



River Danube: Management of nutrient fluxes in a large river basin

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Beginning in the seventies up to the early nineties, the north-western and western Black Sea coastal area suffered from chronic harmful algal blooms, oxygen deficiencies, as well as the mass mortalities of wildlife in the region. An excessive input of nutrients was the main reason for this development, and the Danube River was identified as major source for nutrients in this part of the Black Sea ecosystem. In particular, eutrophication problems close to the mouth of the Danube Delta as well as on the coast north and south of the Delta are a result of direct Danube influence.

Management of nutrients in order to avoid excessive discharges through the river system into the coastal areas has to consider the whole basin. Agriculture driven by the demands of human nutrition, waste water management, as well as combustion processes are the main sectors causing nutrient discharges from the land to the sea. Within the EU-funded research project daNUbs 'Nutrient management in the Danube River Basin and its Impact on the Black Sea' an integrated assessment of the nutrient changes in the Danube Basin and their impacts on the Western Black Sea ecosystem as basis for the development of efficient nutrient management strategies on basin scale was performed. The main findings of the daNUbs project show that the situation in the north-western Black Sea shallow waters has improved considerably since the early nineties due to reduced nutrient inputs. The improvements are the result of decreasing nutrient discharges, especially of phosphorus, to this part of the Black Sea. These current low discharges are the result of improved nutrient removal from waste water in Germany, Austria and the Czech Republic and reduced phosphate discharges from detergents in other countries. The economic crisis in central and eastern European countries have had a consequence on the environment, including the closure of large livestock farms and agricultural point sources, the dramatic decrease of the applica-

tion of mineral fertilizers and the closure of nutrient discharging industries, like the fertilizer industry.

For sustainable development of the western Black Sea ecosystem, the nutrient discharge from the Danube River should be further diminished or at the very least kept at the present level. It has been shown that the economic development in the Danube Basin may reverse the improvement of the quality of the north-western and western Black Sea ecosystem, if nutrients are not managed properly. In order to avoid deterioration of the current situation, national governments should declare the total area in the Danube Basin as sensitive area to facilitate the financial support of investments for waste water treatment with nutrient removal from international donor funds. Furthermore, a consequent implementation of measures to limit nutrient emissions from agriculture is necessary. These measures should be based on the best available agricultural practices for reduction of nutrient losses from agricultural areas and a limitation of the intensity of agricultural production.