VI ПРИРОДНЫЕ РЕСУРСЫ ОЗЕР И ПРОБЛЕМЫ ИХ РАЦИОНАЛЬНОГО ИСПОЛЬЗОВАНИЯ

NATURAL RESOURSES OF LAKES AND THE PROBLEMS OF THEIR RATIONAL USE

BUDGET OF AUTOCHTHONOUS ORGANIC MATTER IN SALT LAKE KUYALNIK

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On the Northern coast of the Black Sea are located peculiar forms of estuaries, the so-called limans. There are lake-like valleys, flooded by sea water and separated by narrow spit. Depending on the freshwater inflow and connection with the sea, these water bodies are characterized by a wide range of salinities. Liman Kuyalnik is isolated hypehaline lake with unstable hydrological regime. Morphometric parameters vary depending of hydrological and climatic conditions: length – within 17–28 km, surface area – 30–50 km^2, average depth – about 1 m.

Specific biogeochemical conditions promote for creation a therapeutic mud. Kuyalnik's peloids and brine are using for balneology and recreation since 1833.

The base of peloids formation is the cycle of autochthonous organic matter. This cycle is stable in wide range of salinity. However, the latest year's climate fluctuations and overregulation of supplying river caused the drying of the Kuyalnik with extremal increasing of salinity. These changes caused stopping most of basic biological processes and degradation of Kuyalnik ecosystem.

During stable state period when the salinity varied in range 80-260 $g \cdot l^{-1}$ synthesis of organic matter in plankton was faster than destruction. This leads to accumulation of organics in water body. Such situation is typical for hypersaline lakes. During the time of stable functioning in vegetation period net primary production in plankton consists 20–40 % of gross primary production (Table). Annual net production was about 3900 tons of organic carbon (13 % of annual GPP), while approximately 1500 tons of dissolved organic carbon (DOC) leaving in the water column. Thereby, about 2.5 thousands tons of DOC went to the formation of new peloids (mud).

Table. Components of autochthonous organic carbon balance in the brine

Seasons	Salinity	Organic Carbon		Daily balance, tons·waterbody^{-1}·day^{-1}			Seasonal balance, tons·waterbody^{-1}·season^{-1}		
	psu	mgC·l^{-1}	tons· water body^{-1}	Gross	Respi-ration	Net	Gross	Respi-ration	Net
Stable state (2001–2002)									
Winter	184	31.4	1446	26.8	58.3	-31.5	2412	5243	-2831
Spring	170	32.6	1628	171.6	101.9	68.0	15444	9175	6116
Sum-mer	208	36.6	1493	104.1	83.2	22.9	9365	7492	2060
Autumn	262	47.2	1528	36.7	52.4	-15.7	3302	4718	-1415
Annual	206	37.0	**1524**				30523	26628	**3931**
Over-salination period (after 2009)									
Sum-mer	320	53.3	**1065**						

During over-salinization (265–320 psu) nearly 30 % of organic matter (~500 tons of DOC) fell out of brine to the bottom sediments. This confirms by concentrations of organic carbon in interstitial water of sediments before and after salinization. Thus, the average concentration of organics previously was 105.3 mgC·l^{-1} and then 193.7 mgC·l^{-1}.

Kuyalnik has been connected with the Black Sea by 2 km length pipe at the end of 2014 for partial filling by seawater to save on drying. This action caused the rehabilitation of biological processes in Kuyalnik ecosystem. Current changes are observing now.