



INTERNATIONAL WATERS RESULTS NOTES

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Hungary : Reduction of Nutrient Discharges in the Danube River and Black Sea

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1. The North Budapest Wastewater Treatment Plant was upgraded and commissioned in April 2011, to provide tertiary wastewater treatment, resulting in a reduction in the discharge of total Nitrogen and Phosphorous from the Plant into the Danube River by 72 and 75 percent, respectively; ammonium-nitrogen discharge reduced by 91 %. Other wastewater discharge parameters from the Plant such as removal of BOD have also improved significantly (92%).
2. About 2500 hectares of wetlands within the Gemenc and Beda-Karapanca areas located within the Duna Drava National Park have been rehabilitated to improve their nutrient (N&P) trapping capacity, and 4500 hectares are expected to be rehabilitated by the end of October 2011.
3. Project results on nutrient reduction using both conventional and wetland rehabilitation mechanisms and related scientific findings have been widely disseminated through various media and fora including workshops, conferences and other knowledge sharing events in the Region and beyond.

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PROJECT OBJECTIVE

The project's development and global environmental objectives are:

- (a) to reduce Budapest's discharge of nutrients (Nitrogen and Phosphorous) into the Danube River, and consequently into the Black Sea;
- (b) to enhance the nutrient trapping capacity of Gemenc and Beda-Karapanca Wetlands situated in the lower Hungarian part of the Danube River; and
- (c) to serve as a model for similar nutrient reduction initiatives in Hungary and other Danube basin countries.

These objectives are being achieved through three main components: (i) development of tertiary treatment (nutrient removal) at the North Budapest Wastewater Treatment Plant (NBWWTP); (ii) rehabilitation of wetlands in the Gemenc and Beda-Karapanca areas of the Duna-Drava National Park (DDNP); and (iii) establishment of a comprehensive Monitoring and Evaluation (M&E) system for water quality and environmental health allowing measurement of nutrient reduction, as well as dissemination activities to foster replication in Hungary and other Danube basin countries.

RESULTS: PROCESS

A comprehensive monitoring and evaluation (M&E) system for monitoring the nutrient reduction capacity of the wetland system in the project area has been developed and installed through the project.

- INDICATOR 1 (Target: M&E system fully operational): The M&E system is operating in a satisfactory manner in the completed sub-projects and is expected to operate in remaining areas once outstanding works are completed.

RESULTS: STRESS REDUCTION

Result 1: Reduction in the discharge of nutrients from Budapest into the River Danube

As a result of development of tertiary treatment at the North Budapest Wastewater Treatment Plant under Component 1, discharge of total Nitrogen and Phosphorous¹ into the Danube River through point source pollution from the Plant has been reduced by 72 and 75 percent, respectively; ammonium-nitrogen discharge also reduced by 91 %. The Plant is operating at an average of about 75 percent of volumetric capacity (140-150,000 cubic meters a day) and in addition to the mentioned nutrient removal, is meeting standards for removal of other parameters such as Biochemical Oxygen demand (BOD), Chemical Oxygen Demand (COD), and Suspended Solids. Nutrient reduction results are demonstrated through the following project results indicators:

- INDICATOR 1 (Annual reduction of nutrient discharges from the NBWWTP (N and P kg/year): Targets: 2945 (N) and 310 (P), representing a reduction from the baseline of about 68% and 60% respectively)]. As a result of the project, the targets with respect to both Nitrogen and Phosphorous were met and exceeded, with results in June 2011 representing a 72% and 75% reduction in the two nutrients respectively.
- INDICATOR 2 (Average operational cost of the nutrient reduction process in the NBWWTP (US\$/kg of nutrient reduced; Target: US\$0.03-0.05/m3). The average operational cost of the nutrient reduction process in the NBWWTP (June 2011) was US\$0.03/m3.

Result 2: Increase in the amount of nutrients retained by the DDNP Wetlands (N and P kg/year)

¹ Data is based on average measurements for respective parameters during the trial period between April 2010 and March 2011 compared to the average measurements prior to operation of the new tertiary treatment system.

As a result of the rehabilitation of an estimated 2500 hectares of wetlands in the DDNP, representing just over half of the envisaged ²works, as well as installation of hydraulic artifacts in the area, the amount of nutrients retained by these wetlands is expected to have increased, although actual results measurements will be undertaken after the works are completed.

- INDICATOR 1 (Number of hectares of wetlands rehabilitated in the DDNP (Target: 4500 ha; estimated 2500 ha completed to date)
- INDICATOR 2 (Annual amount of nutrients retained by the DDNP wetlands (N and P kg/year): Results to be taken after completion of works.

RESULTS: WATER RESOURCE AND ENVIRONMENTAL STATUS

Specific results on the final impact of the project with respect to water resource and environmental status as demonstrated through specific indices are expected to be obtained after the works are completed and will be presented through a Workshop on *Nutrient Pollution Reduction in Wastewater Treatment and Wetlands Remediation: Lessons from Hungary Nutrient Reduction Project* to be held in Budapest November 14-16, 2011.

These results are demonstrated through the following indicators:

- INDICATOR 1 (Overall improvement to the water regime in Gemenc and Beda Karapanca wetlands) (Target: Monitoring system installed and 5 interventions successfully undertaken). The Monitoring system was successfully developed and installed in the pilot areas and all five interventions are under construction.

² The overall scope of works was scaled down significantly from 10,000 ha to 4500 ha due to constraints in obtaining the full counterpart funding contribution.