Global Environment Facility

WORLD BANK - GEF
STRATEGIC PARTNERSHIP FOR NUTRIENT REDUCTION IN THE DANUBE RIVER BASIN AND THE BLACK SEA

HUNGARY - GEF
NUTRIENT REDUCTION PROJECT

A Preliminary Concept Note

Date:	*May 9, 2001.*
Country Director:	*Roger Grawe*
Sector Director:	*Ricardo Halperin*
Task Manager:	*Manuel Mariño/Krisztina Kiss*

HUNGARY
GEF
Nutrient Reduction Project
under the
Strategic Partnership for Nutrient Reduction
in the Danube River Basin and the Black Sea
A Preliminary Concept Note

Introduction

1. Hungary, which lies in the Middle Region of the Danube River Basin, was a founder member of the Danube Convention in June 29, 1994. The Hungarian Government and the municipalities of Budapest and Dunaújváros are committed to reduce nutrient discharges in the Danube river basin. For this purpose, the government (Mr. Béla Túri-Kovács, Minister of Environment) sent to the World Bank (Mr. Roger Grawe, Country Director) an endorsement letter dated January 31, 2001 requesting assistance in the preparation of a project to reduce nutrient discharges and loads. The Hungarian Government is seeking support for this project under the World Bank-GEF Strategic Partnership for Nutrient Reduction in the Danube River Basin and the Black Sea. This preliminary concept note describes the objectives, main components and preparation-implementation arrangements for this possible project.

Background

2. The project -- a potentially eligible proposal for the Partnership GEF Grant funds -- uses a multi-focal area approach, including investments in advanced wastewater treatment of domestic discharges and restoration of wetlands to recover their function as nutrient traps. The project is intended to respond to regional priorities in accordance with the Strategic Action Plan for the Danube River Basin[1]; it has secured financing for baseline non-incremental costs; it will demonstrate pilot experience to test impact through several forms of intervention that would be replicated in other Hungarian river basins as a river basin intervention to reduce the discharge of nutrients from land and local community based sources; and it has Government and local municipality commitment to policy reforms, institutional strengthening and operational development.

3. Consistency with the CAS. The project is consistent with the Bank Group Country Assistance Strategy (CAS) to improve environmental standards, promote sustainable growth

[1] The Strategic Action Plan is the result of the first three-year phase of the Danube Environmental Programme, the initiative of which was decided in Sofia in September 1991 to support and reinforce international cooperation and national actions for the restoration and protection of the Danube River Basin. It provides direction and a framework for achieving the goals of regional integrated water management sand riverine environmental management expressed in the Danube River Protection Convention. The Action Plan laid out strategies for overcoming the water environment related problems in the Danube River Basin. Tha Action Plan was addressed to the officials of national, regional and local levels of government who share responsibility for implementing the Convention and the national environmental action programmes under the Environmental Action Programme for Central and Eastern Europe. The Action Plan supports the process of cooperation and collaboration set out in the Convention to address transboundary problems.

and prevention of transboundary pollution in the region and support the country's efforts to join the EU. The objectives of this project go beyond EU and Hungarian legal requirements, and are clearly aimed at the Black Sea protection under the Danube Programme.

4. The Government of Hungary has proposed this project for GEF financing following a process of project identification, analysis, and priority setting carried out in cooperation with the Danube Commission. 17 possible projects were initially identified. These projects were evaluated on the basis of: (i) importance as nutrient pollution hot spots or areas with higher potential retention capacity for diffuse pollution; (ii) preparedness for participation in the Project; (iii) willingness to take policy/institutional strengthening measures; and (iv) funds that would be available for counterpart funds. Using this criteria, Budapest and Dunaújváros (as municipal wastewater treatment components) and the Danube-Dráva National Park's Gemenc and Béda-Karapancsa Region (as a flood-area-revitalization-wetland-restoration component) have been selected by the Ministry of Environment (MOE) as site for interventions that have the highest priority and capacity for large nutrient reduction in Hungary.

5. The City of Budapest is by far the most important point source of nutrient discharge in Hungary. Apart from Budapest, only two other of the major cities in Hungary, Dunaújváros and Szolnok, still do not have a nutrient reduction phase in their wastewater treatment facilities. Dunaújváros is prepared and willing to participate in the Project[2] and, like Budapest, has secured financing for the baseline investments. The Danube-Dráva National Park's Gemenc, Béda-Karapancsa Region Wetland, lies close to the southern border of the country, where the Danube exits Hungary. According to available information, because of its characteristics[3] and its location, it is the area with the largest nutrient retention potential in Hungary and capable of eliminating large amount of nutrients coming from agricultural and other diffuse sources.

6. The Bank's involvement through GEF in this Project would provide the needed financial incentive to extend nutrient reduction beyond the targets set by Hungary and the EU[4], thus contributing significantly to the Black Sea protection. In addition to making this project happen, GEF involvement can provide assistance to the MOE in developing and introducing appropriate policy measures and environmental incentives and replicating this project in other Hungarian rivers. Environmental public awareness would be raised in the course of preparing the Project and its Environmental Assessment, through a public participation process. The Project will also contribute to improving cooperation between the two main ministries responsible for water related issues, the Ministry of Environment (responsible for water quality protection and nature conservation) and the Ministry of Transport and Water Management (responsible for water quantitative management, water supply, sewerage and wastewater treatment). At the local level, the involved municipalities will improve their institutional framework and could operate more

[2] Szolnok is not interested in cooperation with the Bank for wastewater treatment

[3] The Danube Dráva National Park's Gemenc Béda-Karapancsa region is primarily covered by leafy forest lying in the flood area of the Danube. The surface is about 90-100 m above sea level, which is the altitude also of the Great Plain. The Gemenc area lies within the dams and about 20,000 ha is flooded at least once a year. The whole region is a Ramsar International Convention designated bird sanctuary.

[4] The currently valid EU recommendations for the Danube are: 2 mg/l phosphorous and 15 mg/l nitrogen in effluent waters. The Hungarian legislation sets no requirements for phosphorous discharges in the Danube and 30 mg/l for nitrogen. The River Danube is considered a non-sensitive water basin by both the EU and Hungary.

cost-effectively though the establishment and operation of Project Management Units. Without GEF involvement, there is little to suggest that the investment planned under the project would be carried out or that this Project approach would be generalized throughout Hungary.

7. The proposed Project will meet the criteria to be funded under the GEF Partnership for nutrient reduction in the Danube River Basin. Municipal wastewater treatment and wetland restoration are two priority and eligible activities for GEF funding under this Partnership and Budapest and Dunaújváros have been identified as priority hot spots by the Danube Commission. Gemenc wetlands are one of the most important ones located in the Hungarian Danube and identified for priority rehabilitation by WWF and the Danube Commission. Preliminary analysis shows the Project would have unit abatement cost between US$ 500-800 per ton of nutrient reduction.

Project Development Objectives

8. The main objective of the Project is to decrease nutrients discharges into the Danube river and loads to the Black Sea, by improving the reduction of nutrients in effluent from wastewater treatment plants at Budapest and Dunaújváros and increasing the nutrient retention capacity at the Danube-Dráva National Park's Gemenc and Béda-Karapancsa Region. The Project will complement the Government of Hungary in its efforts to reduce transboundary pollution in the Danube, and will lead also to necessary policy, institutional and legal reforms related to regional nutrient reduction and improved water quality management.[5]

The Project

9. The project would finance the building of the nutrient reduction phase of the North-Budapest and Dunaújváros Wastewater Treatment Plants – the ongoing World Bank Municipal Wastewater Loan Project is financing the solid phase of the North-Budapest WWTP and the primary and secondary treatment of the Dunaújváros WWTP – and the restoration of wetlands in the Danube-Dráva National Park Gemenc, Béda-Karapancsa Region[6]. The Project comprises four Components as described below.

10. ***Component 1.*** **Municipal Wastewater Treatment for the Municipality of Budapest. The Metropolitan of Budapest.** Budapest has two million inhabitants living on both sides of the Danube. In Budapest, water service levels are high and sewerage network is well developed.

[5] The project will catalyze the establishment of an incentive framework for sewerage and wastewater treatment developments. The current fines for effluent waters not meeting the quality thresholds are applied only on wastewater treatment plants and not on those settlements or entities which have no treatment facilities at all. The penalty can be taken into consideration in the further investment development for wastewater treatment and does not have to be paid.

[2]Component 1. Budapest: total nutrient reduction of 2,470 tons per annum (TN 2,050 tons per annum and TP 420 tons per annum). Component 2. - Dunaújváros: total nutrient reduction of 182 tons per annum (TN 146 tons per annum and TP 36 tons per annum). Component 3. Wetland Restoration/Flood Area Revitalization at the DDNP's Gemenc, Béda-Karapancsa Region: total nutrient reduction of about 13,000 tons per annum (about 10,950 tons of TN per annum and about 2,080 tons of TP per annum).

However, wastewater treatment, especially tertiary treatment, is only partially developed except for the South Pest WWTP. The Municipal Wastewater Treatment Project, which is under implementation with support form a World Bank loan, is financing the extension and upgrading of the South-Pest and North-Budapest Wastewater Treatment Plants. The proposed GEF Project would complement this project and complete the nutrient reduction phase of the North-Budapest Wastewater Treatment Plant.

11. Investments to be financed include a new chemical mixer and handling equipment, laboratory instruments, upgrading of the *SEDIPAC* primary cleaners into *DENSADEG* ones, (anoxic spaces in the aeration tanks), increases of the aeration capacity, extension of the secondary cleaners and upgrading of the operational management system (computer hardware and software). Annex 1 summarizes the description of this Component and the specific investments as well as the impact of the component on the nutrient loads coming from this plant.

12. ***Component 2.*** **Municipal Wastewater Treatment for the Municipality of Dunaújváros.** Dunaújváros (60,000 inhabitants), despite its medium-size, is a significant industrial and commercial city, lying south of Budapest on the Danube. As in Budapest, in Dunaújváros water service levels are high and the sewerage network is well developed. A wastewater treatment plant is under construction and will be completed by 2002 under the World Bank Municipal Wastewater Project. However, most nutrient content of the wastewater will still flow into the Danube since only mechanical treatment and simplified secondary treatment will be provided by the new plant. Building on the World Bank Municipal Wastewater Project, the GEF project would fund the necessary investments to achieve the above objective of nutrient reduction through the provision of necessary equipment, instruments, IT system, training and pilot operations. The detailed description of this Component and the specific investments as well as the current and planned nutrient load data are in Annex 2.

13. ***Component 3.*** **Danube-Dráva National Park, Gemenc and Béda-Karapancsa Region Wetland Restoration/Flood Area Rehabilitation.** As a result of the river regulation on the Danube, riverbed-deepening, decrease in water output, and shortening of the period of inundation, nutrient reduction capacity of the area have strongly deteriorated primarily due to the drying out of the former wetland areas and agricultural or communal use of the land. This component would involve the revitalization of about 25,000 ha of wetlands in the about 28,000 ha area of Gemenc and Béda-Karapancsa. This 25,000 ha area (18,000 ha in the Gemenc and about 7,000 ha in the Béda-Karapancsa region) currently is dry, gets water only in the course of flooding (once a year) and therefore can not perform proper nutrient reduction. The investments to be financed by the project will include civil works and earthworks for smaller dikes, dams and sluices, wetland and forestry management equipment, smaller dredgers, reed-cutters, laboratory instruments and operational management system (computer hardware and software). Current and planned detailed nutrient load data are in Annex 3.

14. ***Component 4. Replication.*** The project will fund the dissemination of the project findings and replication activities in other areas of Hungary and in the upper Danube region. Hungarian authorities plan to replicate the program in other parts of the Danube basin through seminars and information sharing. The project will facilitate the execution of the mutual international obligations of the region. This component will be fully funded by GEF.

15. **Project Costs**. Total project cost is estimated to be 17 million US$ (additional investments currently financed by the Bank's project are not included in this figure, although they correspond to the main baseline investment). Table 1 below presents the costs distribution by component and its proposed financing by sources (the expected GEF contribution under the Partnership is 7.50 million US$).

Table 1. Project Costs and Financing:

Component:	**Costs:** ***(US$ thousand)***			***Financing:*** ***(US$ thousand)***			
	Foreign	***Local***	***Total***	***GEF***	***Gov. & EU***	***Munic.***	***Total***
North-Budapest WWTP tertiary treatment upgrading	6,000	6,000	**12,000**	4,400	5,600	2,000	**12,000**
Dunaújváros WWTP nutrient reduction upgrading	875	525	**1,400**	600	275	525	**1,400**
Wetland Restoration *of the Danube-Dráva National Park*	1,800	1,200	**3,000**	2,000	700	300	**3,000**
Project Management and Monitoring	150	350	**500**	400	50	50	**500**
Replication	100	0	**100**	100	0	0	**100**
Project Total:	**8,925**	**8,075**	**17,000**	**7,500**	**6,625**	**2,875**	**17,000**

16. **Project Benefits**. The project is expected to significantly contribute to the reduction of nutrient discharges into the Danube and to the load it transports on leaving Hungary, thus contributing to improving water quality in the Black Sea. The project is also expected to provide a significant contribution to Hungary's effort to comply with EU standards and demonstrate the Government's and Municipalities' commitment to EU accession. It will support improved policy, institutional and legal framework on nutrient reduction management in Hungary and specifically at the two above-mentioned cities and help raise the level of environmental awareness. During the nearly 25 years of operation of the North-Budapest WWTP about 41,235 tons of TN and 8,432 tons of TP, and of the Dunaújváros WWTP about 4,000 tons of TN and 1,000 tons of TP reduction would be achieved. During the over 100 years of "operation" of the Danube-Dráva National Park Gemenc and Béda-Karapancsa Region restored wetland area, about 1,100,000 tons of TN and 210,000 tons of TP reduction would be achieved. The Project outcomes will be measured in terms of the actual nutrient reduction through laboratory testing and the more effective operation and management of the involved institutions. Table 2 summarizes the expected impact of the project in terms of nutrient reductions.

Table 2. Preliminary Estimate of Investment Costs and GEF Cost Effectiveness [to be determined]:

Component:	***Costs: (US$ thousand)***			***Annual Nutrient Reduction: (in tons)***	***GEF Cost Effectiveness (US$/kg/yr)***
	Investment Costs	***IOC***	***Total Costs***		
North-Budapest WWTP	11,000	1,000	12,000		
Dunaújváros WWTP	800	600	1,400		
Danube-Dráva National Park Wetland Restoration	2,700	300	3,000		
Investments Total	**14,500**	**1,900**	**16,400**		
Project Management and Monitoring	100*	400	500		
Project Total:	**14,600**	**2,300**	**16,900**		

* Computer hardware and software and some monitoring instruments.

** Costs effectiveness basis: Total Grant/Total Nutrient Reduction.

Institutional, Preparation and Implementation Arrangements

17. The Hungarian Ministry of Environment (MOE) has been the lead agency in identifying potential projects for GEF funding and is expected to continue as the lead implementing agency. The overall role of MOE in project administration, project oversight, reporting, auditing, monitoring and evaluation will be agreed at appraisal. The Project Management Units of the ongoing Municipal Wastewater Treatment Project would manage the implementation of the Budapest and Dunaújváros components. The MOE would oversee the management of the Wetland Restoration Component, while the Danube-Dráva National Park Directorate would be in charge of the day-to-day management and reporting activities.

18. The Government of Hungary plans to submit a request for a Project Development Facility (PDF) Block B Grant in the amount of US$ 300,000 to support further and detailed analysis of the Project and the preparation of the Project Concept Document (PCD). The Government would provide from central and local contribution about US$ 150,000 as counterpart funds. The PDF Grant would be used to finance the costs of consulting services, preparation of the Environmental Assessments and monitoring plans, workshops and consultations, as required for the preparation for public participation and information. The executing agency for the PDF-B will be MOE with support form the two PMUs and the DDNP Directorate.

19. The specific activities for which the PDF Grant would be used are the following:

(i) **Carry out a Social Assessment.** Identify key stakeholders of the Project; analyze their economic needs vis-a-vis the likely impact of Project activities; carry out a social analysis of the affordability to pay more for better wastewater services; identify socioeconomic aspects of potential negative impacts on local industry and general public including phase-out of phosphorous containing detergents; and, identify mechanisms for the involvement of key stakeholders in overall project preparation ad implementation; assess whether or not any resettlement would be required (including economic displacement) with restoration of flood plain and wetland rehabilitation.

(ii) **Carry out an Environmental Assessment (EA)** of the Project. The expected overall impact of the Project on the environment will be highly positive in global, regional and local dimensions, specific activities, however may have some negative environmental impacts which should be mitigated.

(iii) **Conduct Economic and Financial Analysis**. On the eligible incremental costs that would be financed by GEF, review and analyze opportunities for financial sustainability of activities.

(iv) **Prepare an Investment Program.** Analyze the alternatives for the Project; prepare detailed cost estimates and procurement specifications for all Project activities; prepare a financing and investment plan, develop TORs for the detailed designs and; identify sources of co-financing to support other, non-incremental activities related to the Project.

20. The Project would be implemented in three years. Project completion is estimated for 2005. A preliminary preparation timetable is attached below.

Preliminary Timetable of Preparation

Preparation Steps:	**Month/Year**
1. Identification	05/2001
2. Agreed project preparation plan	05/2001
3. Project Concept Document	10/2001
4. Pre-appraisal. Project proposal to GEF-CEO	11/2001
8. Environmental Assessment	03/2002
10. Appraisal	04/2002
11. Updated PAD to RVP	06/2002
12. Invitation to Negotiate	04/2001
13. Start Negotiations	04/2001
14. Board Approval	06/2002

Annex 1.

Budapest Component
North-Budapest Wastewater Treatment Plant

The North-Budapest Wastewater Treatment Plant started operation in 1983 with 140,000 m3/day capacity for treatment of sewage of the North part of the Pest side of the city Budapest. The technological process of the plant is as follows: screenings for removal of floating wastes, screw-pumps for lifting the sewage, sand traps and fat skimmers, pre-aeration, pre-settling tanks, aeration tanks, post-settling tanks, disinfecting tank, sludge re-circulation system, chemical stabilization of the crude and surplus sludge, de-watering of the sludge in filter presses.

The efficiency of the aeration was low. The retention time in the aeration tanks was less than six hours. The surface velocity in the post-settling tanks was too high and due to this fact sludge concentration too low. For these reasons modernization of the plant was needed. At the same time the Budapest Municipal Sewerage Company extended the collection area of the plant with construction of a sewage pressure pipeline. Even the City area intends to join in on the North-Budapest collection area of the plant. Therefore, extending capacity up to 200,000 m3/day is also necessary. The modernization and the extension of the plant are just now being carried out with the support of EU funds. But also upgrading of effluent quality would be desirable. Despite the receiving waters of the treated water, the Danube River, not considered a sensitive waterbody, the Authorities request the City to remove the N and P compounds from the treated water. (In case of the North Budapest Plant, 5 mg/l NH4-N and 11.3 mg/l NO3-N, as well as 2 mg/l total P is allowed in the treated water by the Authorities. Recently the total P concentration is 4 mg/l and NH4-N 27 mg/l in the treated water. So chemical treatment needs to be applied for elimination of phosphorous through transforming the existing pre-settling tanks into high efficiency DENSADEG purifiers, and the biological process must be extended with nitrification and de-nitrification. Therefore the sludge concentration will have to be increased with extension of post-settling capacity, and the nitrified water will have to be re-circulated. In addition, the aeration capacity will have to be extended.

Nutrient Load to the Danube at North-Budapest
(Current and after the Implementation of the Project)

Current Nutrient Load	**Unit**	**Minimum**	**Average**	**Maximum**
Nitrogen	Mg/l	21	38	74
	Kg/d	3,095	5,601	7,517
Phosphorous	Mg/l	4	7.1	19
	Kg/d	653	1,144	1,611

Planned Nutrient	Unit	Minimum	Average	Maximum
Nitrogen	Mg/l		10	
	Kg/d		1,082	
Phosphorous	Mg/l		2	
	Kg/d		220	

Annex 2.

Dunaújváros Component

The **existing** old Central WWTP (Kohász road) is one of the oldest municipal treatment plants of Hungary. At the end of the new sewage collection system build up for the newly formed city of Dunaújváros, it was put into operation in 1951. Later another plant was built to collect and pump the sewage from the old quarter of the town (Szt. István road).

The level of sewer network was quite extensive for the municipal needs (72% combined gravity system, 20 % separate gravity system, 6 % separate system under pressure, and 2 % other solutions), but the existing sewage treatment is very obsolete, consisting of only mechanical treatment equipment and elements (rough screening, fine screening, rough-ink tank, storm water reservoir and outlet).

The **basic improvement** of the whole system, under construction, has two main parts:
- upgrading the existing plants (Kohász road and Szt. István road) and elements (downward pipe-system, pressure pipe on the bank, environmental monitoring etc.);
- placing into operation a new primary and secondary treatment plant with fine screening, primary settling, basic biological treatment, secondary settling, sludge stabilization.

To **improve the efficiency** of the new plant further steps have to be done:
- upgrading the technology (biological P-removal, sludge thickening and de-watering, sludge disposal with slurry deposit re-cultivation);
- responding with new operational expectations (septic sludge collection, outlet in the Danube river, laboratory for controlling plant operation).

Nutrient Load to the Danube at Dunaújváros
(Current and after the Implementation of the Project)

Current Nutrient Load	**Unit**	**Minimum**	**Average**	**Maximum**
Nitrogen	Mg/l	15	50	90
	Kg/d	200	500	800
Phosphorous	Mg/l	5	10	20
	Kg/d	60	120	180

Planned Nutrient	**Unit**	**Minimum**	**Average**	**Maximum**
Nitrogen	Mg/l	3	8	10
	Kg/d	60	100	150
Phosphorous	Mg/l	1	1,5	2
	Kg/d	10	20	30

Annex 3.

Nutrient Load to the Danube at the Danube-Dráva National Park
(Current and after the Implementation of the Project)

Current Nutrient Load	**Unit**	**Minimum**	**Average**	**Maximum**
Nitrogen	Mg/l			
	Kg/d/ha		5	
Phosphorous	Mg/l			
	Kg/d		0.5	

Planned Nutrient	**Unit**	**Minimum**	**Average**	**Maximum**
Nitrogen	Mg/l			
	Kg/d/ha			
Phosphorous	Mg/l			
	Kg/d			