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

SIC ICWC made monitoring of changes in the Aral Sea and the Aral Region by using the Landsat 8 OLI images. The images got on 16 February 2022 on the Western and Eastern parts of the Aral Sea allowed having wetland and open water surface areas.

Figure 2 The Aral Region. Landsat 8, 16 February 2022. Clouds 2.6%

Table 1

The area of wetlands, open water surfaces and dried ground* in the Aral Region, ha

Water body	Water surface	Wetlands	Dried ground
Sudoche	8651.61	29295.81	34749.58
Mejdureche	3597.93	8374.41	25811.66
Rybache	902.88	2129.85	8460.27
Muynak	323.46	3211.65	12628.89
Djiltyrbas dam-terminated	7341.39	13575.15	26555.85493
Djiltyrbas (together with former right and left streams)	65.97	30675.15	68209.88
Dumalak	22.32	5032.62	10995.06
Makpalkul	2195.37	1429.38	5059.25
Mashan Karadjar	307.98	4807.62	22085.4
Water surface southward of Muynak	0.54	2463.21	7141.25
Water surface along Kazakhdarya river channel	0	0	4751.5
Zakirkol	208.53	274.14	2308.63
Total	**23 617.98**	**101 268.99**	**228 757.22**

* bare soil, dense or rare vegetation

Since 2019, SIC ICWC has been using a new methodology for detection of water surfaces and wetlands through the controlled classification (Automated Water Extraction Index, AWEI).

The boundaries of water bodies and wetlands (i.e. Sudoche lake system, Mejdureche reservoir, Makpalkul, Djiltyrbas reservoirs, etc.) digitized manually in 2016 were used as a 'conditional design' boundaries for statistics on the total open water surface and wetland area of these water bodies (i.e. total water body area = open water area + wetland area).

Such a method minimizes erroneous interpretation/digitization of an area under consideration as the water or land surface (e.g. if plants cover the water's surface). However, the problem of detecting wetlands, i.e. the possibility to distinguish them from land (dry, degraded land) remained open. Moreover, the wetland areas within the 2016 boundaries have changed considerably over the last years, mainly, towards shrinkage/drying (dry, degraded land replaced wetlands).

Therefore, in early 2022, we undertook a research to improve the 2019 methodology. To this end, we determined the threshold values of open water surface (water depth of 5-25 cm, depending on the rise or fall of water), wetlands (water depth of up to 5 cm, wet and moist soil), and non-water sites (all other land surfaces, except for open water and wetlands) for 10 spectral indices (including NDVI and AWEI).

Based on the research results, we selected the threshold values for NDVI (< -0.001 for open water, -0.001÷0.05 for wetland, and > 0.05 for other land surfaces) for further classification of water sites.

By present, the information for 2020 and 2021 have been updated on the base of the improved methodology. In this context, differences can be found when making comparison with the data for the past years.

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