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Results of Water and Bottom Sediments Pollution Studies in the Zmiinyi Island Area of the Black Sea in 2011-2012

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Abstract

Pollution of marine environment has been one of the main Black Sea problems controlled by all the Black Sea countries in the framework of the Convention on the Protection of the Black Sea Against Pollution. The aim of our studies has been to investigate the current state of marine water and bottom sediments' pollution with total petroleum hydrocarbons (TPHs), trace metals (TM), organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and polyaromatic hydrocarbons (PAHs) in the Zmiinyi Island area, which according to our previous studies is the area with practically natural conditions [1]. During 2011-2012 the Research Station of Odessa National I.I. Mechnikov University continued the water and bottom sediments sampling programme. Analyses of sea water and bottom sediments have been carried out in accordance with the national methods and the methods recommended by the ISO in the laboratory of the Ukrainian Scientific Centre of the Ecology of Sea. The results are being regularly included into the Ukrainian National Reports for the Black Sea Commission Secretariat.

The data on coastal sea waters and bottom sediments pollution for 2011-2012 with TPHs, OCPs, PCBs, TM and PAHs are being analyzed in details. It is shown that the sum of TPHs and concentrations of trace metals in all water samples did not exceed the MPC. It has been revealed that out of 11 OCPs only in 2012 the contents of Lindane (λ -HCH) exceed the MPC several times. PCBs concentrations were lower

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than the MPC. Out of 16 PAHs analysed, only for 3 (phenanthrene, fluoranthene, benz(a)anthracene) 10-20 times' excursions of MPCs have been revealed. However, compared to 2009-2010, when 8 PAHs with concentrations exceeding the MPCs were registered, the situation in 2011-2012 has improved. Analyses of the results of bottom sediment samples have shown that the content of TPHs and TMs exceeded the MPCs 2-4 and 1.5-3 times respectively. The MPC of total PCBs concentration was exceeded twice in 40% of samples. Concentrations of other organic toxicants in bottom sediments were lower than the MCPs. It means that toxicity of bottom sediments in 2011-2012 decreased compared to previous years [1]. The origin of pollution in coastal waters and sediments near the Zmiinyi Island is being discussed. It is shown that concentrations of six TMs (arsenic, cadmium, cobalt, copper, mercury, lead and zinc) in the sea water and bottom sediments are not exceeding MPCs and range from 0 to 0.4 MPCs for different metals, i.e. no problem of TMs accumulation in the bottom sediments had been revealed. The main conclusions of our studies during 2011-2012 are the following: the levels of pollution for all toxicants are lower than in previous years [1]; the results of comparison with the other Ukrainian areas of the Black Sea has shown that the Zmiinyi Island area could be used as a reference area for analysis of the BSIMAP monitoring data. The study has been carried out in the framework of research activities funded by the Ministry of Education and Science and Ministry of Ecology and Natural Resources of Ukraine and as a contribution to the European FP7 project PERSEUS.

References

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