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Pressures and impact analysis in the Dnipro river basin within Ukraine

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The third largest European river Dnipro covers 48% of Ukraine's territory. An analysis of the main anthropogenic pressures in the Dnipro Basin was first performed according to the requirements of EU WFD.

Surface water pollution by organic substances and nutrients is principally attributed with point sources, among which the municipal wastewaters play the dominant role. The main load by organic substances and nutrients is caused by the wastewater discharges of big cities with Population Equivalent >100 000; 89% of such cities are located within the sub-basins of Middle Dnipro and Lower Dnipro.

Point sources form 33% of nitrogen and 61% of phosphorus loads in the Dnipro Basin. Diffuse sources related to agricultural production cause incoming of 29% of nitrogen and 36% of phosphorus. Phosphorus is transported to the water bodies mainly with erosion particles.

Natural conditions in the River Basin are one of the reasons of nitrogen load significant share (33%). Humus compounds and nitrogen compounds enter into water bodies due to the high bogginess of the Dnipro Basin upper part, especially the Prypiaty Basin. This leads to winter and summer anoxia in the rivers and upper reservoirs and creates prerequisites for eutrophication of the Dnipro cascade reservoirs. Rivers of the Prypiaty sub-basin, Upper Dnipro, and Desna sub-basins are extremely vulnerable to anthropogenic pollution by nutrients and organic substances that generates the increased background of organic compounds and nitrogen in the Dnipro reservoirs cascade.

The load of the Dnipro Basin surface water by hazardous substances (especially synthetic) still remains insufficiently studied. Currently, information is only available regarding load by heavy metals included to the list of priority substances and some other ones. Water pollution by metals is noted mostly in the Lower Dnipro sub-basin where the most of the metallurgical enterprises are located.

The high application of pesticides (> 3 kg/ha) in 4 administrative Rayons leads to the appearance of risk conditions for pollution of xenobiotics in 50 surface water bodies (SWBs).

The Dnipro reservoirs cascade serves as a powerful geochemical barrier causing heavy metals and

pesticides deposition in bottom sediments. The highest pollution by metals is noted in the sediments of the Dnipro reservoirs that receive the metallurgy enterprises wastewaters. Probability of significant secondary remobilization is foremost noted for Cadmium. Organochloride pesticides content in the bottom sediments is 2 to 5 times lower than maximal allowable concentration in soil.

Water abstraction volume is around 22% of the annual flow of 95% probability. The natural flow of the Dnipro is regulated by 6 large reservoirs. Besides, there are 1072 dams and other cross-sectional artificial installations. Natural morphology changes are observed in a large number of rivers within the Dnipro Basin.

It was found that 56% of the Dnipro Basin SWBs are at risk of failing the "good" ecological status.

Hydromorphological alterations cause the main anthropogenic pressure in the Dnipro Basin (concerning 45% of the SWBs). Risks from diffuse sources and point sources are observed in 23% and 5% of SWBs, respectively.