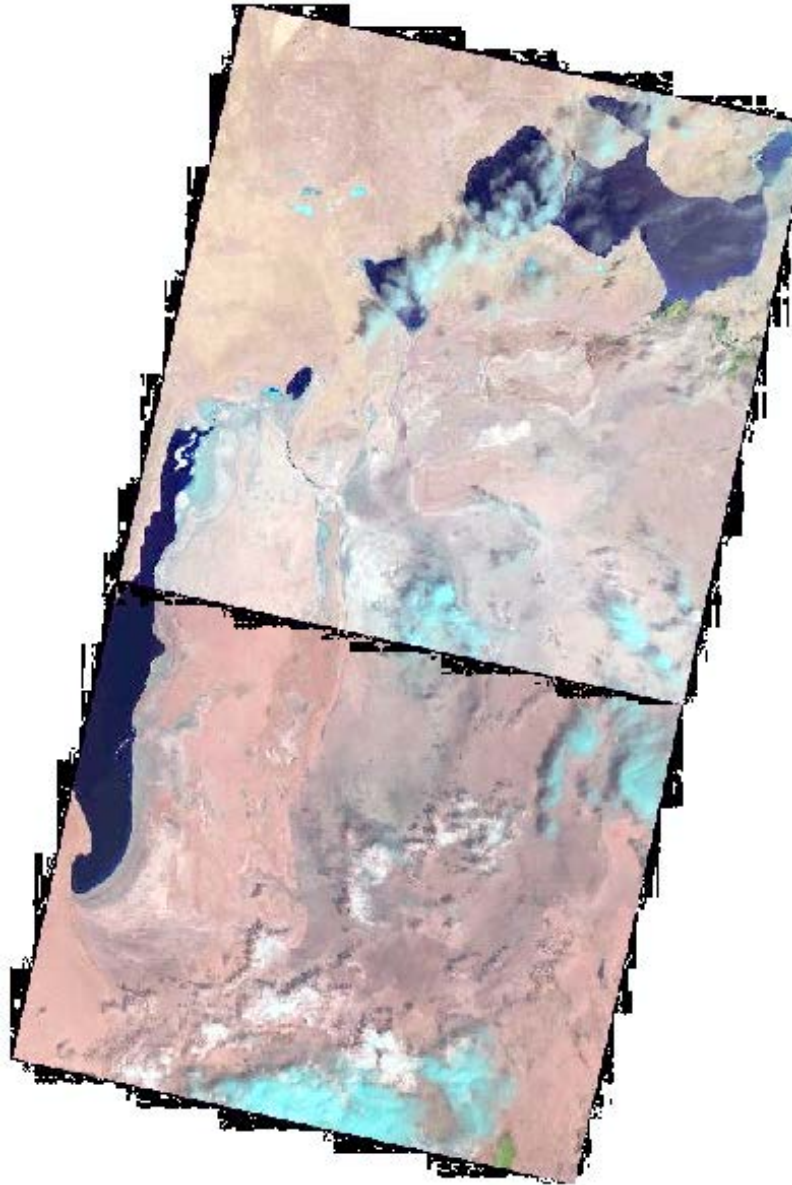


Monitoring of changes in the water surface and wetland area of the Aral Sea and the Aral Region

SIC specialists are constantly monitoring the state of the Southern Aral Sea and parts of the Greater Aral Sea by using the Landsat 8 OLI images. According to the image from June 08, 24, 2022, the areas of wetlands and open water surface were determined



**Figure 1. Western and Eastern parts of the Aral Sea.
Landsat 8, 8 June 2022.**

Table 1

The area of wetlands, open water surfaces and dried ground* in the Western and Eastern parts of the Aral Sea

	29.04.2022	23.05.2022	08.06.2022
<i>Western part of the Aral Sea, ha</i>			
Wetland	284 687	5877	15 446
Water surface	220 020	219 193	218 914
Dried ground*	56 642	342 097	326 990
<i>Eastern part of the Aral Sea, ha</i>			
Wetland	1 292 357	Clouds	Clouds
Water surface	1 624		
Dried ground *	202 841		
	April	May	June
Water quota	180	336	391
Inflow to the Aral Region, Mm ³ /month	188	189	162

* bare soil, dense or rare vegetation

Table 2**Areas of wetlands in the Aral Region, ha**

Water body	16.02.2022	20.03.2022	29.04.2022	23.05.2022	24.06.2022
Sudoche	29295.81	24279.57	2105.35	228.69	17801.2
Mejdureche	8374.41	4637.79	2768.67	30	330.9
Rybache	2129.85	802.98	509.04	0.81	631.3
Muynak	3211.65	2732.76	1514.34	3.15	101.6
Djiltyrbas dam-terminated	13575.15	11424.78	7184.43	42659.3	6048.45
Djiltyrbas (together with former right and left streams)	30675.15	20224.26	1715.4	98856.77	0
Dumalak	5032.62	2980.62	2012.31	0	64.44
Makpalkul	1429.38	1512.18	1157.13	34.65	188.82
Mashan Karadjar	4807.62	3557.16	1988.19	17.37	498.9
Water surface southward of Muynak	2463.21	419.58	301.86	9605	48.42
Water surface along Kazakhdarya river channel	0	522.27	192.69	4751.5	0
Zakirkol	274.14	133.2	36.09	2790.04	0
Total:	101 268.99	73 227.15	21 485.5	158 977.3	25 714.03



Figure 2 The Aral Region. Landsat 8, 24 June 2022.

Table 3

**The area of open water surface
in the Aral region, ha**

Water body	16.02.2022	20.03.2022	29.04.2021	23.05.2022	24.06.2022
Sudoche	8651.61	9182.07	9580.95	9009.99	6374.5
Mejdureche	3597.93	2824.47	1788.48	1389	898.9
Rybatche	902.88	1007	789.48	628.92	44.19
Muynak	323.46	259.02	36.27	23.76	7.2
Djiltyrbas dam-terminated	7341.39	7739.01	5948.1	4813.02	1617.9
Djiltyrbas (together with former right and left streams)	65.97	149.22	196.29	94.23	0
Dumalak	22.32	0.99	0.09	0	0
Makpalkul	2195.37	1575.81	815.13	401.58	0
Mashan Karadjar	307.98	293.94	181.17	33.57	0.36
Water surface southward of Muynak	0.54	0	0.09	0	0
Water surface along Kazakhdarya river channel	0	0	0	0	0
Zakirkol	208.53	179.1	57.78	1.26	0
Total	23 617.98	23 210.63	19393.83	16 395.33	8 943.05

Table 4**Dried ground area* in the Aral Region, ha**

Water body	16.02.2022	20.03.2022	29.04.2022	23.05.2022	24.06.2022
Sudoche	34749.58	39235.36	61010.7	63458.32	48521.3
Mejdureche	25811.66	30321.74	33226.85	36365	36554.2
Rybatche	8460.27	9683.02	10194.48	10863.27	10817.51
Muynak	12628.89	13172.22	14613.39	16137.09	16055.2
Djiltyrbas dam-terminated	26555.85	28308.60	34339.86	401.58	39806.04
Djiltyrbas (together with former right and left streams)	68209.88	78577.52	97039.31	5.76	98951
Dumalak	10995.06	13068.39	14037.6	16050	15985.56
Makpalkul	5059.25	5596.01	6711.74	8247.77	8495.18
Mashan Karadjar	22085.4	23349.9	25031.64	27150.06	26701.74
Water surface southward of Muynak	7141.25	9185.42	9303.05	0	9556.58
Water surface along Kazakhdarya river channel	4751.5	4229.23	4558.81	0	4751.5
Zakirkol	2308.63	2479	2697.43	0.81	2791.3
Total	228 757.22	257 206.41	312 764.8	178 679.6	318 987.1

* bare soil, dense or rare vegetation

Notes: From 2012 to 2019, to determine the area of the water surface and wetlands, satellite image data were digitized manually with a comparison of the NDVI index (Normalized Difference Vegetation Index/ Standardized Index of differences in vegetation Cover). Since 2019 SIC ICWC has started using the methodology of water surface and wetlands recognition based on a controlled AWEI pixel value classification (Automated Water Extraction Index). At the beginning of 2022, it was decided to return to the use of the NDVI index, but according to the specified threshold values. The main provisions of past and new approaches are presented below so that users can correctly interpret and compare data from different years.

Until 2022, the total area of the reservoir was defined as the sum of the area of open water surface and the area of wetlands. However, the question of the exact division of the wetlands area in order to distinguish it from the land (dry, degraded lands) remained open. Therefore, since 2022, the use of the NDVI index with refined threshold values has been started, which allow recognizing three categories of surfaces: 1) open water surface, 2) wetlands, 3) land. Their descriptions and threshold values for the NDVI index are given in the table below. In order to further classify water bodies based on the results of

the study, NDVI thresholds were selected: < -0.001 for open water, $-0.001-0.05$ for wetland and > 0.05 for other Earth surface coverings. Currently, the materials (2021 and 2022) on the site have been updated according to an improved methodology. In this regard, there may be some discrepancies when compared with data from previous years.

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