

**Heavy metals distribution on the Nile Delta Coast: a review emphasizing the eco-environmental challenge after Aswan Damming, Egypt**

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The Nile Delta coast along the southeastern part of the Mediterranean Sea is featured by 4 lakes, from east to west, are: Manzalah, Burullus, Edku, and Mariut. The levels of pollution in these lakes are Lake Mariut > Lake Manzalah > Lake Edku > Lake Burullus.

For the purpose of coastal conservation and environmental development of the Nile Delta region, multipurpose projects are being carried out as to face the eco-environmental challenge particularly after Aswan Damming. Government strategy is directed towards promoting environmental collaborative projects (e.g., climate change, geomorphology, hydrogeology, hydrogeochemistry, soil geochemistry) such as the Seventh European Framework Programme (FP7) and the current Egypt-China project.

Erection of the Aswan High Dam (AHD) in 1964 was accompanied by a considerable increase in population and consequently in man's activities, mainly in agriculture and industrialization, constituting the main causes of pollution in the Delta wetlands. Major power-based industries were developed after the completion of the AHD power station in 1970. These industries have discharged untreated metal-bearing wastes into the Nile Delta drainage network.

The most important heavy metals from the point of view of water pollution in the Nile Delta lakes are Zn, Fe, Cu, Mn, Cd, Pb, Hg, Ni and Cr. Values of contamination factors showed that Cd is the major pollutant to cause relatively high pollution load in all Nile delta lakes, while Fe and Mn are the least metals to influence the pollution load. Moreover, computing ratios of some heavy metals to Fe revealed a Cu enrichment in lake Manzalah and a Zn enrichment in Lake Mariut.

The mean post-1960 sedimentation rates (0.2 and 0.21 cm yr<sup>-1</sup> for Manzala and Burullus, respectively) calculated from records of fallout <sup>210</sup>Pb, <sup>137</sup>Cs and radionuclides, including macrofossil and pollen are significantly lower than the pre-1960 values (0.51 and 0.39 cm yr<sup>-1</sup> for Manzala and Burullus, respectively). These results suggest a significant reduction in sedimentation rates after ca. 1960 which is probably attributed to reduced sediment inputs as a consequence of the end of Nile floods following construction of the Aswan High Dam.

The coastal aquatic environment and its water

quality is becoming the main concern for social development in a close association to health security through food chain, nowadays. Heavy metals are signatures of diseases in the northern Nile Delta region (e.g., renal failure, cancer, liver diseases). Pancreatic cancer patients in East Nile Delta, for example, revealed significantly higher serum cadmium levels than control subjects. In order to increase the opportunities of socio-economic development the environmental-protection policies such as legislation, standards, criteria, waste minimization, effluent treatment, monitoring, education and public awareness should be enforced.

**Artificial reefs as the tool of handle of processes in coastal ecosystems**

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Now artificial reefs are considered as the effective tool of handle of ecological processes in coastal ecosystems of the sea [1-5]. In lab of an Ecological metabolism of Institute of Biology of Southern Seas (Sevastopol, Ukraine) is accumulated wide experience in constructioning and in multipurpose usage of artificial reefs [3-17]. In the report the theoretical and practical aspects of constructioning and usage of reef constructions of different reserving are considered.

References

- Zaitsev J P (1987). Artificial reefs - tool of handle of ecological processes in a near-shore area of the sea. Theses The reports on All-Union Conference (Moscow, December 2-4): 3—5 (in Russian)
- Shadrin N V (1987). The possible tendencies of change of plankton communities after creation of synthetic reefs. Theses The reports on All-Union Conference (Moscow, December 2-4): 94—96 (in Russian)
- Khailov K M, Prazukin A V, Kovardakov S E, Rygalov V E (1992). Functional morphology of seaweeds. Naukova Dumka Publishers, Kiev: 282 (in Russian)
- Khailov K M, Prazukin A V, Minkina N I, Pavlova E V (1999). Concentration and function activity of alive matter in inspissations of a miscellaneous level of organization. Uspekhi sovremennoi biologii, 119 (1): 3—14 (in Russian)
- Khailov K M, Bimbad G. E, Kovardakov S A, Prazukin A V, Yurchenko Y Y (1999).