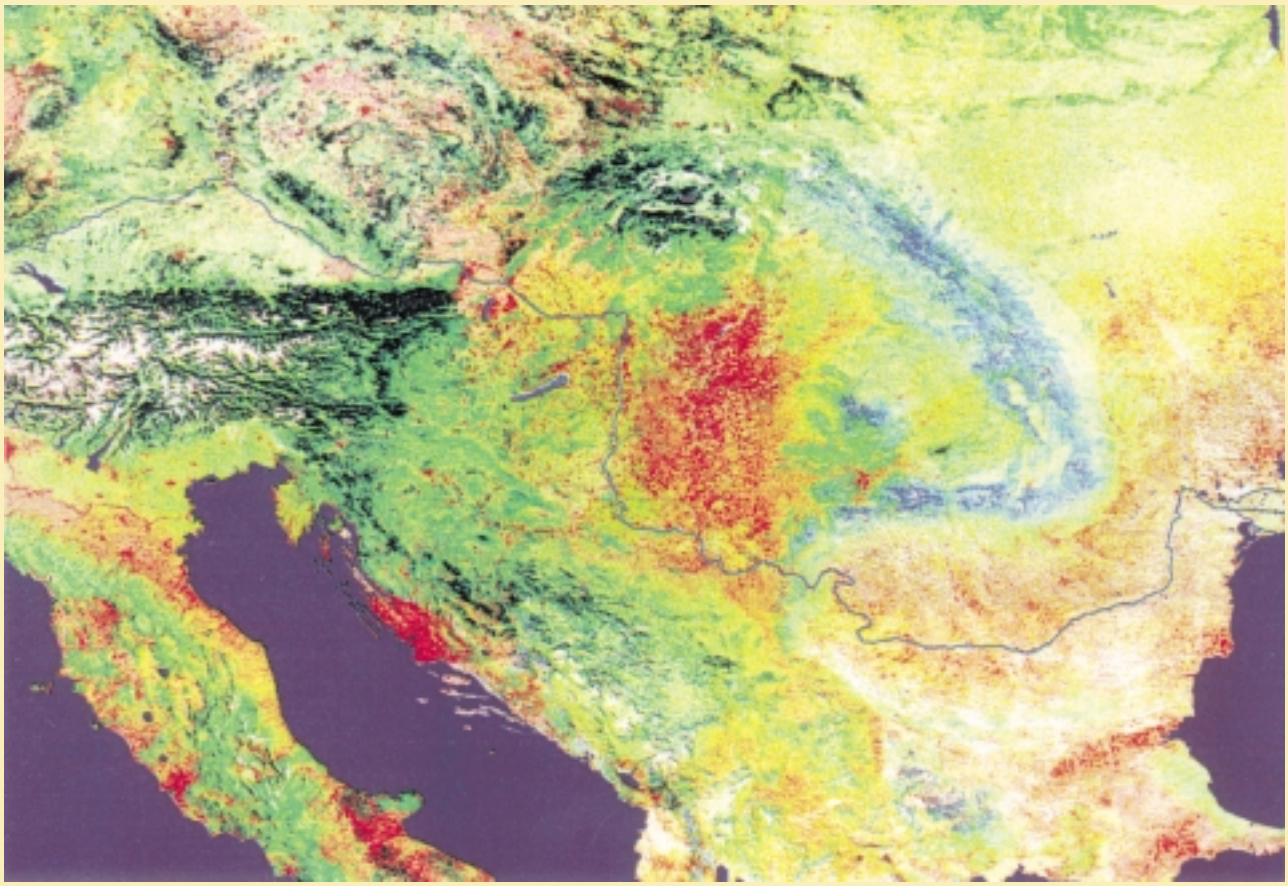
DANUBE POLLUTION REDUCTION PROGRAMME

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME REPORT

June 1999



Programme Coordination Unit
UNDP/GEF Assistance

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Prepared by

ROLF NIEMEYER, GFA - UMWELT, GERMANY

Preface

The present Pollution Reduction Programme was prepared in the frame of the UNDP/GEF assistance to the Danube Programme Coordination Unit. The PRP presents a group of projects and measures that respond to identified pollution and transboundary effects in the Danube River Basin and the Black Sea. Projects for pollution reduction are presented for identified sub-basin areas and for significant impact areas (SIA). The proposed programme supports the strategies and policies as defined in the updated Strategic Action Plan (SAP) as well as the implementation of the Danube River Protection Convention.

Despite the improvement in the scope and the quality of data and information, it should be noticed that information concerning the expected pollution reduction from proposed projects as well as the associated investment costs, collected in the frame of the National Review Reports, need still to be further completed. The proposed projects largely focus on point sources of pollution although diffuse pollution from agriculture and other activities is responsible for a significant portion of the nutrients reaching the Black Sea.

Considering these constraints, the Pollution Reduction Programme does represent a major step forward in developing a comprehensive response to the need for pollution reduction in the Danube River Basin. The PRP is the basis for developing investment portfolios in support of the ICPDR Action Plan.

A first Draft of this report has been discussed and amended at the Pollution Reduction Programme Workshop held in Hernstein the 12th to 15th of May 1999. Decision-makers from all Danube countries as well as key water experts from throughout the basin have analyzed the results and made suggestions for improvement. The present report has been amended and finalized based on the results of this workshop.

Under the conceptual guidance and organization of activities by **Joachim Bendow**, UNDP/GEF Project Manager, the present report was prepared by **Rolf Niemeyer**, international water engineering consultant with the UNDP/GEF team of experts. Further assistance was provided by **Andy Garner**, Environmental Specialist, **Marcela Fabianova**, Technical Assistant in the UNDP/GEF project team, **Reinhard Wanninger**, UNDP/GEF Consultant for economic and financial analysis and **Jos van Gils**, water quality modeling Expert.

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1. Introduction

1.1. Purpose of the Danube River Pollution Reduction Programme

The aim of the Danube River Pollution Reduction Programme is the improvement of the water quality in all the water bodies in the Danube River Basin. This includes the surface water in the rivers as well as groundwater. The Danube transports its waters into the Black Sea. As the Black Sea is the receiver of various other rivers and partly already negatively influenced by nutrients and other polluting substances, the Danube River Pollution Reduction Programme will be of great importance for the reduction of the pollution into the Black Sea.

This Pollution Reduction Programme Report (PRP Report) gives an overall view of the most important on-going and planned measures for the reduction of pollution in the Danube Basin. It is a comprehensive report which incorporates the information collected in various other reports like:

- SAP – Strategic Action Plan from April 1994 and its Revision from April 1999
- National Reviews of Germany, Austria, Czech Republic, Slovak Republic, Hungary, Slovenia, Croatia, Yugoslavia, Bosnia-Herzegovina, Romania, Bulgaria, Moldavia, Ukraine, (especially Part D, Water Environmental Engineering)
- Transboundary Analysis Report from March 1999
- Danube Water Quality Model Simulations in Support of the Transboundary Analysis and the Pollution Reduction Programme, May 1999
- Data base with on-going and planned projects in the Danube basin (the data base replaces the former ”Project files”)

The PRP Report can be considered as the basis for the necessary actions with high priority to improve the water quality in the Danube and its tributaries. The list of projects for pollution reduction has been agreed within the countries as well as in the sub-basin areas and in the whole basin area. The report contains the most important information for first steps towards the implementation of the Pollution Reduction Programme. It is the first all-embracing programme for the entire Danube basin especially the central and eastern part.

The main source for this report are the National Reviews (Part D: Water environmental engineering). Part D of the National Reviews serves to describe the actual state with regard to water pollution in the Danube River Basin and how to improve the situation by implementing physical and non-physical measures and projects respectively.

The National Reviews have been elaborated following the exemplary table of contents which was presented within the scope of the workshop in January 1998 in Budapest, Hungary. This approach allowed the experts a structured elaboration of the Part D so that the reader disposes quickly of the essential results of the reports.

All submitted National Reviews have been evaluated with regard to their central statements. Thus, the present report contains a relatively brief textual summary and characterisation of the essential statements and conclusions. More detailed information taken from the National Reviews, Part D, are summarised in tabular form and serve as general overview (see annex 1).

A further main part of this report are the tables with the projects which were originally prepared as project files. Now these project files have been transferred into the project data base. All lists of projects (see annex 5) have been elaborated from this new project data base. The data base will allow to update immediately the necessary information about the projects and can serve for the monitoring of project status.

The first SAP from April 1994 contains strategies for the solution of various problems in connection with the situation of water and environment in the Danube basin. It is directed to the governmental, regional, municipal institutions as well as water supply utilities, water consuming and contaminating industries and agriculture. The SAP has four equal important tasks:

- Reduction of detrimental effects of activities in the Danube Basin on river ecosystems and the Black Sea,
- Maintenance and improvement of the availability and the quality of the water in the Danube Basin,
- Installation of measures for protection of contamination as result of accidents,
- Development of regional co-operation in water management.

The necessary measures are determined for the most important sectors. These are as follows:

- Construction of municipal sewer-systems and wastewater treatment plants,
- Reduction of industrial wastewater,
- Reduction of emission of harmful substances from agriculture,
- Maintenance and restoration of wetlands and floodplains of the Danube and its tributaries,
- Integrated water management,
- Reduction of risks of accidents with hazardous substances,
- Investments.

The revised SAP from June 1999 updates the information and develops further strategies for pollution reduction and sustainable water management. Besides the sector strategies the financing mechanisms of the ICPDR action plan play an important role in the SAP on current affairs.

1.2. Special Status of European Union Member Countries Germany and Austria

Within the context of the PRP it is necessary to make a distinction between Austria in combination with Germany on the one side and the other states within the Danube River Basin on the other side. In contrast to other states within the Danube River Basin, both Germany and Austria are already members of the European Union and dispose of relatively highly sophisticated technical systems in order to minimise the discharge of polluted wastewater.

In Germany and Austria the existing and relevant EU-legislation is already incorporated in the national laws and regulations. Concerning some parameters the national regulations are even more strict than in the EU regulations.

High investments for wastewater treatment plants in industry and municipalities have been made in Austria and Germany in order to reduce water pollution and to fulfil the requirements of EU directives.

Austria and Germany will be able to meet the requirements of the EU directives especially the EU water framework directive by their own administrative and financial resources.

The objectives defined in the SAP are already widely fulfilled in Germany and Austria through for example effective legal regulations, appropriate administrative structures and functioning measuring and monitoring systems.

The corresponding National Action Plans of Germany and Austria do not serve as a basis for the financing of projects by international financing institutions.

Germany

Germany has presented the "National Action Plan of Germany", December 1996 (in German language), which gives details to the status and the water management and the planned national actions.

In the German part of the Danube River Basin, located in the area of the federal states/"Länder" Baden-Württemberg and Bavaria, the investments in water pollution reduction especially in wastewater treatment plants exceed the amount of 1,0 billions DM per year (570 millions US$). The state supports the engagement of the municipalities with about 420 millions DM per year (240 millions US$). Because of the high investments in pollution reduction (wastewater treatment plants, changes in the industrial processes towards cleaner and water-saving production (water recycling)) during the last 2 decades no "hot spots" exist in the German part of the Danube River Basin.

In spite of the already reached high level of water quality management and exhaustive and effective water treatment facilities, Germany will continue with investments in the improvement of pollution reduction measures to contribute to easing the burden of the Danube.

Austria

Austria has no SIA (Significant Impact Area) as there is already an advanced wastewater treatment (76 % of inhabitants are connected to a municipal wastewater treatment plant (WWTP) with at least biological treatment. Only some WWTP have to be expanded and upgraded, in particular concerning nutrient removal.

Austria had made large investments to improve wastewater treatment, and is still investing. Between 1993 and 1999 Austrian's investments for wastewater treatment was about 9 billions ATS per year (1000 ATS = 87 US$). About 8,3 billions per year for municipal WWTP, 0,9 billions for small (private) WWTP (< 50 PE) and about 0,8 billions per year for industrial wastewater treatment measures. The same amount of about 10 billions ATS per year is considered to be invested in the forthcoming years.

The term of "hot spot" does not mean for Austria that there is still an extensive pollution due to the lack of biological wastewater treatment plant or due to an inadequate/insufficient treatment. Hot spot for Austria means:

- concerning municipalities: that a WWTP exists with biological treatment (usually BOD-reduction of >95 %) already complying with the provisions of the *EU-Urban Wastewater Directive 91/271*. In order to meet the more stringent requirements (emission standards) laid down in the Austrian "1. Emission Ordinance on municipal wastewater treatment" every WWTP also have to have N removal of at least 70 % and P removal with the max. concentration of 1 mg P/l.
- concerning industry: stringent emission values are laid down in "Emission Ordinances" (differentiating between the industrial sectors) describing the state of the art of wastewater treatment. Those who do not meet already the requirements have to be upgraded within a certain period of time.

This is not yet achieved by all WWTP. Those WWTP (Municipal WWTP > 250.000 PE) which still have to be upgraded to the requirements of the "Emission Ordinances" are regarded as sort of "hot spots". Within this upgrading process capacities of WWTP, where necessary, are extended as well. In connection with the explanation of "hot spots" in Austria given above, it was not useful to differentiate the hot spots according to high, middle and low priority.

Austria has no agricultural point sources due to the traditional small size of the farms and the tradition of low input family farming. The important financial incentives of ÖPUL (Austrian Programme of Environmental Friendly Agriculture) to avoid intensification of production and a nation wide Action Programme in line with the provisions of the EU Nitrate Directive 91/676 was implemented so that no agricultural hot spot regions do exist in Austria.

Austria has presented the “National Action Plan for Austria”, February 1996 (in German language)

Conclusion

Thus, the problems concerning water quality and the measures within the ”Danube River Pollution Reduction Programme” launched in future by Germany and Austria have to be approached in another way. The main objective is to perfect the existent technology and technical schemes, not to implement still absent basic wastewater treatment facilities with only a few exceptions.

The on-going and planned projects for pollution reduction in Germany and Austria are included in the project data base and in the list of projects even if no external financing is expected.

In summary it may be said that Austria and Germany are ”Danubian States” and actively in trouble for the improvement of the water resources of the Danube basin, but they will not be included in any donor financed programme.

The planned actions and investments in Austria and Germany fully meet the requirements of the EU-directives. At the moment all necessary actions are under preparation to reach the goals of the new EU-water-framework directive as soon as this directive will be set in force.

By contrast, in the other 11 countries basic technology has to be implemented or rehabilitated first. Therefore, within the scope of the ”Danube River Pollution Reduction Programme” the problems and countermeasures which will be launched by the former socialist political systems in Central and Eastern Europe are in primary focus of attention.

2. Actual State with Regard to the Water Quality in the Danube River Basin

All countries within the Danube River Basin (including Germany and Austria) have to note that the water quality in many of the surface and groundwater water bodies is not satisfactory. As a rule, the insufficient water quality is directly related to anthropogenic activities and pollution sources. In other words, on the basis of the analysis of the National Reviews (Part D, Water Engineering) about principal sources of pollution of water bodies the following main 4 fields may be quoted:

- Insufficient wastewater collection and treatment on municipal level,
- Insufficient wastewater treatment of industrial enterprises,
- Water pollution caused by intensive agriculture and livestock breeding,
- Inappropriate waste disposal sites.

The insufficient wastewater collection and treatment on municipal level is mentioned as the chief problem. Nearly all countries advance the necessity of the improvement of treatment of municipal wastewater as the first and most urgent matter. According to the adjustment of the national economy and the degree of economic development (industrial or agricultural) the pollution caused by industry or husbandry is in the second highest focus of attention.

Finally, the inappropriate dealing with wastes (domestic wastes as well as hazardous wastes), their problematic landfilling and the application of inadequate landfill and leachate treatment technologies aggravates the situation with regard to water quality in the Danube River Basin and its tributaries.

It is understandable that the discharge situation varies along the reaches of the Danube. Thus, the situation in the middle and downstream part of the Danube River Basin differs from the upstream situation concerning the collection and treatment of wastewater.

Despite the special situation of Austria and Germany and due to the fact that the EU directives concerning water quality management have been successfully addressed there is still also a need for improvement of N and P-reduction. This shows and underlines the result of the ”Danube Water Quality Model Simulations in Support to the Transboundary Analysis” and Pollution Reduction Programme Report, June 1999.

A more precise description of the water quality situation in the Danube basin is contained in various specific reports e. g. the TNMN yearbook 1996 and the Transboundary Analysis, 1999.

2.1. Hot Spot Analysis

The “Transboundary Analysis Report”, June 1999, gives clear and comprehensive information on the identified hot spots. Therefore one can refrain from repeating the hot spot analysis in this report. As shown in table 2.1-1 in the Danube basin the overall number reaches 513 hot spots. In the data base 421 projects are proposed actually by the countries. A number of 246 proposed projects address the identified hot spots.

Table 2.1-1 Identified hot spots and projects in the countries

Country	Number of identified hot spots	Number of hot spots covered by projects	Number of projects in the data base
Germany	(10)	(10)	12
Austria	(6)	(6)	7
Czech Republic	17	17	21
Slovak Republic	20	25	40
Hungary	68	8	10
Slovenia	29	24	26
Croatia	25	22	76
Yugoslavia	83	40	57
Bosnia-Herzegovina	22	21	24
Bulgaria	20	21	28
Romania	185	35	69
Moldova	16	5	18
Ukraine	12	12	33
Total	513	246	421

2.2. Insufficient Wastewater Treatment on Municipal Level

With regard to the situation of wastewater treatment on municipal level the following reasons for the problematic state of affairs can be given (over and over again recurring within the scope of all portrayals of the middle and eastern Danube countries):

- Missing wastewater collection and treatment facilities,
- Generally poor condition of the facilities,
- Antiquated and unreliable treatment technology,
- Insufficient maintenance of technical schemes,
- Lack of qualified staff / personnel,
- Lack of financial means (insufficient financial resources for building, reconstruction and extension).

2.3. Insufficient Wastewater Treatment in Industrial Enterprises

The degree of industrial development and adjustment within every single country varies. Thus, the importance and amount of the pollution caused by the industrial sector varies as well.

In the Danube River Basin practically all industrial branches are represented. Among others the following industries operate in the Danube River Basin:

- Chemical Industry
- Electrical Industry
- Engineering Works
- Metallurgical and Galvanic Industry
- Textile Industry
- Sugar Industry
- Paper-making Industry
- Tanneries

- Wood-making Industry
- Food Industry
- Pulp-mills
- etc.

Thus, there is no doubt about the extensive range of pollution and discharged contaminants. If industrial wastewater is directly discharged into a water body insufficient treatment and purification cause pollution of the waters with hazardous compounds.

In many other cases industrial wastewater is discharged without any or with insufficient treatment into the public sewer network. This causes vast problems at the wastewater treatment plants so that their purification capacity is not sufficient or completely obstructed.

A missing legal framework, the insufficient application of existing laws, the missing supervision and monitoring by the administration or the difficult financial situation of a large number of enterprises avoid a satisfactory industrial wastewater treatment.

An overall impression is that economic activities have been decreased since the demise of the Eastern Bloc. That is the reason why the pollution load has decreased as well without implementing better industrial wastewater treatment facilities or improving the production processes towards cleaner production.

Therefore, the prediction is that with the further (re-)development of industry and the accompanying implementation of better treatment schemes the pollution load caused by the industrial sector all together will stagnate.

2.4. Intensive Agriculture and Breeding Farms

The National Reviews give detailed information about the diffuse (non-point) and point sources of pollution as the result of agriculture as well as breeding farms. The pig and cattle farms are identified as point sources. These hot spots are in general relatively easy to eliminate by the treatment of the liquid manure. The diffuse sources of pollution caused by the intensified plant production can be reduced by the improvement of the agricultural practices.

The inappropriate and excessive usage of fertilisers (liquid manure, agrochemical products etc.) is the main reason for the contamination with nitrates and phosphates. In addition, the use of pesticides causes a crucial situation as well because it is unavoidable that contaminants reach the groundwater layers.

But it is not as easy as it seems to forbid the usage of harmful pesticides and herbicides. The rapid prohibition of plant protecting pesticides is in some countries in the lower Danube basin not feasible in a very short period.

In summary, due to the past agriculture practices has resulted in a water contamination by nitrogen, phosphorous, pesticides and others.

2.5. Disposal Sites

Only in a few cases do disposal sites have an appropriate technology (landfill leachate collection, sealing systems, biogas collection and energy generation, etc.) to avoid re-discharge of contaminants. In addition, at dumps with non-existent or inadequate compacting procedures up to 60 % of precipitation will reappear as polluting seepage. Consequence of the non-controlled landfills is the introduction of contaminants in the ground and, the pollution of valuable groundwater resources.

It is very difficult to bring this problem under control due to the fact that it is nearly impossible to trace back the source / point of departure of the discharge of the contaminants.

Due to the non-homogenous and unknown composition of most landfills effective countermeasures should be all-embracing (which is unfortunately synonymous with expensive).

2.6. Remedial Measures

In the respective countries, measures and projects are on-going with the objective to reduce the water pollution in all sectors. EU-members (Germany, Austria) and EU-candidates (Hungary, Czech Republic, Slovakia, Slovenia) are on the way to undertake comprehensive measures for the improvement of WWTP in the municipalities as well as in the industrial plants. These countries are working to strictly follow EU-directives concerning the water quality.

3. National Targets

3.1. Current National Targets for Pollution Reduction

All countries have clear targets for pollution reduction (see the overview in annex 1). But there are still great differences in reaching the high standards of the EU-directives. Generally it can be stated that the countries with high interest in EU membership undertake the greatest efforts to implement the best environmental practice.

3.2. Analysis of National Targets in Relation to Danube River Basin Targets

The ”Convention on Co-operation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention)” is a basis for the water policy in all countries in the Danube basin. This is especially effective after the convention came into force after the relevant number of member countries ratified the convention by October 1998.

The countries follow in their national targets the binding clauses and have already undertaken great efforts in the direction of implementing the water protection measures. The nature of main problems regarding water pollution of the single countries is nearly equal. Thus, the national targets against the backdrop of sustainable economic development can be summarised and generalised as follows:

- Preservation of still clean water bodies and water resources,
- Stopping of further degradation of polluted water bodies,
- Improvement of water quality by appropriate remedial and preventive measures.

The detailed quantification of these national targets is elaborated in the National Reviews of the single countries (Part D, Water Engineering) and summarised in the overview tables in annex 1.

Of first priority is the creation of a legal and administrative framework for an effective water management. This framework can be created by the passing of a basic water act, further specific laws, bylaws, technical guidelines and regulations and respective legally binding standards and norms.

Furthermore, the creation and implementation of the legal basis should imply the development of an adequate financial system as well (embodied in the laws and regulations, e.g. polluter pays principle etc.) which can support administrative work by offering tools for effective application of laws.

The appropriate technical implementation of measures should be guided and regulated by the above mentioned standards and norms in line with respective legislation. In addition, a complete monitoring system should be implemented in order to:

- Get information about the actual state with regard to water quality, representation and evaluation of pollution situation,
- Monitor the impact of implemented physical and non-physical measures and for,
- Long-term recording of the relevant data to portray the development of pollution situation, control and inspection system.

The analysis of national targets in relation to the Danube river convention shows generally clear strains to address the agreed objectives of co-operation.

The updated SAP Strategic Action Plan from June 1999 is the current strategic document for the remedial measures of all countries in the Danube basin.

3.3. Targets in Relation to Black Sea

There is an overall accordance among all the countries concerning the nutrient loads from the Danube Basin to the Black Sea:

- All Danube River Basin countries contribute nutrient loads to the Black Sea as demonstrated by the results of the DWQM - Danube Water Quality Model Simulations
- Pollution reduction is a common task of all Danube River Basin countries.

This means that all countries agree to strengthen their efforts to implement the necessary steps for reduction of water pollution not limited to the local hot spots but also for reduction of water pollution by nutrients which have adverse transboundary effects and a negative impact on the water quality in the Black Sea.

4. Legislation

4.1. National Water Acts or Laws

Generally speaking, all countries dispose of water management legislation. It is discernible that throughout a dynamic process is inherent in the water management legislation. The main objective of all countries is to create an effective water management legislation according to the positive experiences made in Europe with European legislation. Thus, either the existing legislation in force is already sufficient for the future water management or an adequate and updated water act is currently under preparation.

4.2. Technical Guidelines and Regulations

In most cases the situation regarding the amount and range of action of standards and norms is described as insufficient or in need of updating. Therefore, many countries are still in the elaboration phase of technical regulations. For that a lot of countries orient themselves to already existing technical guidelines and regulations of foreign / European countries. More details can be learned from the overview tables in annex 1.

4.3. Law and Practice on Water Pollution Control

Within the framework of the comments on law and practice of water pollution control the single expositions appear heterogeneously. In summary it may be said that the effectiveness of law and practice on water pollution control is determined by the legal framework of each country, the effectiveness of administration and the capacity of polluters to implement measures for improved wastewater treatment and adequate disposal of solid wastes.

In reference to legislation, technical guidelines and additional economic instruments which are currently under preparation by some countries set out how law and practice on water pollution control could take shape in future (compare the overview tables in annex 1).

Especially in the countries which are not actually in the position as EU-candidates there is still a need for the improvement of water related laws and the practice and monitoring.

4.4. European Legislation

The EU member countries are obliged to adopt the EU directives and transform them into national law. The EU-candidates are in the process of adoption to insure the obligations in schedule. Czech Republic and Hungary undertake at this time great efforts to overtake and to implement the EU directives. Other countries like Slovenia follow this line and transform their national regulations according to the EU directives.

At the moment there are about 30 directives directly or indirectly related to the water sector. The most relevant directives can be summarised as follows:

EU-directives concerning emissions:

- Council Directive 76/464/EEC of 4 May 1976 **on pollution caused by certain dangerous substances discharged into the aquatic environment** of the Community
- Council Directive 80/68/EEC of 17 December 1979 on the **protection of groundwater against pollution caused by certain dangerous substances**
- Council Directive 91/271/EEC of 21 May 1991 concerning **urban wastewater treatment**

EU-directives on water quality

- Council Directive 76/160/EEC of 8 December 1975 concerning the **quality of bathing water**
- Council Directive 75/440/EEC of 16 June 1975 concerning the **quality required of surface water intended for the abstraction of drinking water** in the Member States
- Council Directive 78/659/EEC of 18 July 1978 on the **quality of fresh waters needing protection or improvement in order to support fish life**
- Council Directive 79/869/EEC of 9 October 1979 concerning the **methods of measurement and frequencies of sampling and analysis of surface water intended for the abstraction of drinking water** in the Member States
- Council Directive 80/778/EEC of 15 July 1980 relating to the **quality of water intended for human consumption**

Other EU directives from the water sector

- 77/795/EEC: Council Decision of 12 December 1977 establishing a **common procedure for the exchange of information on the quality of surface fresh water** in the Community
- Council Directive 91/692/EEC of 23 December 1991 **standardizing and rationalizing reports on the implementation of certain Directives relating to the environment**
- 92/446/EEC: Commission Decision of 27 July 1992 concerning **questionnaires relating to Directives in the water sector**
- Council Directive 86/278/EEC of 12 June 1986 on the **protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture**
- Council Directive 91/676/EEC of 12 December 1991 concerning the **protection of waters against pollution caused by nitrates from agricultural sources**
- 86/85/EEC: Council Decision of 6 March 1986 establishing a **Community information system for the control and reduction of pollution caused by the spillage of hydrocarbons and other harmful substances at sea**

EU-directives related to wetland protection

- Council Directive 79/409/EEC of 2 April 1979 on the **conservation of wild birds**
- Council Directive 92/43/EEC of 21 May 1992 on the **conservation of natural habitats and of wild fauna and flora**

EU-directive under preparation

The ”Council directive establishing a **framework for Community action in the field of water policy**” (Water framework directive) is still under preparation. It can be expected that the directive will come into force at the end of 1999 or early in 2000. Because of the importance of the water framework directive the main issues are described in annex 3.

In article 26 of the water framework directive repeals and transitional provisions are foreseen. The following are repealed 7 years after the enactment of the directive: decision 77/797/EEC; directive 79/869/EEC; directive 75/440/EEC. The following are repealed 13 years after the enactment: directive 78/659/EEC; directive 79/923/EEC; directive 80/68/EEC and directive 76/464/EEC.

Internet

The above mentioned EU-legislation and further bodies of EU-law are filed in the Internet as well. In order to get the complete legislation-texts and for complementary information please enter the following address: ***http://europa.eu.int/eur-lex***

Evaluation of measures and application of EU directives in response to non-point sources of pollution with particular attention to agricultural practices and land use

According to Danube Water Quality Model Simulations the agricultural sector contributes to emissions into the Black Sea with 48 % of N and 47 % of P. This means that in this sector there is still a great potential to reduce nutrient pollution especially from non-point sources.

The main reference for this item is the **Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources**. The EU members Germany and Austria made already their own experience in the implementation of this EU directive. From their implementation programmes the accession members may adopt the preparation of administrative and technical guidelines and to implement the directives by tailor made special programmes.

As a general perspective in Middle and Lower Danube countries it may be considered that nutrient application in agriculture will increase in future to assure the balance between crop demand and nutrient input in order to be competitive. Therefore clear recommendations for accession countries in this region can be summerized to avoid the negative impact of the agricultural practices in the past decades.

The main problem concerning the manure management is the lack of proper handling. This means that there is an inappropriate application of manure to cultivated land or no treatment facilities to protect the water bodies. Because of inadequate measures the water bodies are heavily polluted by the manure. In many cases the manure is disposed directly into the rivers. If the manure is applied to the arable land this often happens at the wrong time due to lack of appropriate storage capacities.

The overall objective is to reach the balance between nutrient demands by crop and nutrient input (fertilizer, manure, input by soil capacity and by air). According to experiences there is a general limit for manure application which should not exceed 170 kg N/ha.

Some measures for appropriate nutrient management in agriculture can be recommended as follows:

- Prepare technical fertilizer guidelines for farmers according to good agricultural practice
- Limit or reduce livestock density per hectare cultivated land
- *Assure green/organic coverage of arable land during winter time*
- Rehabilitate green belts along the river according to local conditions and river size (fighting erosion and P-input into water bodies).
- Plant trees to reduce erosion and runoff of nutrient from cultivated lands to the rivers: (see Council directive 91/2091 EEC, concerning afforestation)
- Provide sufficient storage capacities and/or wastewater treatment facilities for extreme large livestock holders.
- Provide standardized technical guidelines for design and implementation of manure storage facilities.

A strong support by government is essential for nutrient reduction. The government has to create the legal framework, setting obligations to farmers and to give financial support.

The indicators, which are necessary to assess the success of the implementation of the nitrate directive are discussed or already accepted by the EU. The main items are:

- Limitation of nitrate concentration in surface and ground water (aim: < 50 mg NO_3/l) and avoid eutrophication in surface water
- Use of agricultural statistics on extent of agricultural land, livestock density per hectare of agricultural land
- nutrient balances at farm level respectively at field level to assure tailor made nutrient application

For the sequence of improvement measures it can be recommended to implement as follows:

- Eliminate point sources of agro-industry by
  - down sizing the livestock breeding farms
  - improve manure storage capacities
  - construct WWTP
- Reduce non-point source pollution by
  - strengthening and/or implementation of advisory boards
  - elaboration and application of good agricultural practices (91/676/EEC)
  - elaboration of guidelines for fertilizer application and different crops applicable for farmers (not for scientists !)
  - design of standardized technical guidelines for manure storage facilities (plans ready for construction)
- Introduce facilities for ecological farming including necessary marketing facilities

As a basis for financial support to the farmers the **EU-Council directive 91/2078 EEC concerning the extensification of agriculture for environmentally sound practice** may serve the national governments to create appropriate programmes. In this directive certain regulations are set for financial support of farmers to reduce negative impact of agriculture to the environment, especially financial support for extensification of production and financial support for bio-farming.

To avoid the creation of new non-point sources for water pollution or the damage of soils with heavy metals the application of sludge in agriculture should follow strict rules. The sewage sludge from municipal WWTP contains very often heavy metals in hazardous concentrations. The **EU-Council Directive 86/278/EEC on the protection of the environment and in particular of the soil, when sewage sludge is used in agriculture** gives clear guidelines for sludge application in agriculture.

4.5. National Responses to EU Legislation

Following the expositions of the countries the European legislation exerts influence on the national legislation of the single countries. In particular in those countries which are interested in a future incorporation into the European Union the European legislation, directives and regulations forge ahead (by contrast for instance, in the Ukraine, the harmonisation of national legislation with EU legislation is formulated only as long-term objective). But not in every case a harmonisation is necessary because some countries point out that in isolated cases the national legislation concerning threshold values and conditions is already stricter than that of the EU. For more details see the overview tables in annex 1.

The analysis of national responses to EU legislation or regulations especially for accession countries is quite clear and simple. The Czech Republic, Slovakia, Hungary and Slovenia as the next accession countries are in the process of adoption of EU-directive with strict schedules. This means that all national laws as well as administrative and technical regulations are in transition to meet the demand of the EU-directives. Currently there are EU-Phare projects in preparation for the implementation of new regulations in the administrative process in the Czech Republic and in Hungary. The other countries, despite the vague perspective of future membership, are also in progress of adoption of EU directives. For instance Romania has already 60 % of EU water legislation approximated in the national legislation.

Especially the accession countries are assumed to implement urgently the following EU-directives in this sequence:

- 91/271/EEC: urban wastewater treatment
- 91/676/EEC: pollution caused by nitrates from agricultural sources
- 75/440/EEC: quality of surface water intended for the abstraction of drinking water

and then but not so urgent:

- 76/160/EEC: quality of bathing waters

This list is not exhaustive but gives a first hint where to concentrate on primarly.

4.6. Water Administration

A well functioning water administration on all administrative levels is essential for the day to day implementation of the legislation. A clear and comprehensive legislation with by-laws and technical regulations is as important as the design and implementation of projects to improve the water quality. But without a strong administration which executes the licensing and the most important water quality inspection services the legislation will have only a very limited effect. In some of the countries in the Danube basin are still deficits on the side of well equipped administrative units with instruments, material and trained personal for inspection services.

5. On-Going and Planned Measures for Pollution Reduction

5.1. Introduction

This section will provide a summary of detailed information about on-going and planned projects in the respective countries. As far as information are available it will provide a typology of projects. The type of projects in each sector and different stages of advancement will be indicated. This means for a wastewater treatment project a differentiation between expansion, rehabilitation or entirely new construction. An important question is whether the sewer and/or collector system is included. The fact of the matter is that most of the available project proposals do not go to these details but should necessarily be included in the amended project files in the future.

Generally speaking, the measures should serve to achieve the fixed objectives. The foreseen measures are characterised by heterogeneously approaches, i.e. the measures have political, social, legal and economic contents.

So far in most cases the financial situation has limited the efforts to implement remedial and preventive measures respectively. Furthermore, the implementation of the Best Available Techniques (BAT) can represent a problem. First due to the already mentioned lack of financial means and secondly due to the lack of corresponding knowledge. On the basis of identified hot spots, the concrete projects have been proposed by the single countries.

Project data base

The proposals take shape within the scope of the project files which have been prepared and presented by the countries. The information from the prepared project files have been transferred to a newly established data base. The structure of the “Project Database” follows the table of contents of the project files, but some amendments have been included. The form of this project data base is visible in annex 2.

For an easy handling the software ”MS-Access” has been chosen. MS-Access is part of the software packet “MS Office Professional” as well as “MS Excel”. The database runs only under version Office97 and Windows95.

Because of the developed structure of the data base there is only a limited knowledge required for its application. The use of standard software MS Access and MS Excel can be considered as a normal standard in the field of PC application. The software handling can be learned from the attached handbook or additional literature. The know how of basic routines of MS Access for date entry and query is sufficient for the efficient use. For further calculations and evaluations of the query results of the data base the tables can be copied into Excel sheets.

Most of the information for the preparation of the tables in the annexes and graphs in this report is extracted from the project data base.

Now the data base will be the only tool for the future collection of proposed and on-going projects. It is easy to add additional information on the projects and to create and update tables and graphs. The respective countries should take the duty to update the project data base for their country. They may obtain the accompanying files with the national projects from the secretariat of the ICPDR for the additional use on national level. The data base can also be used for planning of additional projects which are of local or national importance as well as for monitoring purposes. It will became an integral part of the information system of the ICPDR.

5.2. Summary of Projects per Country and per Sector

The following summarises briefly the central statements of the single countries made within the frame of the National Reviews (Part D, Water Engineering). The main character of the launched and planned measures is described and the essential contents of projects have been analysed per sector. For more details please refer to the tables in annex 1.

5.2.1. Reduction of Water Pollution from Municipalities

The most urgent objective is to reduce the pollution load from municipal wastewater. The countries agree that first of all measures should be implemented as far as sewer systems and wastewater treatment plants are concerned.

Improved wastewater treatment especially for nutrient reduction is essential, particularly through the use of alternative technologies. A key criterion for evaluating this category of project will be the measure of nutrient reduction per dollar spent.

Therefore, proposed projects are the rehabilitation and extension (third treatment stage: nutrient removal) of existing sewer and wastewater treatment facilities as well as the complete new construction of technical schemes for wastewater collection and treatment. Naturally, all conceivable combinations are possible, for instance rehabilitation of sewer system and simultaneous new construction of a wastewater treatment plant. Past experience has shown the necessity to dimension properly the capacity of technical schemes according to the size of municipality. Only by well-adjusted technical solutions the future operation and maintenance will be successful and cost-covering.

5.2.2. Reduction of Water Pollution from Industries

As a rule, industrial wastewater are heterogeneously compounded and intensely polluted so that great efforts (employment of high sophisticated techniques) are necessary in order to realise a satisfactory purification performance.

Obviously, within the scope of the National Reviews the main industrial enterprises responsible for water pollution have been identified and concrete measures have been proposed in order to improve the situation.

With regard to the reduction of water pollution from industries it is indispensable to consider and analyse every single case, i.e. every production plant and the problems related to its individual industrial wastewater have to be analysed in a detailed manner and all potential counter-measures have to be styled according the particular requirements.

Analysing the character of possible measures and projects for pollution reduction from industrial discharges, it is recommendable to take into consideration both possibilities:

- Introduction of new technologies in order to prevent and minimise the pollution discharge from industries (by cleaner production, water- and product-recycling, dry production) and
- end of pipe strategy: the need of construction of new and powerful treatment facilities.

In the main focus of interest should be the prevention of the appearance of hazardous substances. Thus, it should be given preferential treatment to solutions for cleaner production, water recycling processes and dry production. Only unavoidable industrial wastewater should be treated in an appropriate way.

For direct and indirect discharge of industrial wastewater into water bodies proposed projects are the rehabilitation and extension of existing sewer and wastewater (pre-) treatment facilities as well as the complete new construction of necessary technical schemes.

Above all, the industrial sector is responsible for the existence of hazardous wastes. But not only by sewer (by water as mean of transport) hazardous substances are leaving production plants. Rather, hazardous solid wastes as well as the products of wastewater treatment process (by-product treatment sludge) are often deposited in inappropriate landfills so that the emerged leachate endangers valuable water resources as well. (This aspect has also to be taken into account during consideration of solutions for dry production and the conception for industrial wastewater treatment facilities.)

5.2.3. Reduction of Water Pollution from Agriculture

The pollution caused by agricultural activities is characterised by point and non-point sources. For the point sources it is relatively easy to identify hot spots and projects, respectively, because the reason for pollution is obvious.

It is possible to bring it down to a simple formula that the point sources are in most cases breeding farms without adequate wastewater collection and treatment as well as problems concerning storage of liquid manure. Therefore most of the projects aim at the improvement of wastewater collection as well as wastewater and sludge treatment facilities. Above all it concerns the construction of fully equipped WWTPs, i.e. primary and secondary treatment (biological part with nutrient removal) as well as sludge treatment.

It may be mentioned that not every livestock breeding needs a WWTP to avoid water pollution. The extensive spreading of manure at the wrong time period is the most crucial practice if the manure are not directly released to the next river.

If facilities to store the manure are sufficient and the application on cultivated land is appropriate to Best Agricultural Practice then there is no need for a wastewater treatment. In most cases the application of manure with up to 170 t N /ha /y does not lead to adverse impact on crops, soil and waters. Only in those cases where the manure output exceeds these limits, a WWTP is unavoidable and probably the only way to avoid water pollution.

The exhaustive and inappropriate usage of mineral and organic fertilisers and the use of pesticides cause crucial problems in regard to diffuse water pollution. Therefore, the identification and control of the pollution caused by non-point sources are more difficult.

Only under special circumstances structural project can be proposed. The majority of proposed measures are non-structural. As a result, the main objective is a reform of and a sustainable approach in agricultural practices with respect to fertiliser application, preservation of river and buffer zones, storage of manure and silage and fish farming, and the introduction of levies imposed on farmers to encourage treatment or recycling.

In summary, the reduction of water pollution from the non-point-sources should be brought about the promotion (awareness rising etc.) and implementation of improved and sustainable Land Management.

There is a demand for policy alternatives in agriculture that would specifically assist to reduce nutrient loads to the Black Sea.

- For more immediate effects, policies should be introduced to reduce soil erosion and associated N and P from run-off such as policies that would stimulate or support agricultural belts or green banks.
- Further, policies with a more medium term effect in reducing nutrients could be changes in land use patterns as well as policies that would promote afforestation.
- Policies, to promote good agricultural practices (such as appropriate crop rotating procedures etc.) should be developed with a clear understanding on what "good agricultural practices" actually are. Training programmes on "good agricultural practices" should be offered particularly focussing on optimum nutrient applications in agricultural.
- Policies for reduction of fertilizer usage even further, is unrealistic, at least in downstream Danube countries, given the already low consumption due to markets in transition. New policy measures would assist primarily in preventing a large rise in consumption in the future.

Symbolized view of floodplains in the Danube River Basin

Width of Floodplains

middle of river

Type of Floodplains

- Former Floodplains
- Recent Floodplains
- Back water area of dams

Scale: 1:4.500.000

0 50 100 150 kilometers

Area of historical floodplains in the study area: 41600 km
Area of remaining floodplains in the study area: 8000 km
A floodplain loss of more than 80%

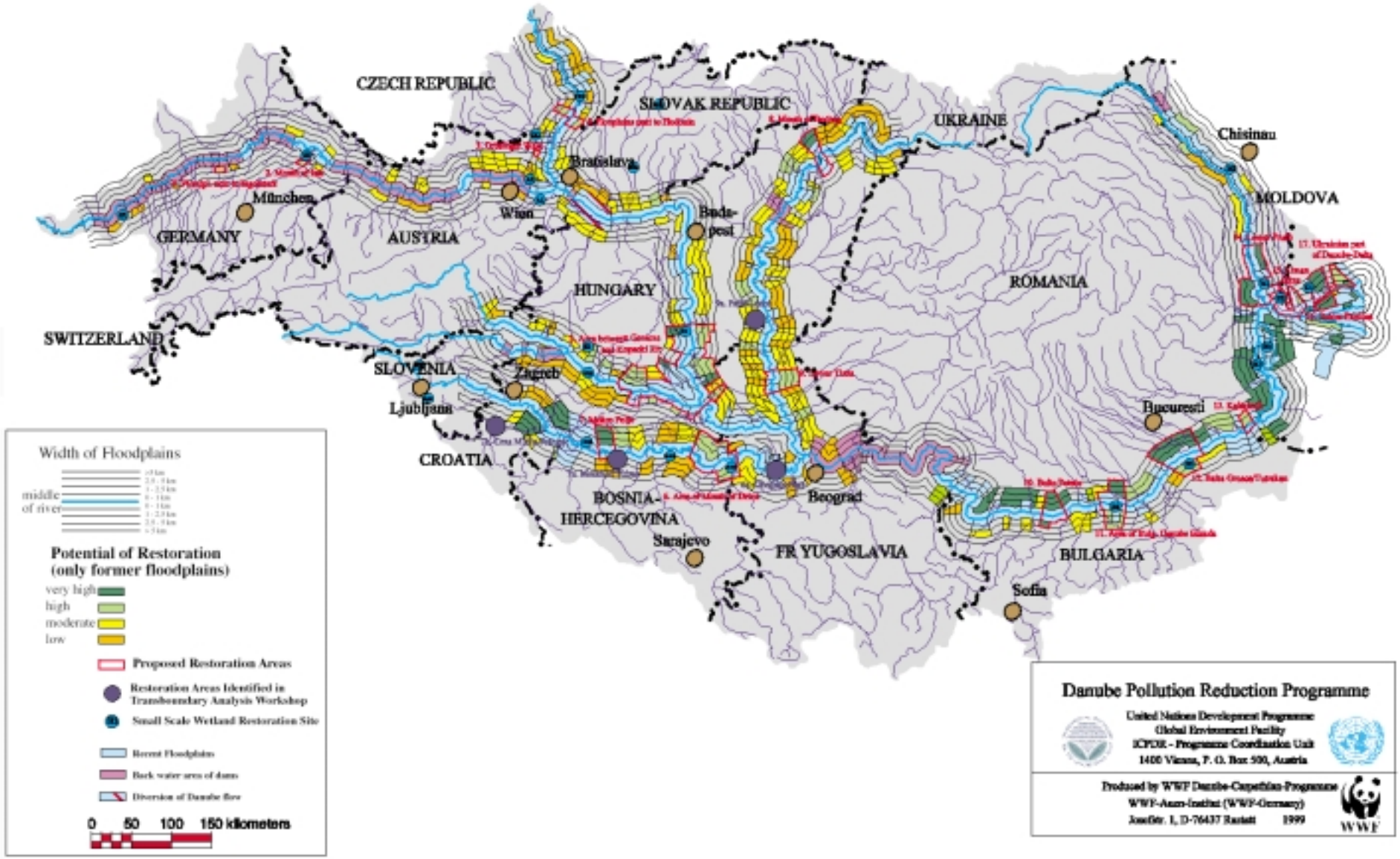
Danube Pollution Reduction Programme

United Nations Development Programme
Global Environment Facility
ICPDR - Programme Coordination Unit
1400 Vienna, P. O. Box 500, Austria

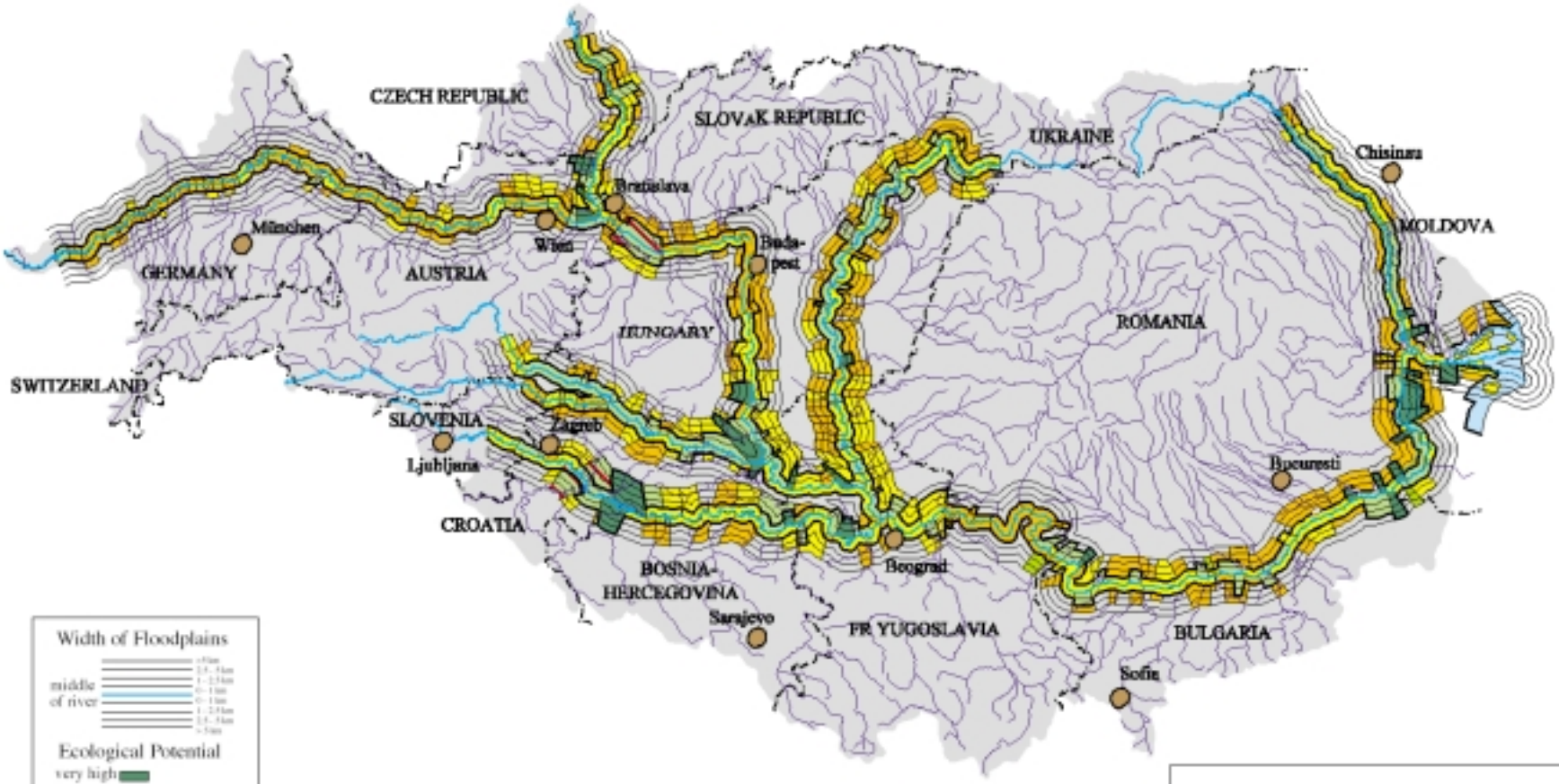
Produced by WWF Danube-Carpathian-Programme
WWF-Auen-Institut (WWF-Germany)
Josefstr. 1, D-76437 Rastatt 1999

WWF

Restoration potential of former floodplains in the Danube River Basin



Ecological potential of floodplains in the Danube River Basin



Width of Floodplains

middle of river

Ecological Potential

very high
high
moderate
low
special problem areas

Border between recent and former floodplains

0 50 100 150 Kilometers

Danube Pollution Reduction Programme

United Nations Development Programme
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5.2.4. Reduction of Water Pollution by Restoration of Wetlands

According to the specific landscape of the single countries and the related problems concerning environmental pollution the countries can propose certain measures such as

- Implementation of effective land use planning,
- Improvement of self-purification capacities of water bodies,
- Restoration or implementation of greenbanks along the rivers,
- Restoration of endangered biotopes, wetlands, etc.

The restoration or new implementation of green banks along all rivers can help to minimise the pollution from diffuse sources especially from intensive agriculture (water erosion, run off with nutrients). This means that along all rivers, even the smallest, green belts on both sides with a minimum width of 5 m should be in existence.

Up to now only a very few projects initiated by the countries have elements of measures to minimise the diffuse sources of pollution reduction especially nutrient reduction.

The respective institutions in the countries should be encouraged to create projects to address diffuse pollution sources. Such measures might be included in pilot projects to improve or initiate good or even best agricultural practices.

Especially in the agricultural sector there is high potential to combine amendments in agricultural practices with reduction of water pollution from diffuse sources. The cost for such projects with incorporated water measures are relatively low compared with structural projects. Policy measures will probably have to be included and could mark the first step.

Wetlands

Rehabilitation of key ecosystems, including the rehabilitation and creation of wetlands in which the assimilation of nutrients occur naturally. The creation of extensive buffer zones in the form of biodiversity would also come under this category.

Floodplains and wetlands play an important role in the remedy of nutrients from diffuse sources. Thus, the restoration of the wetlands is of high importance not only for the nutrient reduction.

The potential for wetlands restoration along the Danube and its main tributaries has been examined in the report ”Evaluation of wetlands and floodplains areas in the Danube river basin” prepared by WWF on behalf of the GEF Pollution Reduction Programme.

The nutrient reduction in the Danube River Basin by wetlands and floodplains has not yet been measured yet. Therefore the values for nutrient reduction have been proposed by taking into account the general knowledge on all factors influencing the Danube basin. According to the study the range may be presented as follows:

- N-reduction: 100 – 150 kg total N/ha/year
- P-reduction: 10 – 20 kg total P/ha/year

For further estimations N-reduction has been calculated with 100 kg total N/ha/year an P-reduction with 10 kg total P/ha/year.

The potential floodplains for rehabilitation have been estimated. The morphological floodplain along the Danube, Morava, Prut, Drava, Mur, Sava, Tisza is as much as 41.605 km². The recent floodplains cover an area of 7.845 km². This means that there would be an overall area of floodplain restoration of about 33.760 km² or 3.376.000 ha. But only a limited part of the floodplains which are now more or less intensively cultivated or covered by infrastructure can be restored.

According to the Wetlands Study there is a certain area that can be restored. 17 wetlands and floodplains have been identified. Along the Danube and the main tributaries 121.000 to 233.000 ha of floodplain could be restored in addition to the already existing areas. These floodplains can be rehabilitated and could play an important role in nutrient reduction (see table in annex 9). The result of the study is shown in the table. N-reduction by newly restored flood plains can be estimated to 34.000 to 49.000 t/year; P-reduction might reach the load of 4.000 to 5.800 t/year.

The economic value of the Danube floodplains can be estimated. The equivalent value only for nutrient reduction has been estimated by 440 DM/ha/year or 250 US$/ha/year (WWF-study, KREN, 1994). If the above mentioned floodplain areas of 277.300 to 389.450 ha was restored, the value of the additional nutrient reduction of the studied 17 floodplains could reach an amount of 69 to 97 million US$/year.

The proposed wetland sites for restoration have been discussed during the Hernstein-workshop in May 1999 in respect to reduction of nutrient loads to the Black Sea. It was decided to include the identified 17 wetlands into the project data base on the basis of the country projects. The following items have been discussed and agreed upon:

- Multiple benefits, particularly economic benefits, should be stressed in preparation and implementation of wetland projects. Success for implementation will depend on how much the local population benefits from restoration. Therefore, it must be clear to local populations the economic benefit before projects begin.
- The Agricultural Ministries should be integrated into land use decisions as soon as possible in projects such as the Middle and Lower Danube Corridor projects to assure implementation.
- NGOs should be included into all wetland restoration projects in order to assure appropriate public participation, increase public awareness, as well as to assist in developing and implementing management plans.
- Monitoring programmes should be established for each wetland restoration site to monitor results of implementation and to identify necessary technical and management changes that might be needed for the wetland sites. A Danube Wetlands monitoring programme should be considered possibly in the frame of a ICPDR Wetlands/Biodiversity Expert Group.
- The Danube Wetlands Rehabilitation Programme should include a component/Project that would strive to improve the ecological functioning, particularly nutrient removal, of existing wetlands and floodplains in the Danube River Basin. This could for example be a project that would develop a management plan (for the Danube Delta for example) to maximise nutrient reduction capacities in an existing (fully or partially) wetland and or floodplain.

5.2.5. Removal of Phosphate from Detergents

The prohibition of polyphosphate-based detergents throughout the Danube basin should be seen as a priority objective. The comprehensive report ”Removal of Phosphate from detergents in the Danube basin” (final report, editor: Istan Ijjas, 1995) gives clear recommendations how to minimise the discharge of phosphorus into the water bodies and recommends the changing of consumer practicies and the raising of public awareness of eutrophication issue.

The feasible development scenarios for the Danube basin in the study shows that the P-load into surface waters from the population in the Danube Basin in the year 2005 could be as much as 16.452 t/y and 23.677 t/y. The P-load from detergents could vary between 2.092 t/y (13 %) and 5.302 t/y (22 %) according to minimum and maximum scenarios.

This indicates the potential reduction of P-load from detergents in the Danube basin.

One of the conclusions of the report is that: Phosphate-free detergents can reduce the phosphate load in surface waters to a significant extent. The cost of introduction of P-free detergents should not significantly increase the cost of P-containing detergents. There is no additional direct cost either to the consumer or to the national budgets resulting from the introduction of P-free detergents.

The cost of introduction of phosphate-free detergents are much less compared with the cost for improvement of sewage treatment. It should not significantly increase the cost of P-containing detergents. The elimination of phosphorous from detergents should be combined with intensified research and development of alternative components and technology of washing, so that the total cost of washing should not be necessarily increased. At the same time the washing efficiency should not be affected.

Higher prices of P-substitutes might be compensated with lower amounts of washing agent needed, smaller water consumption, cheaper wastewater treatment and smaller taxes on these detergents.

In spite of the obvious advantages of P-free detergents, intensified measures for removal of phosphorus detergents are as far as recognisable not on the priority list of the countries in the central and eastern part of the Danube basin.

5.2.6. Reduction of Water Pollution from Dump Sites

Some countries have proposed concrete measures and projects related to the problem of waste disposal sites. The proposed projects include the complete construction of new dump sites as well as the rehabilitation of existing landfills in order to protect water resources.

The objective is the break with non-controlled landfills and the implementation of appropriate and forward-looking technologies (landfill leachate collection / drainage network, sealing systems, biogas collection and energy generation, etc.). In addition to the pure planning and construction work the projects contain for instance preliminary research work (tracing of geological barrier, appropriate sealing systems, concept for operation of landfill, monitoring system, commitment to procedures for waste compacting, etc.), and Environmental Impact Assessment Studies.

Furthermore, in single cases the construction of landfills for hazardous wastes is proposed and planned due to the fact that landfills with predominantly hazardous substances without respective protection-techniques (e.g. impermeability of landfill bottom, etc.) are particularly dangerous for water resources.

According to the small number of proposed projects this seems at the moment a minor problem at least in view of the respective countries. It is necessary to take into account that in most cases it is nearly impossible to trace back the source and point of departure of the discharge of the contaminants, respectively. In addition, an important aspect is that all measures related to landfills and landfill techniques are very expensive and above all rehabilitation measures are relatively difficult to execute.

5.2.7. Reduction of Pollution by Policy Measures

Within the context of policy measures, first of all, the adjustment and improvement of water and solid waste legislation is the main focus of attention. It is obvious that the existence of an effective legal framework is the nucleus for all other measures and projects (including the legitimization of economic instruments). For this, the capacity and the intention of the respective countries to comply with the strict EU-legislation play a decisive role.

Therefore, a number of special ”tools” and regulative instruments for improved water and waste management will be available in the near future. The following potential instruments for environmental policy might be mentioned:

- Instruments for environment policy by public revenues (licences, environmental taxes, etc.)
- Instruments for environment policy by public expenditures (direct public environmental care financed by fees and by inland revenues, exemplary procurement-policy of the state / government/administration*: ”the state as pioneer”*, relevant research work, direct financing of environmental friendly measures, financing of institutions for environmental care, inducing economic activities with positive environmental impact, subventions and support)
- Non-fiscal instruments (environmental constraints, principle of voluntary co-operation between state/administration and ”polluters”, unconstrained non-fiscal instruments, creation of planning instruments: *”Environmental Monitoring and Information Systems”*, *”Experts guidelines for management and control”* or concepts for an *”Integrated Pollution Prevention and Control Programme”*)

In addition, the standardisation of techniques to be applied is one of the further principle objectives. Therefore, extensive technical standards should be elaborated, adapted and put into force. It is declared aim of the respective countries to introduce standards considering the Best Available Techniques (BAT) within the scope of their own national legislation (as a rule, technical standards become binding if they are mentioned in a body of law). Wherever structural projects will be implemented, the BAT should be the standard for the technical equipment and execution (the difficulties related to the application of the BAT have already been mentioned). Regularly, special cases and issues are taken up and treated at the political level with highest attention. For example the problem in regard to detergents/washing powders (see above). Special strategies are under development in order to reduce the load of nutrients discharged due to the use of washing powders.

5.3. Summary of Projects in Relation to Sub-river Basins

The ”Aggregated Sub-river Basins ” have been discussed and agreed in the workshop for a Transboundary Analysis (January 1999, Hernstein, Austria). The sub-river basins allow to better express local/regional and national river basin management needs in relation to the entire Danube basin. A number of 15 sub-river basins have been identified.

All tables and graphs related to the sub-river basins are attached in annex 7 and 8. For each of the 15 sub-river basins the proposed projects per sector are listed. The summary tables show the expected load reduction and the investment cost per sector and sub-basin. The graphs give an immediate overview on the pollution reduction and the investment costs.

5.4 Summary of Projects in Relation to SIAs

The ”Significant Impact Areas” have been identified in the Transboundary Analysis Workshop (January 1999, Hernstein, Austria) which are most intensively receiving pollution immissions and which are from an environmental and/or conservation point of view valuable. So far, 51 SIAs has been identified.

The tables in annex 9 list the proposed projects in relation to the SIAs. The relation depends on the fact whether the proposed projects lay directly in the SIA if they are in a relevant distance upstream of the SIA. The lists with the proposed projects per SIA show clearly the number and type of hot spots which cause harmful effects from pollutants in the respective SIA. No ranking of projects is foreseen in these lists.

6. Expected Effects of On-going and Planned Measures

Finally, all effects described in the national reviews by the countries are hypothetical. Some countries refer to the fact, that data is not available and that is why it is not possible to quantify any expected effects. If available, the data allows to estimate in concrete figures the expected effects of the actual and planned measures. The countries expert that all effects will be positive. More detailed statements are provided concerning:

- Reduction of nutrient emission
- Reduction of hazardous substances
- Reduction of microbiological contamination

For each country the reader is referred to the table within the scope of the second part of the present summary elaborated from the national reviews (see overview tables in annex 1) as well as to the tables with the proposed projects (see annex 5).

6.1 Expected Pollutant Load Reduction per Country

The expected load reduction in terms of BOD, COD, N, P is summarised in the relevant tables in annex 6. The composed lists with proposed projects per country and per sector contain detailed information with the added up figures about the reduction of BOD, COD, N and P. The figures are classified according to the countries, sub-river basins and the sectors.

The results of the collected and processed data from the proposed projects are also introduced in the *water quality model simulations* (see explanations and figures in annex 13).

The figures 6.1-1 to 6.1-3 are developed from the tables in annex 5. They may assist in understanding the expected load reduction by the proposed and ongoing projects in the different countries and sectors.

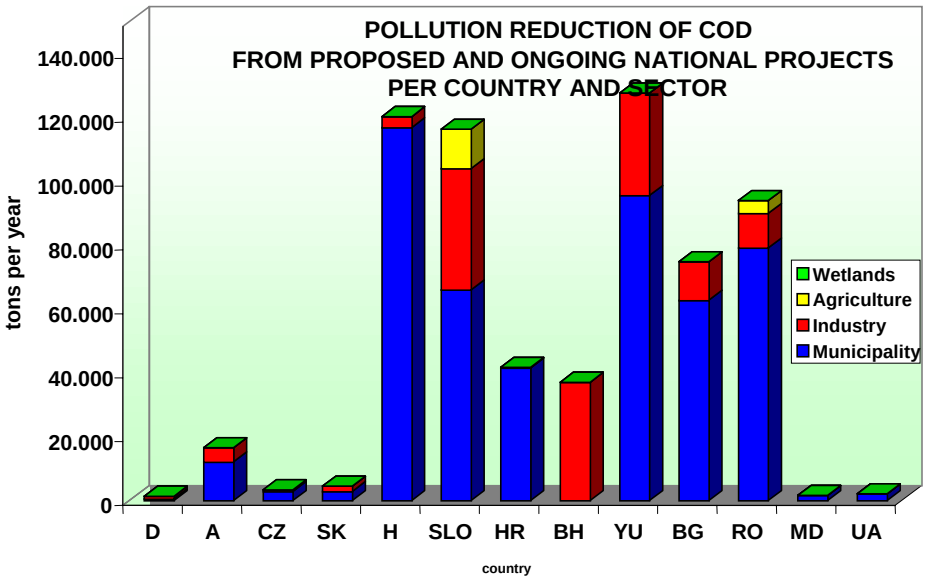


Figure 6.1-1 Pollution reduction of COD from proposed and ongoing projects per country and sector

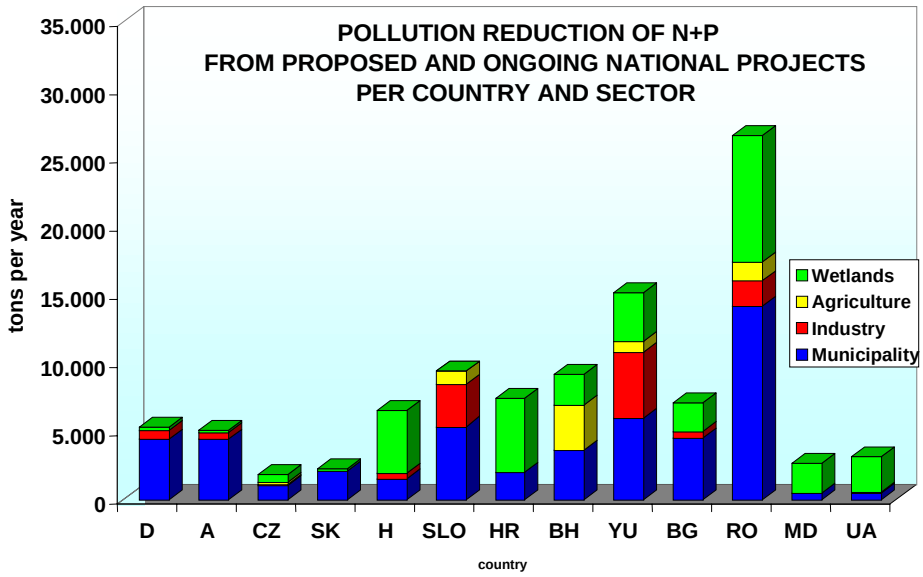


Figure 6.1-2 Pollution reduction of N and P from proposed projects and ongoing projects per country and sector

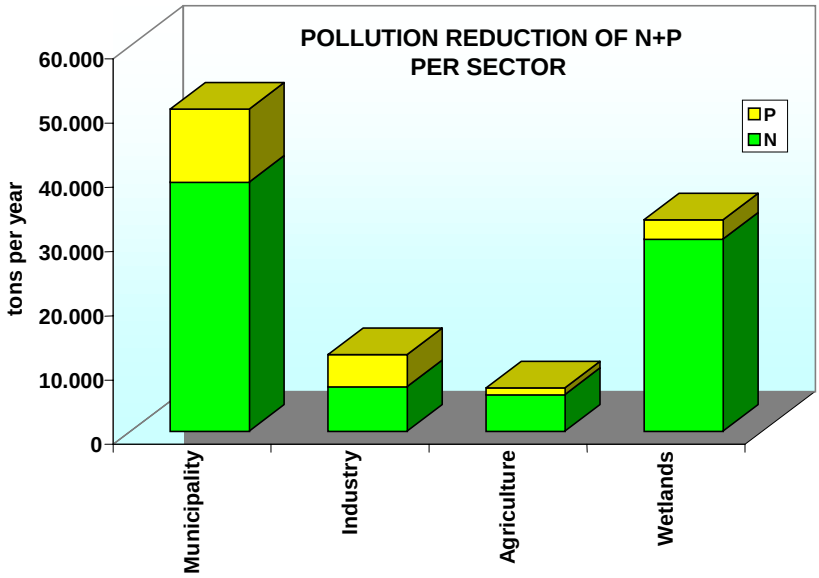


Figure 6.1-3 Pollution reduction of N and P per sector

6.2. Expected Pollutant Load Reduction per Sub-river Basins

The expected load reduction by the proposed projects are calculated in the tables in annex 7. The summary tables in annex 8 contain the most important results. The graphs in figure 6.2-1 show impressively the load reduction in the respective sub-river basins.

The sub-river basins in the Middle and Lower Danube concentrate the biggest part of the load reduction. In the areas of Pannonian Central Danube (6), Drava-Mura (7), Sava (8), Banat-Eastern Serbia (10), Mizia-Dobrudzha (12) and Muntenia (13) are the highest potential for the water pollution reduction.

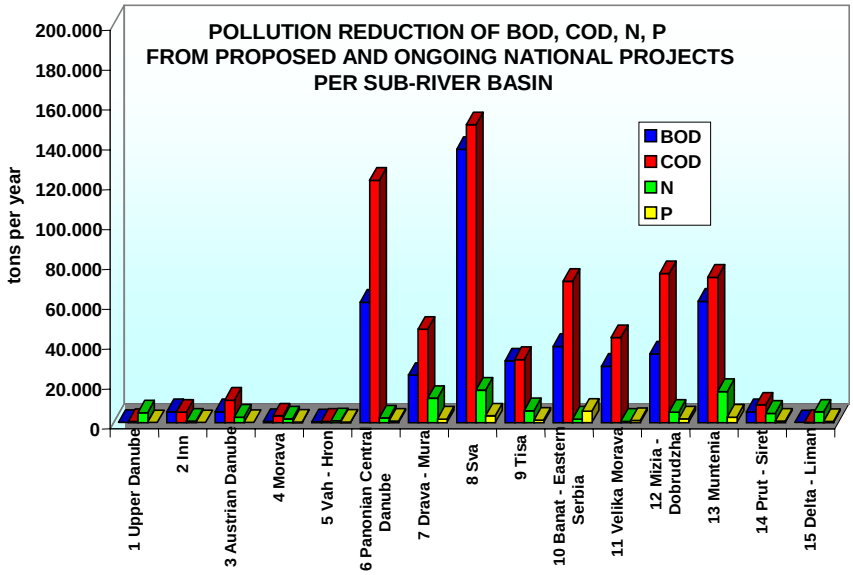


Figure 6.2-1 Total pollution reduction from proposed projects of BOB, COD, N, P per sub-river basins

6.3. Expected Reduction of Hazardous Substances and Microbiological Pollution

The proposed projects especially the construction and extension of wastewater treatment plants in the municipalities will, as a side effect, also eliminate to a certain extend the hazardous substances and microbiological pollution. The reduction of load depends very much on the composition of the wastewater and the treatment process.

Heavy metals will be extracted partially from the wastewater and accumulated in the sludge. The percentage of extraction is depending very much on the chemical and physical conditions of the compounds. Mostly the dissolved part will pass the treatment plant and flow into the receiving water body.

The microbiological pollution is reduced by a well functioning mechanical and biological treatment plant and according to the purification process by up to 95 % of the total bacteria load flowing into the treatment plant.

6.4. Expected Positive Impacts on Significant Impact Areas

The pollution reduction measured in BOD and/or COD gives a certain impression on the amount of pollution which will be kept away from the rivers.

The load reduction which is mostly effective for the SIA from proposed projects can be given by the following figures (see tables in annex 6):

- BOD 431,653 t/y
- COD 640,917 t/y

The BOD/COD load concerns the rivers downstream of the point of emission and reduces the self purification. BOD/COD load reduction is therefore effective for the water quality in the downstream river stretch. The length of impact depends on the amount of polluting substances, the dilution factor and other criteria.

For the evaluation of the positive impacts of the proposed projects on the significant impact areas the load reduction of BOD/COD are the most important criteria. Beside this the reduction of heavy metals and other hazardous pollutants are relevant. For a quick overview tables for each of the SIAs have been prepared (see annex 9). They show the proposed projects which are situated directly in the SIA or are upstream in the stretch of the project with an effective pollution reduction in the SIA.

6.5. Expected Positive Impacts on the Black Sea

The positive impacts on the Black Sea are indicated in the results of the simulation within the water quality model concerning the load reduction of phosphorus and nitrogen (see graphs in annex 13).

The load of nitrogen and phosphorus is not only stressing a limited stretch of the river downstream but mostly the Black Sea. Therefore the *reduction of the nutrients N and P* is of highest importance for the water quality in the Black Sea.

All together the load reduction of the nutrients for the Black Sea will reach the amount of Nitrogen: 81,272 t/y and Phosphorus: 20,371 t/y after the implementation of the proposed projects (see tables in annex 6). These projects enclose the municipal, industrial, agricultural wastewater treatment plants and wetlands restoration.

Altogether the relief of the strain on the Black Sea may reach up to about **80.000 t N/year** and **20.000 t P/year**.

Structural projects should also include components to reduce water consumption, thereby reducing the volume of wastewater going to treatment facilities.

The highest concentration of hot spots are in the Middle Danube but also in the Lower Danube. As the DWQM results show that P reduction in respect to the Black Sea might be more effective closer the distance to the Black Sea whereas N reduction does not appear to be so distance related, emphasis should be given to projects in the Middle and Lower Danube to reduce loads to the Black Sea.

A comprehensive approach to implementation of structural projects should be taken. Furthermore, projects should be launched that address the demonstration of innovative wastewater treatment in small communities utilizing lagoons, constructed wetlands, etc. particularly for countries that have mostly small municipalities.

“Industrial wastewater projects” in branches of industry which emit large amounts of nutrients i.e. Fertilizer Plants, Pulp and Paper, Food etc. should be given priority in a programme to reduce nutrients for the benefit of the Black Sea. Projects should focus on introducing cleaner production processes that can be duplicated throughout the region.

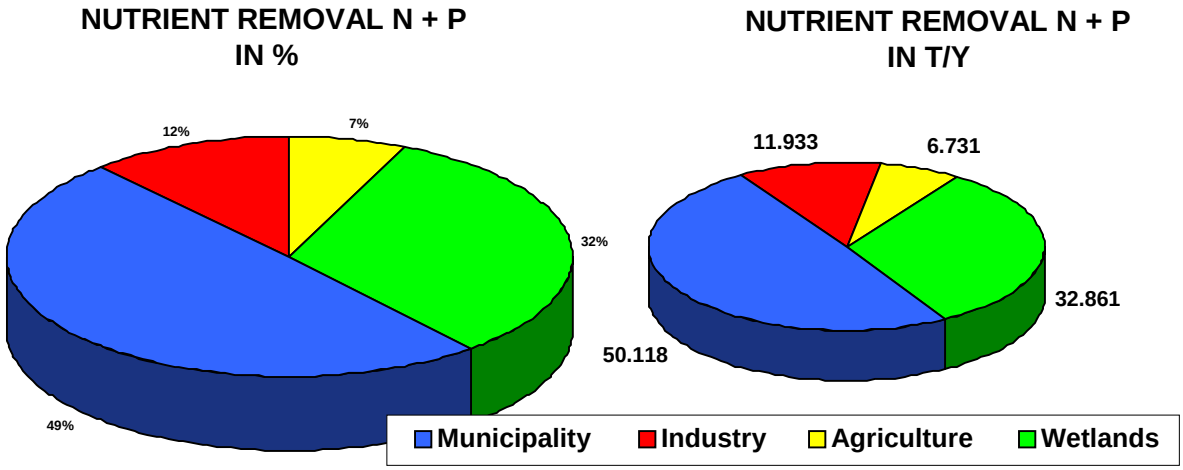


Figure 6.5-1 Nutrient removal of N and P by the proposed projects (total and %)

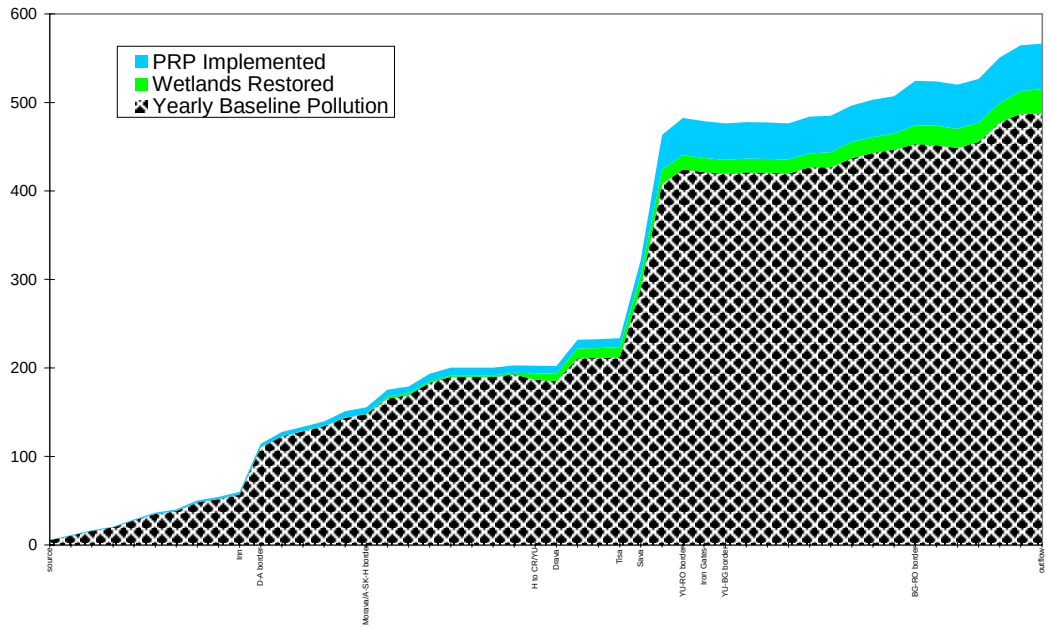


Figure 6.5-2 In-stream nitrogen load profile for the Danube river, before and after implementation of the PRP, with the additional effect of the restoration of 17 wetlands (top). (figure 11 from DWQM, see annex 13)

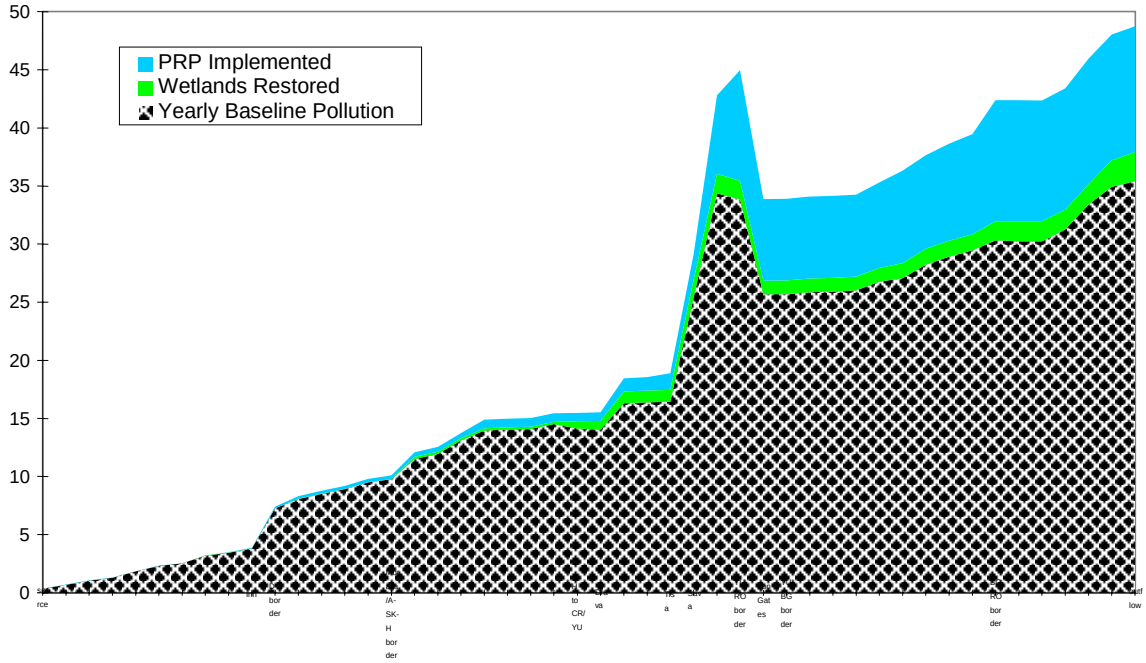


Figure 6.5-3 In-stream phosphorus load profile for the Danube river, before and after implementation of the PRP, with the additional effect of the restoration of 17 wetlands (bottom). (figure 12 from DWQM, see annex 13)

Considering the reduction of the nutrients load to the Black Sea there is a common understanding among the countries for the further steps of the implementation. All Danube countries contribute nutrient loads to the Black Sea. Pollution reduction is therefore a task common to all Danube River Basin Countries.

On the basis of the results of the DWQM it seems that it may be more effective, at least in terms of the Black Sea, to remove P in the Lower Danube. The DWQM indicated that the relationship between N and the Black Sea is not so space dependent. These considerations should be balanced with the responsibility of all countries who contribute nutrients to the Danube to take action (Polluter Pays Principle).

As upstream countries have few hot spots remaining and as these countries still remain significant suppliers of nutrient loads to the Black Sea, these countries should consider identifying and implementing more wetlands rehabilitation projects as part of their own nutrient reduction strategies. Agricultural policy initiatives to reduce nutrients would also be another contribution from upstream countries.

The table 6.4-1 shows the expected nutrient removal from the proposed projects. The results are mainly reached by the remedial measures concerning point sources in the municipal sector but measures in the industrial and agricultural sector play as well an important role in nutrient reduction. The nutrient reduction by remedial measures for wetland restoration may be overestimated but it is clear that there is still a big potential.

Table 6.4-1 Nutrient removal by sectors

Sector	Nitrogen		Phosphorus	
	t/y	%	t/y	%
Municipalities	38,770	47,7	11,348	55,7
Industry	6,933	8,5	5,000	24,5
Agriculture	5,697	7,0	1,034	5,1
Wetlands	29,872	36,8	2,989	14,7
TOTAL	81,272	100	20,371	100

6.6. Adverse Effects of Proposed Measures

Adverse environmental effects

In the national reviews only a few aspects with regard to adverse environmental effects are mentioned. As a rule, the assessment is that there will not occur any adverse environmental effects due the fact that the projects will only improve the situation concerning water pollution.

Nevertheless, concerning the problem of "adverse environmental effects" there are a number of issues which are worthwhile to be discussed. Thus, for instance, the problem of *additional sludge* emerged from expanded wastewater treatment and its disposal might be mentioned. Furthermore, in the case of a technical incident or a non-functioning due to i. e. electricity shortage the concentrated discharge of a sewer system or of a (new) wastewater treatment plant can be a severe threat for the receiving water body.

In conclusion, it is necessary to remark that the installation of technical schemes also demands reflections on possible impacts and consequences respectively. In addition, it is necessary to keep in mind that potential new facilities only will have an positive effect, if all problems as far as stable operation and maintenance are concerned are solved in a sustainable way.

Adverse economic effects

Besides the adverse environmental effects other bottlenecks and constraints may occur. The construction of facilities for sewage collection and treatment in a relatively short period of time means that a great demand in construction services will rise. This could lead in some countries to an inflation in construction prices.

The restoration of former floodplains might be connected with the transformation of arable lands into wetlands. Of course the wetlands restoration may not lead to shortages in food production.

7. Investments for On-Going and Planned Measures

7.1. Summary of Total Investment Costs

The investment costs of the proposed projects have been calculated by the countries. The tables show the various combinations of the projects per sector, per country, per sub-basin area and per SIA. This allows an easy access to the estimated investment costs for the implementation of the proposed projects.

The total investment cost for all proposed projects in the whole Danube basin amounts to 5,571.28 million US$.

7.1.1. Investment Costs by Country

The proposed projects in all sectors require investment costs which are calculated in the tables in annex 6.

The aggregated figures are as follows:

Country	Investment cost for water pollution reduction (million US$)
Germany	233.46
Austria	700.15
Czech Republic	162.01
Slovakia	188.15
Hungary	460.30
Slovenia	341.92
Croatia	914.64
Yugoslavia	905.47
Bosnia-Herzegovina	364.55
Bulgaria	317.99
Romania	758.54
Moldova	161.25
Ukraine	107.05
Total	5,664.28

The ability of the different countries to supply the necessary financial means is quite different. To show the relation between the GNP - gross national product and the investment for the proposed projects the calculation in the table in annex 11 has been elaborated. The figure 7.1-1 shows the result of the calculation and the big differences between the respective countries.

All investment costs are related to the GNP of the year 1997 according to the study “Financing Pollution Reduction Measures in the Danube River Basin – Present Situation and Suggestion for New Instruments”, KfW, 1999.

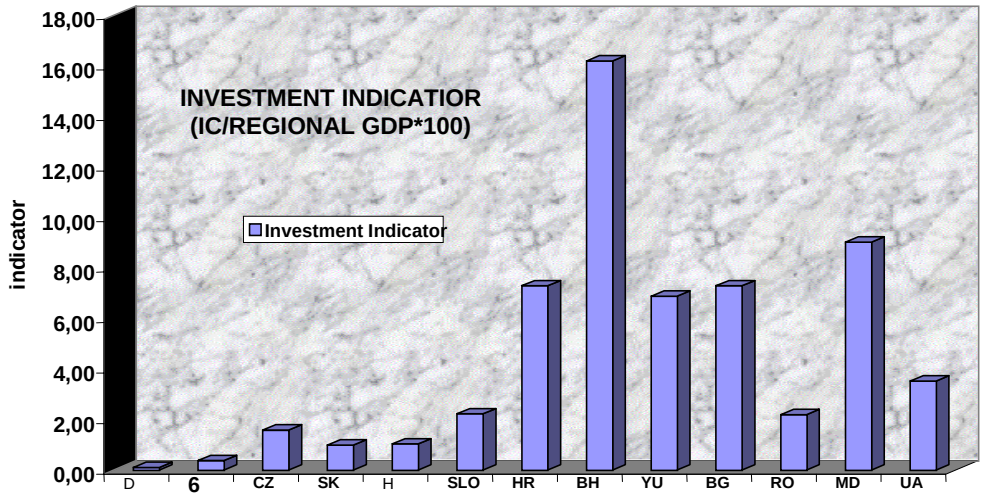


Figure 7.1-1 Investment indicator per country

7.1.2. Investment Costs by Sector

The planned investments for the reduction of water pollution in the whole Danube basin can be separated according to the identified sectors (see annex 6). For the construction of municipal wastewater treatment plants the total investment is estimated to 3,517.81 million US$.

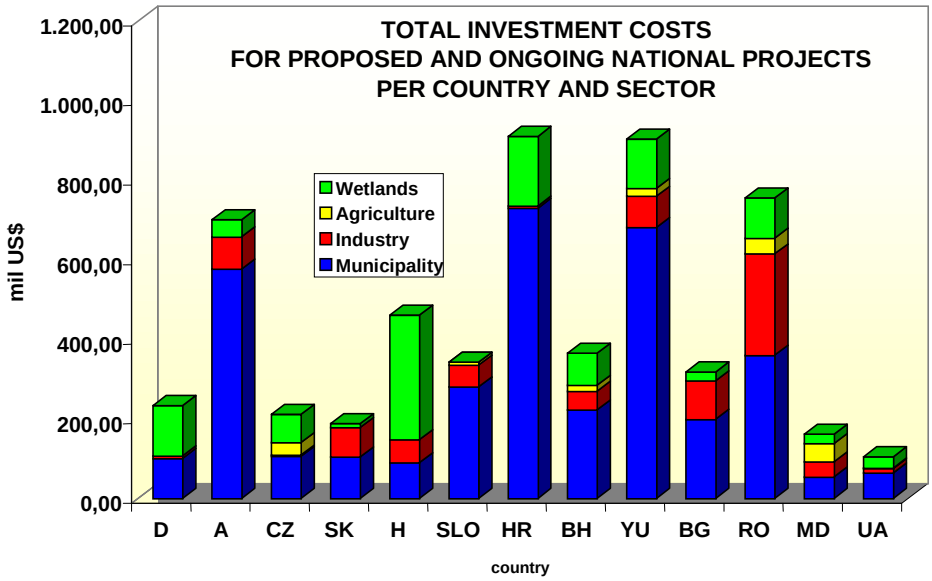


Figure 7.1-2 Total investment cost for proposed and ongoing projects per country and sector

Measures in the industrial sector mainly extension and construction of new wastewater treatment plants will require an amount of 849.30 million US$. Measures to reduce emissions from agricultural hot spots like livestock and breeding farms lead to a demand of 139.18 million US$. The investment costs for the restoration of wetlands and floodplain are estimated according to the proposed projects by the countries and the wetland study to an amount of 11,115.93 million US$.

Projects which propose other measures for the improvement of water quality are very limited with 13.6 million US$. Therefore the investment in most of the countries are relatively low.

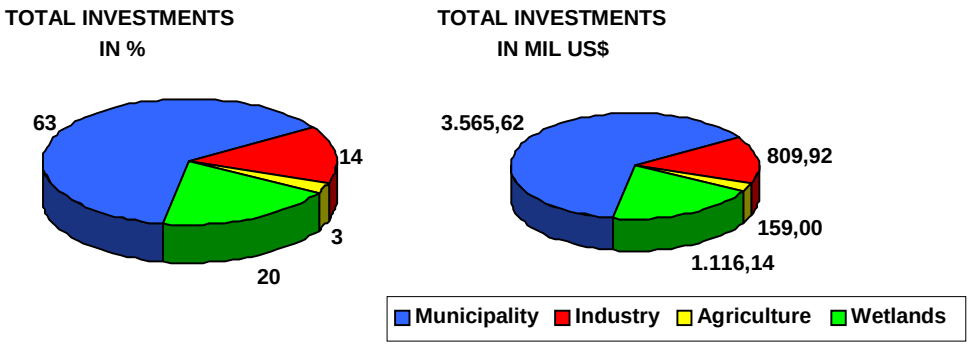


Figure 7.1-3 Total investment cost (in US$ and in %)

7.1.3. Investment Costs in Relation to Sub-Basin Areas

The same procedure as for the SIA has been followed for the sub-basin areas. The investment costs for the 15 sub-basin areas can be extracted from the tables in annex 7. The figure 7.1-4 gives an impressive picture in which sub-basin area the greatest demand for investments can be expected.

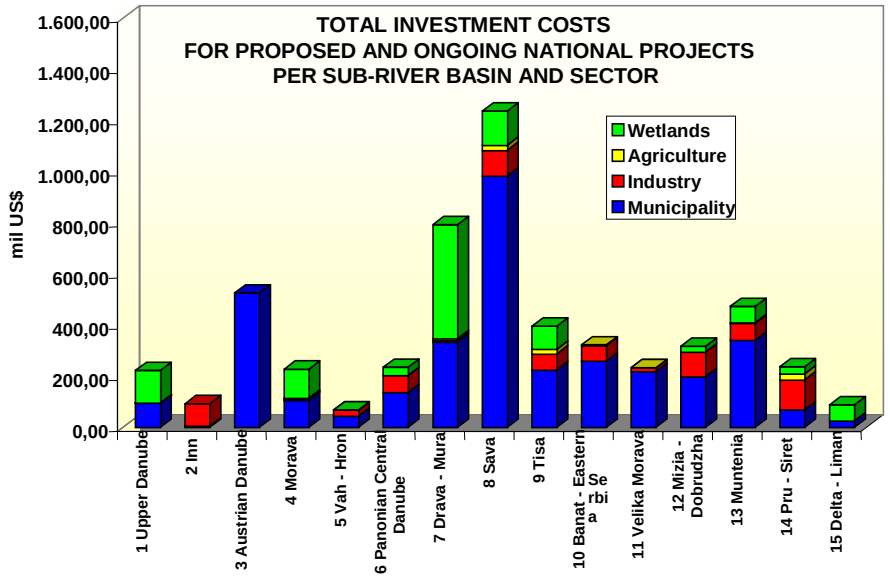


Figure 7.1-4 Total investment costs per sub-basin and sector

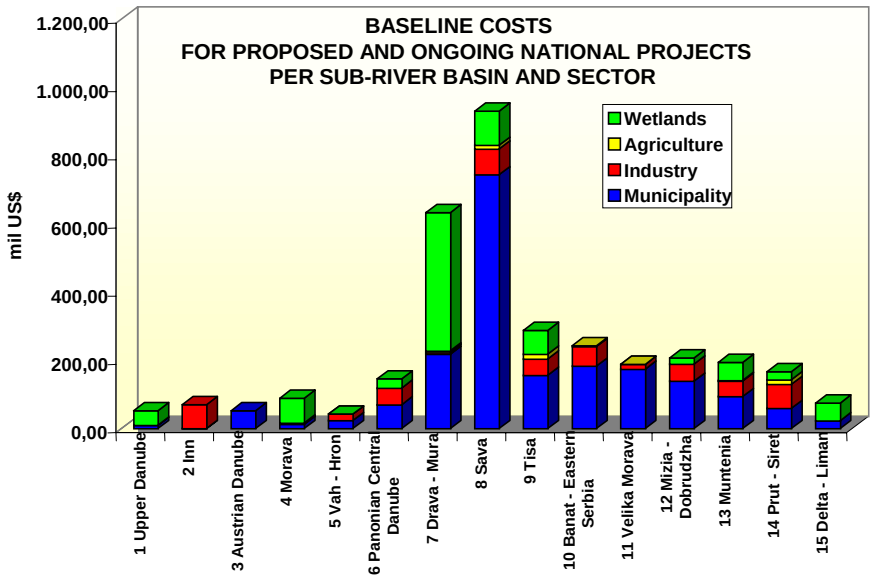


Figure 7.1-5 Baseline costs for proposed and ongoing projects per sub-basin area and sector

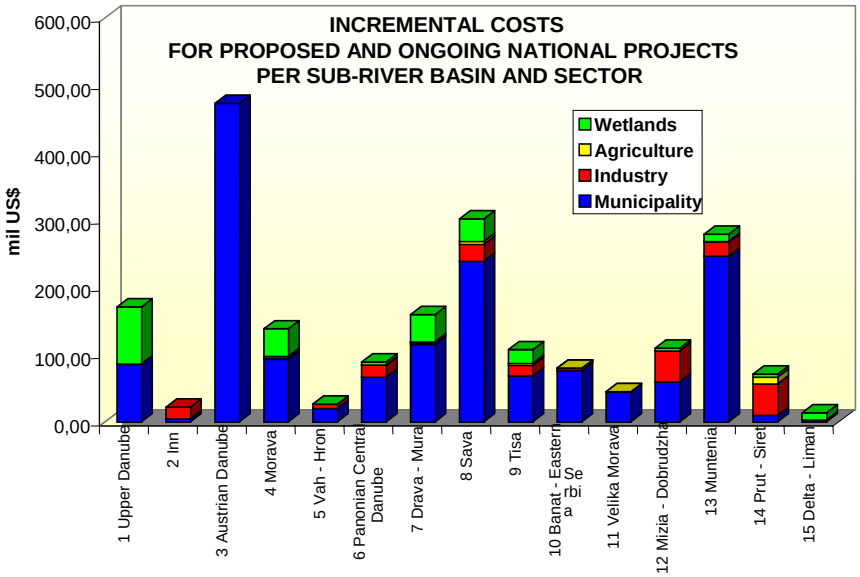


Figure 7.1-6 Incremental costs for proposed projects per sub-basin areas

7.1.4. Investment Costs in Relation to SIAs

Most of the proposed projects have a relation to one of the 51 significant impact areas. These projects have been listed together so that the investment costs related to the respective SIA can be identified. The tables in annex 9 show the total investment costs per SIA.

7.1.5. Investment Cost in Relation to Black Sea

Beside the organic load reduction the nutrient removal is of greatest importance for the water quality in the Black Sea. The incremental costs cover predominately the investment for nutrient removal. Therefore the figure for the total incremental cost give an indication for the necessary investment cost in relation to the Black Sea. The total incremental costs are calculated with 2,085 million US$ (see table in annex 6).

7.2. Cost Analysis and Evaluation of Cost Effectiveness

Cost effectiveness is one of the most essential and common criteria for project assessment, comparison and prioritisation. Therefore this approach has also been taken into account in this programme besides other factors, such as dilution of wastewater in the receiving river and consideration of national interests in project categorisation (low, medium, high priority).

7.2.1. General Approach

In the context of water pollution reduction cost effectiveness is in general terms defined and measured by the “specific cost” required to reduce one unit (usually one ton) of pollution load of a certain type of pollutant.

In a first approach cost effectiveness of a particular project can be determined as the ”specific initial investment cost” required to reduce either ”one unit of a leading pollutant” or one unit of ”a composite of relevant pollutants”. This ”composite unit” can either be determined by simply adding up the anticipated load reduction of the various pollutants in tons or on the basis of a ”weighted aggregate of the relevant pollutants”. The project with the lowest ”investment cost per unit of pollution load reduction” is from this point of view the most preferable one.

In a more sophisticated approach which complies with international standards cost effectiveness is determined and measured by the ”dynamic unit cost” required to reduce one unit of pollution load. According to standard practice the calculation of ”dynamic unit cost” is based on a present value approach, according to which the present value of all project investment, reinvestment and current operation and maintenance costs is to be divided by the aggregated reduction of pollution load over a determined project period. The present value is to be calculated by using a reasonable discount rate which represents the real cost of capital in a particular country. The project with the lowest ”dynamic cost per unit of pollution load reduction” is from this point of view the most preferable one.

7.2.2. Evaluation of Cost Effectiveness in the Framework of the DRPRP

(a) Approach and General Considerations

In view of the high number of projects and the quality of the data available the first approach has been adopted in the framework of the DRPRP. The calculation of cost effectiveness has been carried out as far as data were available for new construction, extension and rehabilitation projects in the municipal sector (primarily wastewater treatment), the industrial sector (primarily wastewater pre-treatment and treatment) and the agricultural sector, as well as for wetland restoration.

In this stage of the DRPRP the cost effectiveness of the particular projects under study has been simplifying determined on the basis of roughly estimated investment cost (expressed in USD at the cost level of the year of cost estimate) and the anticipated annual reduction of the pollutants measured in COD and the nutrients N+P (simplifying added up "non-weighted" in tons per year).

The results of the evaluation of cost effectiveness carried out within the framework of the DRPRP indicate that the cost for the reduction of "one ton of COD" or "one ton of N + P" is extremely different between projects of the same type within one country and from country to country, and in particular between projects of the different sectors (for example investments in municipal treatment plants compared to investments in industrial wastewater pre-treatment or agricultural projects).

The differences are to a certain extent based on the actual different cost efficiency of the particular projects under preparation (within one country as well as between different countries).

The extreme differences are, however, supposed to mainly result from the following facts:

- inadequate cost estimate, respectively inadequate adoption of exchange rates between national currencies and USD for investment cost estimated some years ago;
- exclusion of current operation and maintenance cost (clearly preferring projects with relatively lower initial investment cost and relatively higher current operation and maintenance cost);
- incorporation of cost components which increase investment cost of a project, but do not necessarily have any effect on pollution reduction (for example incorporation of not separately stated investment cost for wastewater collectors in the investment cost of treatment plants);
- inclusion of projects or project components which primarily aim at other improvements than N, P, or COD reduction, with the consequence that the investment cost related to one unit of COD reduction or one unit of "N + P" reduction can be extremely high;
- inadequate estimate of the anticipated pollution load reduction.

From the results of the evaluation process carried out within the DRPRP it turns out that project data need substantial revision and up-dating for a profound evaluation of cost effectiveness.

(b) Results of the Cost Effectiveness Evaluation

The results of the cost effectiveness evaluation can be seen from figure 7.2-1 on country basis. Figure 7.2-1 shows the average investment cost for the annual reduction of one ton of COD (from point pollution sources), as well as for one ton of (N+P) both from point pollution sources and from wetland restoration.

Over all DRB countries the investment cost per ton of annual "N+P" removal is of the order of USD 46000, and differentiated by type of source as follows:

- USD 58400 per ton of "N+P" removal from point sources;
- USD 34000 per ton of "N+P" removal from wetland restoration (including cost of land).

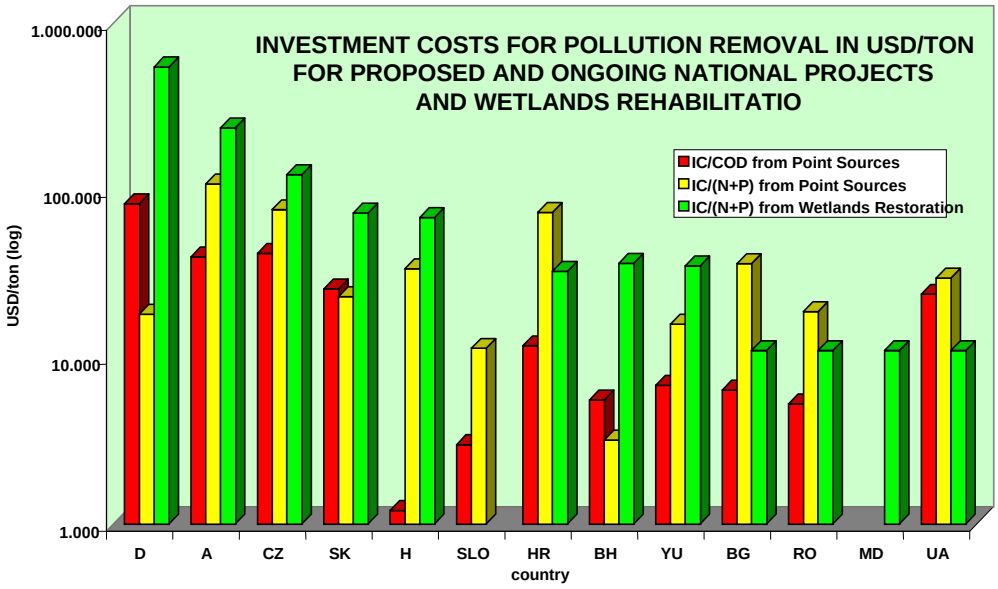


Figure 7.2-1 Investment costs for nutrient removal for proposed and on-going national projects and wetlands rehabilitation (attention: y-axis in logarithmic scale)

7.2.3. Evaluation of Cost Effectiveness by Means of a Present Value Approach

(a) Present Value Approach

The evaluation of cost effectiveness by means of a more sophisticated ”present value approach” is outlined in two calculation schemes presented in annex 4.1 for two fictive alternatives of a municipal wastewater treatment plant.

Alternative (A) reflects a non-staged implementation of a MWWTP with mechanical/biological treatment standard throughout the whole project period.

Alternative (B) reflects a phased implementation of a MWWTP with mechanical/biological treatment standard in the first project stage and the implementation of improved effluent standards (with phosphorus and nitrogen elimination according to BAT) in a second project stage.

During the PRP-Workshop in Hernstein, May 1999, there was a common understanding that the project data have to be up-dated and completed (and put into the DRD - Project Data Base) in order to enable the adoption of such a more indicative approach in the further process of the DRPRP.

(b) Evaluation of Financial Project Viability

The most essential and common indicator for the evaluation of the financial viability of a project is the “Financial Internal Rate of Return“ (FIRR).

This indicator is calculated by comparing the cost cash flow of a particular project with the expected cash flow of project revenues over a defined period of evaluation, usually the expected life time of the main project component.

The FIRR is that interest rate at which the present value of the cost cash flow is equal to the present value of the revenue cash flow.

The FIRR is usually calculated both in real terms (at constant prices) and in escalated prices (using anticipated inflation rates for cost and revenue cash flows).

The higher the FIRR the higher is either the rate of return on the project sponsor’s equity or the interest rate which can be paid out of the project for external loan funding.

The calculation of the FIRR for the two fictive alternatives, as stated above, is outlined in two schemes presented in annex 4.2.

7.2.4. Baseline and Incremental Costs

(a) Methodology

The Global Environmental Facility (GEF) is one source of funding for global environmental actions in four specified focal areas, of which ”international waters” is one. Thus GEF funding is one potential source for the implementation of projects identified in the framework of the DRPRP.

The GEF approach which is relatively simple in general terms but relatively complicated in detail, is well documented by detailed guidelines. In general terms the basic principles and ideas of the GEF approach can be outlined as follows:

- The purpose of GEF funding is to provide new and additional resources for the "agreed incremental costs of measures to achieve agreed global environmental benefits" in specified focal areas.
- The level of GEF funding has to be judged for each proposed project pragmatically, but not arbitrary, by using a standardised framework case by case.
- The framework used by GEF is provided by the concept of incremental cost. The incremental costs of a particular environment relevant project or action are to be determined and measured in comparison to the country specific baseline situation in the relevant sector.

In very general terms the incremental costs are defined as the difference between the overall cost of the project proposed for GEF funding (which is supposed to achieve global, at least transboundary, environmental benefits which are beyond the usual standards of the recipient country) and the saved cost of the project or action which had been implemented alternatively without GEF funding.

The actual estimate of incremental cost should include all investment and current operation and maintenance cost and should be based on economic cost; that means, taxes and duties should be excluded, subsidies taken into account. The incremental costs should be stated in present value terms, using agreed discount rates and time horizon.

The results should be summarised and presented in a matrix that shows the cost, the domestic benefits, and the global environmental benefits associated with the baseline course of action and the proposed alternative course of action.

	Baseline	Proposed Alternative	Increment
Global Environmental Benefit			
Domestic Benefit			
Costs			

(b) Practical Approach Adopted in the Framework of the DRPRP

As outlined above it is clear that finally each project proposed within the framework of the DRPRP has to be studied in detail whether, respectively to what extent, it is eligible for GEF funding.

In view of the high number of projects and the quality of the data available the actual approach adopted in the framework of the DRPRP is relatively simple and schematic. In general terms all identified projects which are supposed to have environmental effects which are beyond the environmental standards as defined by the national policies and strategies from the national point of view are in a first step deemed to be potentially eligible for GEF funding.

Incremental cost of municipal wastewater projects

As far as wastewater treatment is concerned it is simply assumed that the baseline standard in all DRB countries (apart from Germany and Austria) is the mechanical/biological treatment standard. That means, incremental cost are provisionally defined as the amount of investment cost for the implementation of all treatment facilities required for advanced treatment standard with phosphorus and nitrogen elimination according to BAT.

In this context there is a possible differentiation by five types of projects which leads to a categorisation as outlined below.

For the different types of projects the potential share of the incremental cost (related to nutrient load reduction) on the total investment costs is in a first step estimated on the basis of the proposed percentage figures.

These percentage figures are used for the estimation of incremental costs within the process of priority setting; they have, however, to be considered only as a substitute for the calculation and determination of the actual incremental cost.

Table7.2-1 Estimation of incremental cost

Category Type	Type of structural project	Potential incremental cost
1	New sewer and new WWTP	5 %
2	Extension of sewer and extension of existing WWTP	20 %
3	Existing sewer and new WWTP	30 %
4	Extension of capacity of existing WWTP	50 %
5	Extension of WWTP predominantly for nutrient reduction	90 %

Type 1: new sewer and new WWTP

Investments in new wastewater collection systems and in new construction of WWTP with mechanical/biological treatment standard are predominantly basic investments. There is a very small incremental cost component eligible for GEF funding, because the integration of measure to eliminate N and P leads to a small cost increase only. Therefore the portion of incremental cost can be estimated to 5 %.

Type 2: extension of sewer and extension of existing WWTP

Investments in the rehabilitation and extension of sewer systems and wastewater treatment plants have an incremental cost component which can be estimated of about 20 %.

Type 3: existing sewer and new WWTP

Investments in new treatment plants with advanced treatment technology have an incremental cost component which is theoretically determined by the actual amount of additional cost required for the implementation of advanced treatment standard in comparison to mechanical/biological treatment standard. Without detailed knowledge of these cost components it is schematically assumed that on average a portion of about 30% of the rehabilitation or investment cost can be considered as incremental cost.

Type 4: extension of capacity of existing WWTP

Investments in the extension of the capacity of a full functioning wastewater treatment plant (mechanical/biological) with additional installation for nutrient reduction may have an estimated portion of incremental cost of about 50 %.

Type 5: extension of WWTP predominantly for nutrient reduction

Investment costs for the implementation of advanced treatment standards in existing WWTP with well functioning mechanical/biological treatment are to a large extent considered as incremental cost and eligible for GEF funding. The portion of incremental cost is estimated to 90 %.

Incremental cost of industrial and agricultural projects

As far as industrial and agricultural projects are concerned it is at the time being hardly possible to identify the incremental components of the particular projects, which can reasonably be considered as eligible for GEF funding. Provisional estimates of the portion of incremental cost components are stated in the ”country tables” of annex 5. These estimates have in any case to be up-dated and replaced by more precisely determined figures.

Incremental cost of wetlands

Concerning wetlands the estimate of baseline and incremental cost is based on the relatively schematic assumption that the cost of land acquisition is generally considered as baseline contribution and the cost of restoration is to full extent considered as incremental cost.

(c) Results of the Incremental Cost Estimates

The project specific incremental cost resulting from the applied approach are presented by sectors in the “country tables” compiled in annex 5.

For all projects under study the total investment cost are of the order of USD 5,664 million. The portion of incremental cost is USD 2,085 million, respectively 37 % of the total investment cost.

For municipal wastewater projects the portion of incremental cost is USD 1561 million, respectively 44 % of the total investment cost of USD 3,518 million. The composition by baseline and incremental cost can be seen from figure 7.2-2.

For industrial and agricultural projects the portion of incremental cost is USD 219 million, respectively 25 % of the total investment cost of USD 873 million.

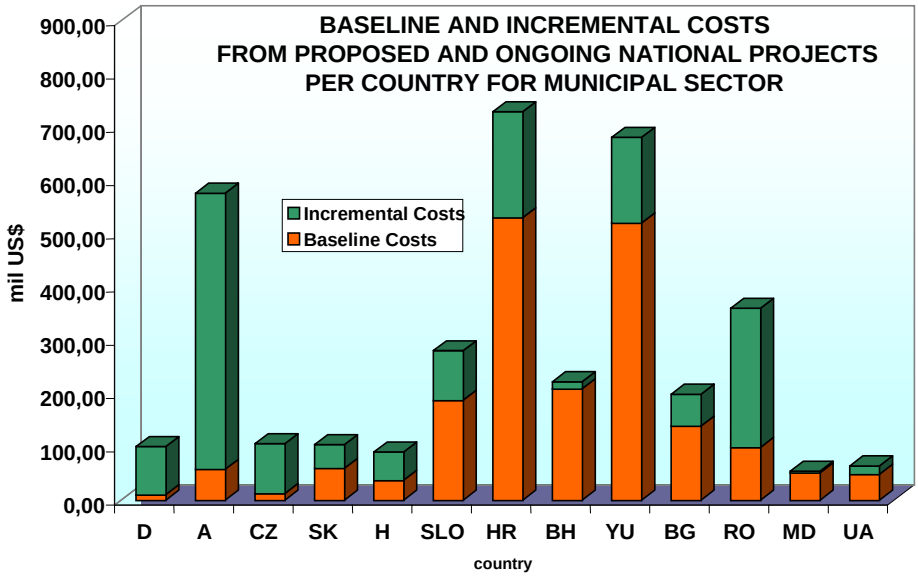


Figure 7.2-2 Baseline and incremental costs from proposed and ongoing national projects per country for municipal sector

7.2.5. Wetlands

Regarding wetlands the composition of investment cost by baseline cost (cost of land) and incremental cost (cost of restoration) can be taken from the following compilation and figure 7.2-3. The portion of incremental cost is of the order of USD 254 million, respectively 23 % of the total investment cost of USD 1,116 million.

Table 7.2-2 Investment cost for remedial measures in wetlands by countries and baseline, respectively incremental cost

Category of Country	Country	Potential area for restoration	Cost of land	Cost of Land (baseline cost)	Restoration costs	Restoration cost (Incremental cost)
		ha	USD/ha	mil USD	USD/ha	mil USD
1	2	3	4	5	6	7
Upper Danube	D	1,125	20,000	22.500	70,000.00	78.75
	A	2,625	20,000	52.500	6,000.00	15.75
	Subtotal	3,750		75.000		94.50
Accession Countries	CZ	5,198	7,000	36.386	6,000.00	31.19
	SK	1,125	7,000	7.875	1,000.00	1.13
	H	41,625	7,000	291.375	500.00	20.81
	SLO	0	7,000	0.000		
	Subtotal	47,948		335.636		53.13
New Balkan States	HR	48,870	3,000	146.610	500.00	24.44
	YU	32,000	3,000	96.000	500.00	16.00
	BiH	20,000	3,000	60.000	1,000.00	20.00
	Subtotal	100,870		302.610		60.44
Lower Danube Countries	BG	18,637	1,000	18.637	200.00	3.73
	RO	84,038	1,000	84.038	200.00	16.81
	MD	19,800	1,000	19.800	200.00	3.96
	UA	23,650	1,000	23.650	200.00	4.73
	Subtotal	146,125		146.125		29.23
	Total	298,693		859.371		237.29

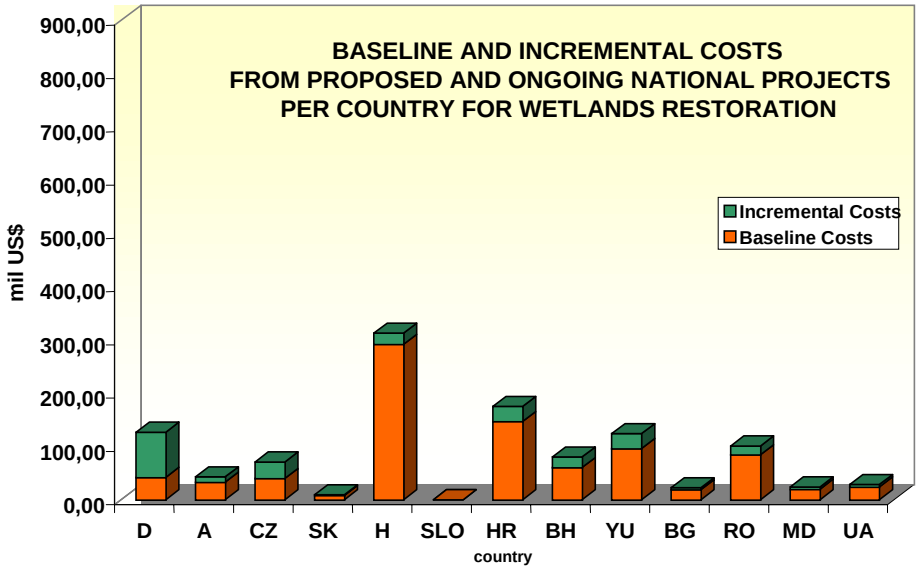


Figure 7.2-3: Baseline and incremental costs from proposed and ongoing national projects per country for wetlands restoration

There are minor differences between the results of the calculations in the table 7.2-2 and in the table in annex 6 concerning the baseline and incremental cost. The results in the summary table in annex 6 contain also some other minor proposed projects for wetland rehabilitation.

7.3. Summary of Projects According to Prioritisation and Ranking

The ranking of projects has to consider the three most important indicators:

- Achievement of the targets concerning good water quality in all the rivers of the Danube basin
- Achievement of targets concerning pollution reduction - especially the nutrients N and P - in the Black Sea
- Reaching of the best cost effectiveness – highest pollution load reduction per dollar invested

These aims can be reached by the proposed ranking factors and procedures. The ranking process is documented in the project overview tables per country (see annex 7).

Prioritisation and ranking of proposed projects

Four steps of prioritisation and ranking have been developed to reach the above mentioned objectives in the shortest period of time:

1. *Prioritisation by respective countries*

   The first setting of priorities has been fixed by the respective countries. The proposed projects were classified according to high, medium and low priorities. This gives a clear picture of the priorities from the view of the respective countries.

   Mainly the high priority projects have been included so far in the proposed project lists. As soon as more information on projects of other classes are available the lists can easily be amended.

2. *Ranking by cost effectiveness with basic investment costs in relation to COD load reduction*

   The total investment cost are calculated by the project holder and presented by the countries. These costs are spit up into basic costs and incremental costs. The basic cost are divided by the expected load reduction of COD. The lower the figure the higher is the cost efficiency and the rank of the proposed project. This ranking is important for the improvement of the water quality in the rivers in the Danube basin.

3. *Ranking by cost effectiveness with incremental costs in relation to N+P load reduction*

   The incremental costs are not defined so far by the countries. Therefore, to get an approximate value, they have been calculated according to the methodology mentioned above. The results are documented in the ”country tables”.

   The incremental costs are divided by the sum of the expected load reduction of N + P. The results lead to a ranking according the cost effectiveness of investments of nutrient reduction. The lower the figure the higher is the cost effectiveness and the rank of the proposed project. This ranking is most important for the pollution reduction efficiency in the Black Sea.

4. *Ranking by consideration of the dilution factor*

   The dilution of the discharge of a sewer system or better a treatment plant is of great importance for the self purification of the receiving water body. Therefore the dilution factor can be taken into consideration for a ranking of treatment plants. A ranking criteria can be introduced by multiplying the specific basic costs with the dilution factor. The lower the figure the higher is the rank of the proposed project. This ranking has a more local importance for the influenced stretch of the receiving river and respectively for the SIA.

The results of the application of the above mentioned ranking procedures are included in the “country tables” in annex 5 and the “sub-river basin tables” in annex 7.

7.3.1. Projects with Largest Reduction of BOD/COD/N/P-Discharge

A list of the 25 projects with the largest reduction of the BOD-, COD-, N- and P-discharge have been prepared (see annex 12). The four tables show the different sequences of projects according to the different parameters. The first 5 projects of each of the 25 project lists have been used to prepare the table with the top 5 projects according to each of the pollution parameters (see annex 12).

From this list all project are combined in table 7.3-1. The top 5 project list contains the most important projects for pollution reduction. These 13 projects together will have a pollution reduction for each of the respective parameter of about 29 to 44 % of all proposed projects.

The developed projects lists (25 / 5 / 13 top projects) will be helpful in reference to the strategies and targets for nutrient reduction to the Black Sea. The list indicates that wastewater treatment plants had the highest potential for reducing point sources of nutrients. Large wastewater treatment projects offer an economy of scale compared to smaller plants.

Table 7.3-1 Projects included in the list of 5 top projects with the largest reduction of BOD-, COD-, N- and P-discharge

	Sector	ID-No	Title	Expected Load Reduction (t/y)			
				BOD	COD	N	P
1	Municip.	RO53	WWTP of the city of Bucharest	42730	56566	7509	1744
2	Municip.	YU01	WWTP "Veliko Selo" - Belgrade (central)	31536	65000	876	1183
3	Municip.	H01	Expansion of WWTP at North Budapest	28000	56000	308	183
4	Municip.	H02	Expansion of WWTP at South Pest	18700	37400	203	122
5	Municip.	BH01	Construction of regional sewerage system Tuzla-Lukavac with central WWTP for cities and industry.	15840		1080	160
6	Municip.	HR19	The central WWTP of Zagreb	10438	29743	1320	220
7	Municip.	BG03	Municipally WWTP of Sofia	5823	12051	273	551
8	Municip.	RO12	Development of WWTP of Resita city	1502	1729	241	527
9	Industry	YU22	IHP Prahovo (fertilizers)	440	2020	460	3800
10	Wetlands	H10	Area between Gemenec and Kopacki Rit - Danube-Drava Region			4050	405
11	Wetlands	HR67	Area between Gemenc and Kopacki Rit - Drava river basin wetlands in Baranja region			4050	405
12	Municipalities	D05	Munchen I - Isar	1	36	2,704	3
13	Wetlands	RO66	Balta Greaca / Tutrakan			2,700	270
Total reduction of the 13 projects of this list				**155,010**	**260,545**	**25,774**	**9,573**
Reduction of the 13 projects as % of all proposed projects				36	41	32	47
Total reduction of all proposed projects				431,653	640,917	81,272	20,371

7.3.2. Consideration on Decision Making for Investment

The results of the ranking process can be considered as a support within the decision making process for investments in pollution reduction. The results allow the investors to select which of the above mentioned achievements should have the highest importance from their own point of view.

If the pollution reduction in the Black Sea is of highest importance than the ranking 3 – following the cost effectiveness for nutrient reduction - should be considered. For the improvement of the situation in the SIAs the results of ranking 2 and ranking 4 may be taken into consideration.

8. Planning and Implementing Capacities

8.1. Planning Capacities

In general, the statements of the countries are mostly identical with respect to the planning capacities within their countries. The message is that in every country there are well educated experts within authorities and planning organisations as well as within the private sector so that planning capacities are sufficiently existent. The only problem is the lack of financial means.

Concerning the integration of high-sophisticated technologies (as best available techniques etc.) in the planning processes foreign input is needed and requested.

8.2. Implementing Capacities

Concerning the implementing capacities the statements of the countries are also mostly identical. The countries point out in the respective national reviews that in every country there is good and strong potential to implement the proposed and envisaged projects.

The main problem is the lack of financial means, which hinders the successful implementation of the proposed projects so far.

Concerning the assembly and application of high-sophisticated technologies (as best available techniques etc.) foreign input is needed and requested.

8.3 Proposed Time Frame of PRP Implementation

A schedule for the implementation of the pollution reduction programme has not yet been established.

Of great importance for the implementation is the identification of **committed projects**. Committed projects means in this context that the national financial contribution is secured by the parliament and/or the government.

An additional remark concerning committed projects might be included in the project lists as soon as this information is available to have a quick overview on feasible projects.

8.4. Immediate Actions

After the identification of projects for urgent implementation there is a strong demand for further actions. The World Bank /GEF has given helpful information on the next steps for implementation (see annex 14). On the basis of these explanations a more precise guideline called **"Strategic Partnership Programme"** has been elaborated during the Hernstein workshop in May 1999 (see annex 15). This Strategic Partnership Programme may be helpful to take the immediate actions and to prepare the necessary documents for funding.

Annexes

Annex 1.

Overview on National Reviews, Part D: Water Engineering

Page 1: Actual State of Water Pollution Prevention and Reduction in the Danube River Basin

Page 4: Legislation, Technical Regulations and Guidelines for Water Pollution Control

Page 7: Actual and Planned Measures for Reduction of Water Pollution

Page 10: Expected Effects of Actual and Planned Measures

Page 12: Cost Estimation of Programmes and Projects

Page 13: Planning and Implementing Capacities

Overview: Actual State of Water Pollution Prevention and Reduction in the Danube River Basin

	Actual State **Germany**	Actual State **Austria**	Actual State **Czech Republic**	Actual State **Slovak Republic**	Actual State **Hungary**	Actual State **Slovenia**	Actual State **Croatia**	Actual State **Yugoslavia**	Actual State **Bosnia**	Actual State **Romania**	Actual State **Bulgaria**	Actual State **Moldava**	Actual State **Ukraine**
Municipal Waste Water Collection	Percentage of sewered population is 87%.	The Austrian waste water collection and treatment are well developed in comparison to other European States • Degree of connected inhabitants 72% with complete biological treatment	Municipality sewer systems represent also a considerable problem, as they are out of date or poorly built and they contaminate both ground and surface water.	The sewerage is constantly behind the development of water supply systems. Exfiltration of conveyed waste water by sewer systems is not an exception in Slovakia and it is dangerous problems especially in regions with high groundwater table.	The level of wastewater collection and treatment remained much behind the public water supply (95% water supply, 43 waste water collection)	In average about 55 % of the population in connected to sewer systems.	About 42 % of the population in the Croatian part of DRB are presently connected to a sewage system. Great parts of existing sewage systems are not completely constructed, and conditions of sewage systems related to their water resistance have to be improved.	Quantity of 44,9 % of the population connected to the water supply system also has sewage.	Underdeveloped sewerage network. The sewerage system covered 38 % of city zones and 11 % of village zones. Planning and implementation of sewerage systems was without proper documentation. Solutions were mostly partial and inadequate.	The damaged sewage collection network is regarded as a diffuse source of pollution. There are localities where the sewage collection system transport capacity is necessary to be increased.	One of the main polluting sources of the water are the Municipal wastewater discharges. Basic problems in sewerage • The realisation of sewerage networks requires great investments	*No separate description*	*No separate description*
	Actual State **Germany**	Actual State **Austria**	Actual State **Czech Republic**	Actual State **Slovak Republic**	Actual State **Hungary**	Actual State **Slovenia**	Actual State **Croatia**	Actual State **Yugoslavia**	Actual State **Bosnia**	Actual State **Romania**	Actual State **Bulgaria**	Actual State **Moldava**	Actual State **Ukraine**
Municipal Waste Water Treatment	In the Danube basin are 2250 municipal WWTP with a total capacity of more than 20 Mio. PE.	The Austrian waste water collection and treatment are well developed in comparison to other European States • Degree of connected inhabitants 72% with complete biological treatment • 1093 biological WWTPs (15,2 Mio PE) • 59 mechanical WWTPs	Almost all larger towns are equipped with waste water treatment plants but their efficiency is not satisfactory. In all cases many of indirect industrial discharges are connected to WWTP and these plants are accordingly highly overloaded	The level of waste water treatment lags behind western standards. The main reason of insufficient treatment is hydraulic and mass overloading. Most WWTPs consist of mechanical and biological treatment. The smaller plants prevail. Sludge treatment and disposal is tremendous problem.	The level of wastewater collection and treatment remained much behind the public water supply (95% water supply, 43 waste water collection). The municipal point source pollution is regarded as the major factor of transboundary pollution from Hungary. The amount of treated wastewater led into surface waters will increase. The level of organic matters and microbial pollution will likely be decreased considerably.	There were 100 waste water treatment and sludge treatment facilities in 1994. Pollution from urbanised areas along the rivers is especially severe. Existing waste water treatment plants do not have tertiary grade of treatment, that is why there is no reduction of nutrients.	The total installed capacity of treatment plants in Croation part of DRB is around 900,000 PE – mechanical treatment and in some cases also biological treatment. Increasing the treatment capacity and improving the effectiveness of existing treatment plants is necessary.	Of all waste waters 9,5 % is purified. High rate of organic pollution and a high concentration of micro-organisms.	Most of the municipalities have sewerage systems that collect waste water and discharge it directly to the water recipient without previous treatment. Very small number of larger cities has waste treatment water facilities. The WWTPs are in bad state. For any kind of maintenance, reconstruction or intervention repairs, public company has lack of finances.	There are 257 WWTPs provided for 248 human settlements, at present. Out of this number 143 WWTPs might be consider not working at the planned efficiency level. Reasons: • Unsuitable operation • Construction errors • Overloading There is no tertiary treatment in Romania, at present	One of the main polluting sources of the water are the Municipal wastewater discharges. Basic problems in sewerage • Study and redesigning of existing WWTPs are needed • Antiquated equipment • Power consumption is generally very high • Post-treatment of N and P is not resolved technologically • Problem of sludge treatment is not resolved	*No separate description*	Many industrial enterprises discharge their waste waters into municipal sewer system. This is why municipal waste water discharges potentially are the source of serious pollution with heavy metals and persistent organic micro-pollutants.
	Actual State **Germany**	Actual State **Austria**	Actual State **Czech Republic**	Actual State **Slovak Republic**	Actual State **Hungary**	Actual State **Slovenia**	Actual State **Croatia**	Actual State **Yugoslavia**	Actual State **Bosnia**	Actual State **Romania**	Actual State **Bulgaria**	Actual State **Moldava**	Actual State **Ukraine**
Industrial Waste Water Treatment	Integrated clean production process plus WWTP minimise emission discharges.	Powerful Biological WWTPs (>10.000 PE) have been installed by the industry for treatment of industrial waste waters (total capacity 6,2 Mio. PE)	Industrial sectors can be ranked among the greatest polluters regarding specific pollutants in the Czech Rep. There are ***800*** industrial point sources of water pollution in the Czech sub-catchment area of the Morava River. 360 factories discharge their sewage directly into receiving waters, major part of them being provided with more or less efficient sewage treatment. Many of indirect industrial	The majority of industrial waste water is collected together with municipal waste water and consequently it is treated at municipal treatment plants. *(A description with regard to Industrial Waste Water Treatment Plants is missing)* According to the Slovak Environmental Inspectorate the most of the accidents on the Danube River is caused by oil mate-	As a consequence of former water policy today all the industrial factories have their own water treatment of pre-treatment facilities. These facilities are not always good enough regarding the existing pollution load, effluent requirements. Water protection administration was relatively successful o the field of industrial pollution reduction.	Pollution caused by industry has decreased over recent years partly as a result of reduced economic activity in certain key sectors. There were ***422*** industrial waste water treatment and sludge treatment facilities in 1994	Industry pollution decreased in last few years as result of reduced economy activity and war situation – the ration of industrial waste water connected on sewage systems decrease with rising trend of municipal waste water. Present problems: non-existance of pre-treatment on some industry facilities due to lack of financial means, poor maintenance of some existing pre-treatment facilities, outdated	Most industrial enterprises are located in urban communities and they most often discharge their waste water into the city sewage system.	Bosnia and Herzegovina have the most of “dirty” industry of the former Yugoslavia The industrial plants were mostly without waste water purification plants.	There are 475 industrial units discharging their waste water directly into the Romanian rivers via 417 WWTPs. Out of the whole number of the WWTPs 196 units have been found not reaching their designed efficiencies. 217 industrial WWTPs are considered working properly.	Impact of the industries to the river basins • more than 130 significant industries representing practically all the industries branches. • At the territory of the Danube River Basin there are more than 200 sources generating hazardous wastes. • Considerable amount of sources in each river ba-	The problem of industrial and domestic waste utilisation is still remaining, in spite of the fact that the volume of their production has decreased in comparison with previous years.	Many industrial enterprises discharge their waste waters into municipal sewer system.

Source: National Reviews, Part D: Water Engineering

			discharges are connected to WWTP and some of these plans are accordingly overloaded.	rial.			treatment equipment when treatment facilities do not follow the changes in –technological processes.				sin generate small quantities of so called “generic wastes”.		
	Actual State Germany	**Actual State Austria**	**Actual State Czech Republic**	**Actual State Slovak Republic**	**Actual State Hungary**	**Actual State Slovenia**	**Actual State Croatia**	**Actual State Yugoslavia**	**Actual State Bosnia**	**Actual State Romania**	**Actual State Bulgaria**	**Actual State Moldava**	**Actual State Ukraine**
Agricultural Waste Water Treatment	On going investments in appropriate and environmentally sound liquid manure techniques. Extensive agriculture activities	Relatively meagre utilisation of fertilisers and pesticides	It is almost unambiguous that the agriculture is the biggest source of nutrient emission into waters in the Czech Rep. Agricultural pollution has been originated in part from livestock operations, especially in large-capacity pig farms and in part from non-point effects due to the recent oversize application rates of manure, fertilisers and pesticides.	Agriculture is one of the most important pollution source of aquatic environment. At present live stocks are not any more important as point sources of pollution. It exists the regulation concerning handling of manure, but in reality it does not exist inspection of the level of fulfil of these specified requirements It is estimated that about 20-25% of the total N and P load of surface waters is due to the manure discharge.	There is no statistic data on diffuse pollution from agriculture in Hungary (uncontrolled situation) The agricultural diffuse pollution is low today The pesticide use is on so low level that it would not easy to reduce further	Agriculture may be partly responsible for soil pollution. There is no control on heavy metals in currently used mineral fertilisers and no maximum values are specified. Pesticides have been detected but never in high concentrations	Agricultural pollution decreased in last few years as result of reduced agricultural activity and war situation which cause damage to irrigation/drainage systems and hydrotechnical facilities and increased soil pollution, mined area which cause reducing agricultural activities. Other present problems are: inadequate use of mineral fertilizers, inadequate application of pesticides and disposal of packaging material, inadequate handling of pesticides, inadequate	The extensive use of fertilisers and pesticides has a considerable impact on the environment in general and on water resources particular. Wastewater from agriculture comes primarily from livestock farms with liquid manure disposal.	The largest emission of pollution from non-point pollution source occurs in the river basins of Bosna (20%), Sava (13%), Drina (12,5%) and Vrbas (10%).	Most of the WWTPs of the breeding farms are uncompleted or not well operated. That is why the treated waste water quality characteristics are above the allowable level, before discharging into the recipients rivers. For the time being there are no special agro-technical measures to improve live stock practices	Impact of Agriculture on the River Basins • The breeding farm complexes and the exceeded fertiliser use are the main reasons for contamination with nitrates and phosphates. • Water quality data relevant to nitrate values shows that contamination caused by agriculture is significantly decreased. • The necessity of intensive usage of pesticides in the Danube region is doubtless.	*No separate representation*	*No separate representation*
	Actual State Germany	**Actual State Austria**	**Actual State Czech Republic**	**Actual State Slovak Republic**	**Actual State Hungary**	**Actual State Slovenia**	**Actual State Croatia**	**Actual State Yugoslavia**	**Actual State Bosnia**	**Actual State Romania**	**Actual State Bulgaria**	**Actual State Moldava**	**Actual State Ukraine**
Waste disposal sites, Landfill techniques	The National Action Plan of Germany does not treat this issue.	*The National Action Plan of Austria does not treat this issue.*	According to the Czech law, solid waste is divided into 2 categories (dangerous and others) and 20 groups (according to their origin). Dump sites are divided in four groups according to the leachates quality. The dangerous waste is permitted only in one of these four groups. At present, only well secured dump sites are officially in operation. Many closed dump sites have not been precisely identified hitherto.	*(No description with regard to the problem of inadequate landfills)*	The majority of municipal waste dumps (incl. old abandoned) cause risk of pollution for surface and groundwater. Considerable development is expected, due to the increase of financial sources. The rate of municipal liquid waste is relatively high. Their dumping method is mostly unsustainable. The hazardous waste management is strictly regulated. Central programme has been launched for survey, impact evaluation and rehabilitation.	The total available capacity of all landfills amounts to approx. 13 million cubic meters. There are currently 13 industrial waste disposal sites.	Some existing landfills are not situated in appropriate locations and cause pollution of ground water. Deficiency in terms of solid waste management concerns a lack of waste separation, recycling, or reuse.	The total amount of municipal waste in 1993: 1.5 mil. tons. Disposal, transport and treatment of hazardous waste in most parts of the country is inappropriate. The processing technologies and incentives are insufficiently developed. Mun. waste disposal is a major problem both from the aspect of env. and human health risk and from the aspect of possible solution. Now prior measures were taken to protect groundwater from contamination before establishing landfills.	*No separate description*	After 1990 a downward trend of waste production has been estimated. In 1996 53,7 million tons of industrial waste, 6,7 million tons of municipal waste and 3.8 million tons of agricultural waste were produced. *No problems are described*	Impact of the municipal refuse sites on the river basins • 230 registered municipal refuse sites • Total amount of accumulated waste 1.947.265 tons • Most of the municipal refuse sites are not controlled	The volume of accumulated waste is growing (lack of specialised dumps and of systems for neutralisation). The situation is getting worse because the majority of industrial enterprises is in critical condition and there exists relevant, efficient and normative basis. There is no program for hazardous waste reduction in Moldava yet.	Landfills and dump sites are serious sources of pollution.

Source: National Reviews, Part D: Water Engineering

Overview: Principal National Targets

	National Targets	National Targets	National Targets	National Targets	National Targets	National Targets	National Targets	National Targets	National Targets	National Targets	National Targets	National Targets	National Targets
	Germany	**Austria**	**Czech Republic**	**Slovak Republic**	**Hungary**	**Slovenia**	**Croatia**	**Yugoslavia**	**Bosnia**	**Romania**	**Bulgaria**	**Moldava**	**Ukraine**
National Targets for Water Pollution Reduction	The most important targets and principles of German water management have been described in Part A, chapter 7.1 • Reduction of detrimental impacts of activities in the Danube river basin • Improvement of availability and quality of water in the Danube river basin • protection measures against accidental spills • Development of regional cooperation in water management issues • Perceptual upgrading of existing industrial and municipal waste water treatment plants and pretreatment facilities	Main targets of Strategic action plan for the Danube River Basin: • Reduction of negative impacts of activities in the Danube River Basin • Maintenance and improvement of water quality • Implementation of measures for emergency case • Development of regional cooperation in the sector of water management Austrian National Action Plan: The objectives of the SAP should be put into action by the NAP	Water pollution must be reduced mainly in municipalities and in industry. National targets and instruments for water pollution reduction are entirely drawn up in the text of "State Environmental Policy" (1995) ***Short term objectives:*** • Improving water quality by limiting pollution discharges • Reducing the production of wastes, namely hazardous wastes • Eliminating the impacts of harmful physical and chemical factors • Remedying previous environmental damages ***Medium term objectives*** • Creating land use provisions which will safeguard the efficient protection of water and fulfil international commitments through regional planning • Increasing the water retention capacity of land by improving the revitalising measures The Document State Environmental Policy has been updated in 1999. The harmonisation of Czech Legislation with the EU regulations and implementation of other measures connected with EU accession as well as sustainable development in all sectors are stressed.	***Long-term goals of state environmental policy:*** • Formation of economic barriers and systems, which will have preventive impact • Applying the increased protection and rational exploitation of natural sources • Harmonisation of economic, environmental and social interests • Applying the prohibition of ground water use for other than drinking purposes • Ensure the treatment of 80-90% of discharges waste water • Reduction of pollution of watercourses To be achieved in three phases: • Short-term • Medium-term • Long-term	***Main Targets:*** • Danube and Tisza should reach the Class III level in all important parameters • The further pollution of irrigation waters should be stopped • The harm on vulnerable ground water resources should be decreased by better control of land uses and environmental conditions on the surface • The pollution of nitrate and pesticides from diffuse sources should be decreased in groundwater and sensitive surface waters. Safety of groundwater resources.	***Main targets***: National Water Programme: • Formulation of sustainable water management • Implementation of integrated water management • Creation of regional institutions and enterprises to manage water quantity and quality • Development of a financial system for the support of the strategy • Development of the inspection and control system • Development of an information system on water economy	State Plan for Water Protection from Pollution: ensure water management based on the principle of integrality of water system and on the principle of sustainable development (The state plan describes the measures for water pollution control, the targets of the measures and schedule for implementation of these measures.). Objectives: • Preservation of water resources which are still clean • Stopping further degradation of water quality • Restoration or removals of sources of pollution • Strengthening of the monitoring system • The water pollution control is conducted through monitoring of water quality and sources of pollution Polluter pays principle	***Long-term objective:*** Full protection of the quality of surface and groundwater • Long-term plan for maintenance and development of the water regime • Determine the available water potentials in the catchment area and the conditions for water management • Define water resources management development • Ensure integral, complex, economic and uniform use of water resources in all spheres • Secure the protection and improvement of water quality • Gear scientific, research, study and observation activities Their proposal is that a detailed analysis be carried out of the existing water quality monitoring program ar all international waters, which would be compared with the international cooperation programs. Based on the results national needs and commitments, a draft New Water Quality Monitoring Program would be prepared with a list of priorities and the schedule for completion of future tasks.	Conception of the long-term water protection program: • Protection of potable water sources • Protect river water from further deterioration • Special protection of karst water • Gradual reduction of river and sea water • Etc. Program is directed to repairing of existing state of concentrated pollution sources from urban and industry plants. Common ***targets*** for water pollution reduction: • Establishment of clean technologies • Establishment minimum criteria for effluent quality • Rehabilitation and (re-) construction of WWTPs • Industrial WWT • Establishing of a new system and activities schedule for control and degree of pollution • Monitoring, Permanent measurements • Planning, designing or reconstruction of industrial and other structures • Legal provisions	***Strategic objectives:*** • Development, preservation and use of natural capital under the supportability limit, firstly of natural renewable resources • Permanent restructuring on ecological principles • Development of human capital ***National targets:*** • Reducing nitrates, organic substances including pesticides • Decreasing the amounts of heavy metals and highly degradable organic compounds in sediments • Reducing BOD_5, N and P emissions from WWTPs • Controlling the diffuse pollution ***Main strategic directions:*** • Gradually development of municipal wastewater treatment capacities • Gradually development of wastewater treatment in agricultural sector • Gradually development of wastewater treatment in industrial sector • Integrated management of water resources • Abatement of risks related to accidental pollution and natural calamities • Ecological reconstruction	Bulgaria Environmental Strategy Study developed in 1992 by experts from the Ministry of Environment and Waters and the World Bank includes the following priorities in water management: • Reduction of industrial contamination, especially of the toxic substances • Completion of the municipal waste water treatment plants with advanced stage of construction, modernisation of existing municipal and stock-breeding WWTPs. • Construction of municipal WWTPs in towns with developed sewerage system	The national targets of reduction of water pollution is to maintain human health and to eliminate health risk in water resources, to provide sources of nutrition and to maintain and restore biodiversity: • Comprehensive evaluation of water resources conditions and elaboration of a concept of protection and rational use of water resources and water-balanced systems based on sustainable development approach • Elaboration of scheme for river basins use • Development of ecological criteria for assessment of permissible loads into surface waters • Development and putting into force of integrated parameters and criteria for maintaining of ecological balance in water bodies. • Preparation of ground for rehabilitation and maintenance of proper ecological conditions in water bodies for certain uses.	***National Targets:*** Short term objectives (for period to 2000) of water resources management: • Normative and legal maintenance of the New Ukrainian water legislation • Development of the ecological normative on water quality standards with short term stages for their implementation • Organisation of the State Monitoring system of the waters • Improvement of the water quality(quantity control through the water objects pollution reduction control • Establishment of the technological regulating systems of water use / pollution to be sure that "polluter pays and user pays" principle are applied in practice Long term objectives (for period to 2015): • Harmonisation of the Ukrainian and European community's (EC) legislation • Organisation of the legislative and economic substantiation of the water resources management based on the basin principle

Source: National Reviews, Part D: Water Engineering

Overview: Legislation, Technical Regulations and Guidelines for water pollution control

	Legislation	Legislation	Legislation	Legislation	Legislation	Legislation	Legislation	Legislation	Legislation	Legislation	Legislation	Legislation	Legislation
	Germany	**Austria**	**Czech Republic**	**Slovak Republic**	**Hungary**	**Slovenia**	**Croatia**	**Yugoslavia**	**Bosnia**	**Romania**	**Bulgaria**	**Moldava**	**Ukraine**
Water Management Legislation (Water Act)	In Germany the water act (water resources policy act) gives the frame-conditions for water management The German federal states (Länder) have their own water acts. These are put into action among others by administrative rules.	The water act has been amended in 1990: integrated water management with consideration of ecosystems. The essential innovations: • all-embracing approach • principle of provisions • Application of BAT • Principles of emission and harmful effect • Improvement of the authorities of administration • exhaustive monitoring system	After political changes in the year 1989 were performed necessary legal adjustments by the means of other tools coherent with the water act. In such way many new environmental laws sprung out including the act No. 17/1992 on environmental protection, the act No. 244/1992 regarding environmental impact assessment, the act 388/1991 on the state Environmental Fund. In the 1998 the Water Act No. 138/1973 Col. has been amended (Amendment no 14/1998 Coll.) and new Water Act is in preparation. Act No. 58/1998 Coll. on Charges for Wastewater Discharge to surface water as well as related Intimation, Government Decree No. 82/1999 Coll. Setting up Admissible Limits for the Water Pollution and Government Decree No. 100/1999 governing Flood Protection have recently entered into force.	The principles, priorities and strategies of the Environmental Policy are based predominantly on the following documents: • The UN Conference on the Environment and Development • The Environmental Action Program for Central and Eastern Europe • Multilateral international environmental conventions and bilateral treaties on environmental cooperation • The Maastricht Convention on EU The present Water Act is based on the former Czechoslovak Water Act No.138 from 1973 and is currently revised. ***Short-term objective:*** Preparation, acceptance and implementation of the new Law on Water and related executive provisions	There is no legal obligation for reaching water quality targets in the surface stretches The basic targets have not been turned into ambient water quality standards for the touched water courses yet.	Main law: Environmental Protection Act: • Efficient environmental monitoring and polluter-pays-principle • EIA and environmental vulnerability studies • Environmental research • Public expenditure related to environmental protection. • Public participation A number of decrees are currently being drafted on waste oil management, on waste management, on hazardous waste management, on the management of galvanic cells, on the transit of waste etc.	Main document for water management: ***Water Act (1995)*** This document defines the following issues: •Water management •Protection from harmful effect of water •Water protection from pollution •Water use and utilisation •Conditions and methods of conducting water management activities ***Basic principles***: •Integrity of the water system •Sustainable development •Water management units are river basins •Preparing and adopting water management plans •Regulations for investments	The basic documents are: • Resolution on the Policy of Environmental Protection (1993) • Law on the principles of Env. Protection (1998) • Law on the Env. Protection of the Republic of Serbia (1991) • Etc.	A new ***Water Act*** came into effect 19.05.98 in the federation of Bosnia and Herzegovina. According to the law two public utility companies will be in charge for water management: Public water resources management company for Sava river basin Public water resources management company for Adriatic sea river basin	The ***Law of Waters*** No. 107/1996 provides the framework of technical regulations for water pollution reduction and water management. Besides The ***Law of Environmental Protection*** No. 137/1995 comprises special provisions for water protection. According to the existing legislation no discharge into water is permitted without authorisation.	In Bulgarian legislation the water resources protection and their complex management and use are regulated currently by the ***Water Act*** from 1969. Water protection adopted is also regulated by the Law for prevention of Air, Water and Soils against Pollution adopted in 1963 and the corresponding regulations for its enforcement. A ***new Water Act*** is under preparation and it will regulate all water resources from qualitative and quantitative point of view.	Water Code: The discharge of water is only permitted: • If it will not result to exceeding the maximum allowed concentration in receiving water • If the users will provide the treatment of waste water to the degree required by the ecological, water management and sanitary authorities The base for calculation of fees or charges are wastewater-volume- and pollution-load-related	According to the ***Water Code*** of Ukraine water resources management is carrying out dealing with National, International and regional Programs in Water Resource Use, Protection and Restoration.

	Legislation Germany	Legislation Austria	Legislation Czech Republic	Legislation Slovak Republic	Legislation Hungary	Legislation Slovenia	Legislation Croatia	Legislation Yugoslavia	Legislation Bosnia	Legislation Romania	Legislation Bulgaria	Legislation Moldava	Legislation Ukraine
Technical Regulations and Guidelines	In co-operation of all 16 federal German states guidelines for water resources protection are prepared, for instance: • Recommendations for monitoring the status of natural waters • Analytical quality control for water, waste water, sludge etc. • Concept concerning measures for im-	*No separate description*	According to a new Czech Standard CSN 757221, flowing water is classified into 5 categories. (class I - clean water, class V - the most polluted water). Basic classification is according to the following determinands: saprobity index, BOD, COD, $N\text{-}NO_3$?, $N\text{-}NH_4^+$, total P. This basic group of determinands can	Water quality management is based on the Water Act and government directives, further supported by technical standards ***TR for quality standards:*** The Government decree No. 242/1993 (most important legislative norm) was prepared with the aim to correspond with EU legislation, especially with Direc-	The concentration limits fixed in the 3/1984 Governmental Decree on effluent discharge fines are regarded as effluent standards in Hungary. As the system was set up fifteen years ago it can not fully serve the today's needs. The Ministry for Environment is of the opinion that the effluent standard and fining system	*The text of subchapter "Technical regulations and guidelines" describes more or less "the law and practice on water pollution control" but not technical regulations.*	All documents are based on the standards for recipient, although the Water Act foresees the definition of effluent standards. Moreover, the several important technical regulations are still being prepared in order to achieve the criterion defined in EU directives for water quality.	There are developed technical regulations within the framework of JUS-ISO standardisation where in practice ISO standards are in force	Adequate water course protection and pollution control calls for introduction and legal standardisation for public –utility and industrial effluent quality Bosnia has made a guidelines draft based on the experience of the other European countries which classified quality of industrial effluent both when it is discharged into	The Law of Waters No. 107/1996 provides the framework of technical regulations for water pollution reduction and water management. The technical regulations TNWP 001 and 002 are used to set license conditions. There are also standards regarding water quality.	The various aspects of water protection and management are settled by different regulations: According to the existing regulatory system there are planned several kinds of licenses: for waste water discharge, for various kind of water consumption, for complex use of reservoirs and dike con-	*No separate description*	The status of regulatory documents and pollution control is identified and approved at the level of the Cabinet of the Ministers in a form of amendment of acting legislative norms. There are several documents dealing with monitoring, control etc. ***Standards:*** • Of ecological safety of water usage • Ecological stan-

Source: National Reviews, Part D: Water Engineering

	provement of rational water usage • Conception and strategies for protection of inland surface water bodies		be supplemented with other relevant ones. The condition of identical determinads for together evaluated sampling points-profiles should be kept. Resulting class is according to the most unfavourable classification.	tive 91/271/EEC. There is a tendency to take over European Standards and to incorporate them into Slovak Technical Standards.	should be differentiated in the near future.				sewerage systems or into open streams		struction, for hydrogeological explorations and drill wells. For river bed construction, inlets, outlets etc.		dard of water quality in water bodies • Of maximum allowable discharge of pollution substances • Industrial technological standards of generation of substances that are discharged into water bodies • Water usage technological standards
	Legislation Germany	**Legislation Austria**	**Legislation Czech Republic**	**Legislation Slovak Republic**	**Legislation Hungary**	**Legislation Slovenia**	**Legislation Croatia**	**Legislation Yugoslavia**	**Legislation Bosnia**	**Legislation Romania**	**Legislation Bulgaria**	**Legislation Moldava**	**Legislation Ukraine**
Law and Practice on Water Pollution Control		In order to put into action the water act legal and administrative "tools" have been created to achieve the following targets: • limitation of emissions • Limitation of harmful effects • Threshold values for groundwater and rehabilitation of groundwater resources • Monitoring of harmful effects • Protection areas and frame programmes • water management planning • Financing of water management facilities in residential areas • Protection of wedlands • Hazardous wastes, waste solid treatment and disposal • Sustainable agriculture • Environmental Impact Assessments • Application of EU Legislation	Practical use of valid Czech laws, acts, decrees, directives and regulations is not so complicated as the knowledge of international documents. The function of water pollution control was well prepared twenty – twenty-five years ago and within the control system all relevant parties have been involved. The compatibility of individual elements of water pollution is relatively good, the missing part is represented only by the link of the Civil Service and Autonomy responsible for Water Management Fund Control.	Government of the Slovak Rep. Stated in its resolution No. 623/1990 the need for integrated monitoring of environment.	*Licensing:* the licensing authority is the regional water directorate. EIA is obligatory for a specific list of activities by law *Enforcement tools:* Waste water fine, The possibility for occasional general environmental check-up, environmental supervision, stopping the questioned activity.	The Ministry of Environmental Protection is responsible for the overall water management and consequently for establishing regional plans on all water aspects. Regarding water management the Slovene territory is divided into eight subdivisions. The Institute of Public Health tests the quality of water in the supply systems. The methodological procedures are modern and carried out according to international –standards	The main documents concerning water pollution control: Water Act, Act of financing of water management, State Plan (see below), Ordinance of water classification, Ord. About hazardous substances, etc. State Plan for Water Protection: • Monitoring of water quality and related research • The categorisation of water • Measures for water protection from pollution • Measures in case of accidents • Plan for building WWTPs incl. Financial mechanisms • Description of duties and responsibilities of authorities In order to carry out the water pollution control activities it is important to pass another legal acts where the standard for effluent will be defined The monitoring is carried out by state and county water management inspections	The basic documents are: • Resolution on the Policy of Environmental Protection (1993) • Law on the principles of Env. Protection (1998) • Law on the Env. Protection of the Republic of Serbia (1991) • Etc. ***Practical measures in water pollution control:*** The law on waters of the Republic of Serbia stipulates that a Plan for the Protection of Waters against Pollution will be drawn up and that protection will be effected in accordance therewith. This plan sets out measures *in all fields of environmental protection.*	Law does not provide benefits for those legal entities and institutions who make contributions to rationale water usage, decrease of water pollution and direct efforts for better water management. Law provides control and supervision over water pollution by inspection services as well as penalties if the measures are failed to apply properly.	• The responsibility to prepared legislation acts is taken by the Ministries • Guidance documents are generally prepared by the National Research Institutes and finally approved by the Ministries • Industrial licenses for emissions are issued finally by the local environmental authority that is Env. Protection Agency. The communication between the authorities involved in the licensing process is established by the existing regulations. The main problems with the administrative framework are: • Possible parallel work • Tackling public participation problem The licensing conditions are not negotiated with the discharger.	An extremely important feature of the new legal system is the introduction of a new system of taxes and fines for waste water discharge. A very serious problem that has to be solved by the new water act is the introduction of the "self monitoring" principle. The requirements and standards are borrowed mainly from the EC.	Currently pollution fees and fines and natural resources user charges inadequately reflect the social cost of environmental degradation and do not provide pollution reduction. Generally, the efficiency of existing system for water quality monitoring is quite poor because implementation is realised by various institutions and often is not co-ordinated.	Licensing: Monitoring: The state water monitoring is conducted with the aim of ensuring collection, processing, storage and analysis of the information on the condition of waters, prediction of its changes and development of the recommendations for making scientifically substantiated decisions in the field of water usage and protection and water resources restoration.
	Legislation Germany	**Legislation Austria**	**Legislation Czech Republic**	**Legislation Slovak Republic**	**Legislation Hungary**	**Legislation Slovenia**	**Legislation Croatia**	**Legislation Yugoslavia**	**Legislation Bosnia**	**Legislation Romania**	**Legislation Bulgaria**	**Legislation Moldava**	**Legislation Ukraine**
Introduction and Application of EU-Legislation	Due to the fact that Germany is one of the foundation members of the European community, the European legislation has been incorporated into	Austria is member of the European Union since 1995, so that Austria is obliged to incorporate European into national law.	*No separate description.* The updated State Environmental Policy is focused predominantly on the fulfilling of task	The involved ministries support the preparation of legislative measures, focused on completing the formation of total modern systems of legal	The majority of the EU directives has been built into the new proposal on Hungarian water protection legislation. E.g. the *Framework*	All the EU directives in water sector have already been introduced into the national legislation. The first bilateral screening at EU-Commission was	The several important technical regulations are still being prepared in order to achieve the criterion defined in EU directives for water quality.	The integral water pollution control is expected to be further developed. The now obvious problem stems from the absence of	Bosnia has made a guidelines draft based on the experience of the other European countries	The new regulations have supplied the new principles and the outcome ideas of EU legislation. The harmonisation of EU legislation is going on,	The requirements and standards are borrowed mainly from the EC	So far Moldava has not applied for the membership in the EU, actually EU practice in the use of directives is only on the level of proposal, based on the	The harmonisation of Ukrainian Legislation with European Directives has been carried out for three main directives:

	national laws.		connected with the EU accession, inclusive approximation of CR legislation to EU legislation. Many new harmonised regulations have already entered into force and other are in preparation	provisions on protection and rational use of water, comparable and harmonised with the legislation of the EU countries, and their implementation into practice.	*Directive* were integrated into the proposal on the development of the Hungarian water legislation. The basic goal was at that time to avoid any contradiction with the EU directive *Nitrate Directive*: the detailed examination of this directive has just started in Hungary.	on going in February 1999 and the output of this presentation in basis for negotiations on transition period for implementation of specific directives (e.g. EU WWD). Refer to plans, this process should start in September 1999.		harmonisation between the national legislation and the EC regulations and other international provisions, because the application of different regulations on waters has not been harmonised.		but the most important issue is the compliance with the regulations.		experience obtained from the seminars on the EU practice in the field of water management legislation, standards and normative acts in autumn 1996.	• 96/61/EU: control and prevention of pollution • 91/271/EU: municipal waste water treatment • EU principles of Water Management Further activities on harmonisation will be carried out
	Legislation Germany	**Legislation Austria**	**Legislation Czech Republic**	**Legislation Slovak Republic**	**Legislation Hungary**	**Legislation Slovenia**	**Legislation Croatia**	**Legislation Yugoslavia**	**Legislation Bosnia**	**Legislation Romania**	**Legislation Bulgaria**	**Legislation Moldavia**	**Legislation Ukraine**
Expected Impacts of EU-Directives to Water Pollution Control	*The European legislation is already long-term applied.*	*The European legislation is already incorporated into national laws. No separate impacts described.*	The comparison of many values is resulting in the conclusion that it would be no problem to modify Czech system of standards to European Union values. Many Czech limits have been even more severe than European. However, some criteria must be modified.	The Government decree No. 242/1993 was prepared with the aim to correspond with EU legislation, especially with Directive 91/271/EEC. Within the framework of European Environmental Policy also Slovakia laid down new regulations: Waste Law and List of Wastes	The industry is controlled according to the existing waste water fine decree. This decree relies on the end-of-pipe concept. The introduction of the IPPC (EU) Directive) approach will likely completely change the existing situation	*Only the financial impacts have been described.*	The main difference between the EU-Directives (step-by-step approach) and existing legislation in Croatia is the lack of selective approach to the solutions of particular subjects of water pollution control in the Croatian laws. The Croatian laws often define the more strict maximum allowed concentrations of parameters than the European Union, although the EU-Directives define the higher number of parameters.	*No separate description*	The authors hope that signing the important documents related to environmental and water protection , accepted by many European countries, will be done in Bosnia in the near future. Propose for introduction of uniform standard for municipal plants effluents quality made by EC has a considerable effect on defining the criteria for effluent quality in the course of drawing the water protection program in BiH.	The Directive 91/22 EEC is to give the most important impact to national policies and regulations.	*No separate description*	Actual standards for water quality in Moldava are stricter than in the EU. Generally it is expected that the use of the EU directives will improve the control after the water quality and pollution reduction by the directives issued by authorised institutions.	For harmonisation of Ukrainian legislation with EU-directives *available financial means must be taken into consideration*

Source: National Reviews, Part D: Water Engineering

Overview: Actual and Planned Measures for reduction of water pollution

	Measures **Germany**	Measures **Austria**	Measures **Czech Republic**	Measures **Slovak Republic**	Measures **Hungary**	Measures **Slovenia**	Measures **Croatia**	Measures **Yugoslavia**	Measures **Bosnia**	Measures **Romania**	Measures **Bulgaria**	Measures **Moldava**	Measures **Ukraine**
Generally	The following main objectives have to be mentioned: • avoidance of emissions at the source • Permission and surveillance of waste water treatment plants • application of best available techniques • prohibition of hazardous substances • fixed objectives Priority Program: • Connection of settlements in the rural areas, non-equipped with WWTPs. • Rehabilitation of old and damaged sewer systems • Rehabilitation of existing overcharged storm water outlets and storm water reservoirs • Extension of non-efficient WWTPs. • Extension of WWTP for N and P-elimination • Enlargement of sludge treatment capacities • Improvement of performance of industrial WWTPs (application of best available techniques)	Objectives of National Action Plan • realisation of common objectives • Extension of information systems • Improvement of water quality • Reform of application of laws and guidelines • Reform of sectional measures and creation of incentives • protection of drinking water resources	• In addition to political, social, normative, legal and economic measures there have been mainly some technical measures by means of sanitation	The prepared list of hot-spots covered by Project Files indicates the actual problems in the fields of municipal and industrial waste water treatment including partially the problems of waste disposal. The agricultural problems are described in general, but they are not covered by any Project Files	The basis for water quality management and regulation is the river basin concept according proposed new water legislation. A new institutional machinery is necessary to be developed what is capable to define the catchment management plans. Building of Catchment Planning Commissions for each catchment area. There are different central programs on water pollution reduction. Their targets are mostly well defined but they are not always strictly defined regarding their technical content and financial consequences.	***Concept of planned measures:*** • Development of integral management in individual water basins • Development of institutions of management • Development of monitoring and information support • Development of the water economics • Enforcement of the principle of the full value costs for water • Financing extraordinary expenses resulting from water consumption • Rational water consumption as an economic impetus of the development • Development of mechanisms and institutions to improve the supervision of the programme implementation	Admin. measures: • Water management plans • Changing and improving of the existing water management licenses of discharge of waste water • Permanent supervision • Technical documentation • Restoring the information system Several documents issued by authorities serve as an instrument for water pollution reduction. These documents are water management conditions, water management approvals, water management permits and permit ordinances. Measures for conservation of water quality • Water protection zones • Bans of discharge Measures for reduction and stopping water pollution • Planning, reconstruction and building measures • Replacement of technologies • Building of appropriate dump sites • Restoration of existing dump sites, of sources of pollution on seacoast	Due to well known and elaborated reasons after 1991 almost nothing was realised from adopted measures and legislative enforcement In the last 6-7 years only small and low cost interventions on local level were realised.	Measures, which would achieve reduction of water pollution in the future period, are as follows: • Reduction of pollution on sources itself • Law and legal regulations will improve monitoring and control • Economic measures • Technical measures	Categories of measures: • Protection of surface and ground water quality • Protection of soil quality and biodiversity conservation • Legislation and institutional projects to achieve EU requirements • Economic analysis and EIA • Legislation, institutional development and regulations It can be said that planning according to “Best Available Techniques” and “Best Available Practice” presents some difficulties due to lack of information and due to the financial problems. The opinion of the experts is that the first step to act for pollution reduction is to increase the efficiency of the existing WWTPs by improving operation.	The measures for water pollution reduction could be summarised as follows: • Accelerated investments • Construction and rehabilitation of WWTPs (municipal, breeding-farms) • Improvement of maintenance • Monitoring • Elaboration of reporting system • Development of an inventory of the historically damaged industrial sites • Technological improvement of production processes • Setting up of national requirements and norms on water quality, harmonised with those of EU	• Improvement of legislation and creation of technical regulations for pollution reduction. • Strict observance of legislation and technical regulations • Development of new taxes on usage of mineral fertilisers, pesticides and other agro-chemicals • Development of new systems of fees and charges for discharge of wastewater in reference to the real damage • Creation of a system of taxes for the withdrawal of raw water from surface and groundwater sources The first measures will be concentrated at the bringing and maintaining water treatment efficiency in existing wastewater treatment plants to relevant level.	• Public control of water resources use, protection and restoration • State Water Quality Monitoring • Environmental Impact Assessment Survey • State Water Accounting • State Accounting of Water Use and Water pollution • Conducting of the State Water Register • State Accounting of surface waters & ground waters • Organisational-economic measures which provide water resources rational use, protection and restoration • Standardisation and Regulation in the field of water resources use, protection and restoration • Standards of maximum allowable discharge of polluting substances are established with the aim of stage-by-stage attaining the ecological standard of water quality for water bodies. • Monitoring systems

	Measures **Germany**	Measures **Austria**	Measures **Czech Republic**	Measures **Slovak Republic**	Measures **Hungary**	Measures **Slovenia**	Measures **Croatia**	Measures **Yugoslavia**	Measures **Bosnia**	Measures **Romania**	Measures **Bulgaria**	Measures **Moldava**	Measures **Ukraine**
Reduction of Water Pollution from Municipalities	Continuation with all (already started) measures concerning treatment of municipal waste waters. • Improvement of WWT facilities according to the BAT standards • Protection of	• Measures for minimisation of water pollution caused by municipal waste waters • Strategic Investment planning • Rehabilitation and modernisa-	• Modernisation of all systems of sanitation	24 hot spots have been identified by using multi-criteria analysis of ranking assumed problems	Program which was launched for communities with the aim of reaching 67 % level of canalisation for 2010 (subprograms: 1. Sewage treatment Program of Hungary for the smaller settlements, 2. Sew-	Long term and short term projects have been identified.	Recommended projects for municipal hot spots: ***41*** projects have been identified.	*Table of hot spots for reduction of water pollution from municipalities is missing.*	*No separate description*	There are ***8*** short term priority projects identified. All together 15 projects are identified.	*No separate description*	In the respect of reduction of water pollution from municipalities in the first turn the measures will be concentrated at the bringing and maintaining water treatment efficiency in existing WWTPs.	*4 hot spots have been identified*

Source: National Reviews, Part D: Water Engineering

	source water bodies by implementation of improved /rehabilitated waste water treatment facilities. • Improvement of premises sewage treatment plants by implementation of biological purification stage	tion of municipal WWTP • Investment in sewer systems and WWTPs •			age Treatment Program of the Capital and the cities with county status) Separate programs were launched for the protection of existing and future wellfields.							To relevant level. All these WWTPs have been constructed 15-20 years ago and at the moment practically for each WWTP there exists a project for ist reconstruction or construction of a new one.	

	Measures Germany	Measures Austria	Measures Czech Republic	Measures Slovak Republic	Measures Hungary	Measures Slovenia	Measures Croatia	Measures Yugoslavia	Measures Bosnia	Measures Romania	Measures Bulgaria	Measures Moldava	Measures Ukraine
Reduction of Water Pollution from Agriculture	Multiple programmes and measures with the objective to reduce nutrient and pesticides emissions into water bodies. • training measures • improvement of co-operation of farmers and responsible persons for water management • Application of careful pesticides • Promotion of extensive agriculture • Purchase of bank-areas • Extension of existing water protection areas • development of adequate rehabilitation concepts	• Essential reduction of maize and grain arable acreage • More biological agriculture and implementation of agricultural alternatives (changes of crop rotation etc.) • Commitment to emissions limits for manure industry Implementation of environmental friendly agriculture-policy	• ***Point sources:*** 5 pig farms has been identified as hot spots • ***Non-point sources****:* Development of sustainable approaches in agricultural management • The main present task in Czech agriculture is concentrated on the stabilisation or rural inhabitants and workers and on the solution of ownership relations.	***Point sources:*** No hot spots identified A strong focus is needed in the future to handle and utilise the manure in the agriculture properly ***Non-point sources*** • Measures to reduce the erosion of soil • Pollution reduction from diffuse sources (by passing guidelines, principles of fertiliser dosage, etc.) • Implementation of sustainable and ecological agriculture Reduction of Water Pollution by improved Land Management	***Point sources:*** Further technical development (e.g. in the fields of: storage tanks, correct use of manure etc.) ***Non-point-sources:*** The authors can not identify specific areas and projects. Measures concerning use of pesticides would be needed to prevent the increase of use in future. The level of pollution from agriculture has decreased considerably due to the changes of the structure of agricultural production. The repeated increase should be avoided by extension of Best Agricultural Practice.	Slovenia estimates that long-term agricultural development will be possible only under conditions similar to those prevailing in other European countries. The risk of water pollution with nutrients is largely linked to pig farms. The optimal size of such farms is currently under discussion. This debate is supplemented by efforts to find generally applicable solutions to waste water treatment *No concrete measures / projects have been identified*	There are ***3*** projects recommended for the reduction of water pollution from agriculture.	***Point sources:*** table represents data about waste water treatment status at farms with capacities more than 10.000 heads of cattle. Those farms are hot spots. Non-point sources: The balanced usage and quality of fertilisers and pesticides are the main preventive steps to prevent pollution from the non point sources. The good agriculture practice should be implemented	*No separate description*	***Point sources:*** ***19*** projects are identified. ***Non-point sources:*** Other actual measures for reduction of water pollution from agriculture are related to the privatisation process *depending on financial means*	*No separate description*	***Point sources:*** *One project identified* ***Non-point sources:*** Measures to be undertaken: efficient fertiliser application to minimise agrochemical pollution, soil conservation practice to reduce agricultural run-off, study the possibility for sustainable level of fertiliser application etc.	*2 projects have been proposed*

	Measures Germany	Measures Austria	Measures Czech Republic	Measures Slovak Republic	Measures Hungary	Measures Slovenia	Measures Croatia	Measures Yugoslavia	Measures Bosnia	Measures Romania	Measures Bulgaria	Measures Moldava	Measures Ukraine
Reduction of Water Pollution from Industries	Improvement of performance of industrial WWTPs (application of best available techniques)	• Commitment to limits for industry according to the application of BAT • pollutants register • Laws for protection against hazardous substances • Laws and guidelines for storage, treatment and usage of manure	*2 key industrial hot spots*	*9 industrial hot spots identified*	All industrial plants have their treatment facilities but their performance is not good enough as proven in 80 % of the control cases. The driving force increasing the efficiency is low due to the weak legislative basis. The industrial point source pollution could be kept on existing level. State grants are available. 80 % of accidential pollution events are connected with oil contamination.	*Without any continuous text* ***11*** Projects have been identified.	There are ***6*** projects recommended for the reduction of water pollution from industries.	For minor number of hot spots Project Files could be formulated. *Table is still missing*	*No separate description*	***16*** projects are identified	*No separate description*	***3*** *projects identified*	*4 projects have been proposed*

Reduction of Water Pollution by Measures in the Landscape / Improved land management	Promotion and support for careful nature management and environmental care.	Programmes for preservation of wetlands	*No separate description*	It is assumed that four principal measures should be applied for specific Slovak's conditions to restore riverine ecosystems • Recreation of buffer strips • Alteration of tile drainage • Restoration of riverine wetlands • In-channel modification	*No separate description*	• Studies on optimal dynamics of water protection • Rehabilitation of manure hills and septic pits • Economic analysis • Restoration of endangered biotypes Measures in the Sava River basin.	*No separate description*	Land-use-planning should be coordinated or even integrated with environmental protection policies.	*No separate description*	There are no special measures taken for improving selfpurification of watercourses. As far as the floodplains and wetlands are concerned a special national commission has been created in 1998.	*No separate description*	It is supposed that it will be established a conservation program for natural reserves and wetlands. *4 sites for possible wetland restoration have been identified.*	*No separate description*
	Measures Germany	**Measures Austria**	**Measures Czech Republic**	**Measures Slovak Republic**	**Measures Hungary**	**Measures Slovenia**	**Measures Croatia**	**Measures Yugoslavia**	**Measures Bosnia**	**Measures Romania**	**Measures Bulgaria**	**Measures Moldava**	**Measures Ukraine**
Reduction of Water Pollution from Dump Sites	All existing landfills are constructed and operated according to the relevant standards and regulations	*The National Action Plan does not treat this aspect.*	*No separate description.* Many fault landfills were closed according to Act. No. 238/1991 Coll. Only controlled landfills are in operation at present. All closed landfills must be step by step identified and accordingly rehabilitated. (National Planning Workshop Report)	*7 hot spots of landfills identified*	Program on municipal waste management was started (groundwater pollution reduction). Measures are needed to decrease pollution risk from liquid wastes (seepage) by increasing sewerage, treating seepage at WWTP, increasing the rate of environmental sound individual WWT systems.	*No separate description*	There are ***9*** projects recommended for the reduction of water pollution from dump sites.	*No concrete measures are described* Hazardous waste management is under development.	*No separate description*	*No concrete projects are proposed*	*No separate description*	*No concrete projects are proposed*	Ukraine will need external financial support to carry out the needed assessment and introduction of new technology in the field of solid waste disposal. *No projects have been recommended*
	Measures Germany	**Measures Austria**	**Measures Czech Republic**	**Measures Slovak Republic**	**Measures Hungary**	**Measures Slovenia**	**Measures Croatia**	**Measures Yugoslavia**	**Measures Bosnia**	**Measures Romania**	**Measures Bulgaria**	**Measures Moldava**	**Measures Ukraine**
Special Remedial Measures **Special Policy Measures**	• Liability for damages • Waste water taxes • Fees for water supply and sanitation Furthermore • Pollution Alarm system • Improvement of measurement network • Extension of monitoring activities • Promotion and public relations • etc.	• Elaboration of integrated Plans for the Danube River Basin and new dimensioned water usage permissions • Commitment to uniform quality objectives and criteria in the Danube River Basin • Elaboration of reform programme for permission procedures • Final elaboration of information system for the river • Pollution Alarm system • Improvement of water management capacities	*No separate description* On January 1st 1998, the Act 125/1997 Coll. Regulating Waste Treatment and Disposal came into force. The Act determines duties of inhabitants and companies in the field of collection, salvage, separation, manipulation and transport, storage, reuse and disposal of waste. In the year 1998 the Ministry of Environment started the three years project "Evaluation of environmental risks from closed landfills, establishment of classification register with the proposal of remedy measures and determination of priorities". (National Planning Workshop Report)	• Improvement of water legislation (e.g. legislation regarding sewage sludge disposal) • Improvement of technical standards • Solving the problem of washing powders • Transformation of water and sewage works	• Introduction of the new water legislation being developed • Introduction of the water discharge fee • Increase the enforcement capacity of the water authorities • Organisation of river basin associations	• Toxicity Reduction in Effluents • Expert guidelines for management and control of municipal biological treatment facilities • Development of persistent toxic tests • Balances of organic pollution and nutrients • Integrated Pollution Prevention and Control • Introduction of BAT	In order to reduce the water pollution the further improvement of legislation and technical regulations have to be achieved	Special policy measures: • Waste management: Waste oil and other hazardous substances • Detergents and washing powders and liquids	By passing the new Law on Waters a significant progress was made in legislative and technical regulations improvement	Polluter pays principle is applied	*No separate description*	The most appropriate for pollution reduction of water appeared to be the improvement of legislation and technical regulation and water management	Economic Regulatory Tools for water resources use, protection and restoration are currently under development. Ukraine introduces –payments for natural resources use and allocates these revenues to environmental protection, conservation and restoration measures. Polluter pays principle.

Overview: Expected Effects of Actual and Planned Measures

	Effects **Germany**	Effects **Austria**	Effects **Czech Republic**	Effects **Slovak Republic**	Effects **Hungary**	Effects **Slovenia**	Effects **Croatia**	Effects **Yugoslavia**	Effects **Bosnia**	Effects **Romania**	Effects **Bulgaria**	Effects **Moldava**	Effects **Ukraine**
Reduction of Nutrient Emission	*The National Action Plan does not treat this aspect. Only the measures have been described, not the possible impacts*	*The National Action Plan does not treat this aspect. Only the measures have been described, not the possible impacts*	The expected amount of nutrient reduction expected from each current or planned project has been quantified in detail but all results will have to comply with limits or modified limits of Czech Governmental Decree No. 171/1992. The Government Decree No 171/1992 Coll. has been replaced by new one No. 82/1999 Coll. being in better compliance with the EU regulations. Valid since June 1st 1999.	***Municipal WWTPs***: about 60% TN reduction and 22 % TP reduction. ***Total discharge:*** Current total discharge: 59 KtN/a & 5KtP/a after implementation of projects: 55.374 tN/a and 4.755 tP/y	Contradictory tendencies: The amount of collected water will increase. It causes increase in nutrient load, even when it is treated. The introduction of EU standards increase the treatment efficiency. As a consequence it is estimated that the nutrient load will remain on the existing level. The nutrient emission from agriculture is very low now. It can be decreased further by erosion control.	Reduction of nutrient emission in waste water treatment plants is shown in the table on p. 40 (National Review Part C) Effects of planned measures concerning reduction of nutrients emission in agriculture can not be evaluated by now.	Due to lack of data it is hard to quantify the possible impact of planned measures for nutrient emissions reduction. The projects main purpose is the mechanical-biological treatment (removal of suspended soils and reduction of BOD and COD) and not removal of nutrients. As an exception may be considered the project file for industrial pre-treatment of "Petrokemija d.d." Kutina. Expected effects of planned measures for reduction of BOD, COD are given in tables 4.3-1 and 4.3-2 (National Review Part C)	*Accessory table is missing* With proposed measures the major quantities of pollutants expect to be reduced	Considerable decrease of nutrients in waste water which is discharged into water streams would de done by implementing the planned projects that include sewage systems in municipalities with more that 5.000 inhabitants and construction of central municipal and industrial WWTPs.	Out of the total amount of nutrients estimated for emission in the short term projects proposed, 8202 tons nitrogen p.a., 2290 tons phosphorus p.a., 54279 t BOD_5 p.a., about 24% of N, 59% of P and 89% of BOD_5 are supposed to be removed by implementing the short term structural projects.	In Table 4.1-1 the expected amounts of nutrient reduction of the planned projects for water pollution reduction from municipal and industrial waste water discharges are summarised. *(Representation of reduction of nutrients is not clear enough: figure also in per cent so that a comparison between new and old state is possible)*	There are no special programmes and projects aimed on the reduction of nutrient emissions in the Moldavian part of the Danube River Basin.	Reduction of nutrient discharges is only identified for municipal pollution sources which are presented in the *accompanying* table.

	Effects **Germany**	Effects **Austria**	Effects **Czech Republic**	Effects **Slovak Republic**	Effects **Hungary**	Effects **Slovenia**	Effects **Croatia**	Effects **Yugoslavia**	Effects **Bosnia**	Effects **Romania**	Effects **Bulgaria**	Effects **Moldavia**	Effects **Ukraine**
Hazardous Substances	In streams and rivers a reduction of volatile halogenous hydrocarbons and heavy metals was registered within the last decade.	*The National Action Plan does not treat this aspect. Only the measures have been described, not the possible impacts*	Difficulty of estimation of quantifying the amount of hazardous substances reduction expected from each current or planned project. However, it is sure that all actual and planned projects contribute to a reduction of heavy metals and other hazardous substances in the Morava River Basin.	It is not possible to define generally the reduction of hazardous substances so that the selected industrial plants and expected reduction is described in single paragraphs.	The data available is not enough for estimation of the level of pollution.	Effects of planned measures can not evaluated by now	All projects main purpose is the mechanical-biological treatment and not removal of hazardous substances with an exception of oil pollution removal. The projects for reduction of water pollution from dump sites could play a more important role on reduction of hazardous substances in surface and ground waters, but more detail description of their impact does not exist. Some measures already took place and these sources are putted under control.	Measure to prevent, control and reduce the release of hazardous substances into the aquatic environment, have to ensure conservation and, where necessary, restoration and remedy of ecosystems.	If the long-term programs for water protection in Bosnia and Herzegovina up to the year 2020 are implemented, more than 80 % of waste waters pollution decrease would be expected.	*The expected effects are summarised in table 4.1, Part C, National Review*	If Bulgaria reduce the total number of landfills with at least 50 %, the positive impact towards the water pollution will be more than 50%.	There are no special projects aimed on the reduction of the hazardous substances loads in the Moldavian part of the Danube river basin	*dimension of values is missing, table is not sound enough*

	Effects **Germany**	Effects **Austria**	Effects **Czech Republic**	Effects **Slovak Republic**	Effects **Hungary**	Effects **Slovenia**	Effects **Croatia**	Effects **Yugoslavia**	Effects **Bosnia**	Effects **Romania**	Effects **Bulgaria**	Effects **Moldava**	Effects **Ukraine**
Microbiological Contamination	Primarily the easily degradable organic compounds are being reduced by the improvement of municipal waste water collection	*The National Action Plan does not treat this aspect. Only the measures have been described, not the possible impacts*	With respect to improved waste water treatment in many municipalities and industrial establishments it may be expected a de-	The author expect a reduction of microbiological contamination but at this time it is not possible to quantify the range of the re-	*No separate description*	Estimation or reduction of microbiological contamination is shown in table on page 41.	The reduction of microbiological contamination may be achieved when the construction of waste water treatment plants for big-	*No separate description*	Micro-biological contamination reduction of river courses can be expected.	One can say that more than 80 percent of the existing microbiological contaminants will be reduced from the effluents of the	The existing information on microbiological contamination does not permit to quantify the effects of the ongoing or planned	An existing TACIS project is partially aimed on the reduction of microbiological pollutants.	There is no data on microbiological pollution in waste water

Source: National Reviews, Part D: Water Engineering

	and purification		crease of microbiological contamination within the Morova River Basin.	duction			ger cities (more than 50 000 PE) will be finished.			social and economic activities related to the short-term projects proposed in the NEAP.	projects.		
	Effects Germany	**Effects Austria**	**Effects Czech Republic**	**Effects Slovak Republic**	**Effects Hungary**	**Effects Slovenia**	**Effects Croatia**	**Effects Yugoslavia**	**Effects Bosnia**	**Effects Romania**	**Effects Bulgaria**	**Effects Moldava**	**Effects Ukraine**
Evaluation of Remedial Actual and Planned Measures	*The National Action Plan does not treat this aspect. Only the measures have been given, not the evaluation of actual and planned measures*	*The National Action Plan does not treat this aspect. Only the measures have been given, not the evaluation of actual and planned measures*	*No separate description*	*No separate description*	The actual remedial measures ensure the implementation of the National Environmental Program. The harmonisation of the goals of the national program with the new Danube SAP seems to be necessary.	There are some laws and decrees under preparation as a solid basis in order to bring into effect future goals.	Due to lack of data in project files it is impossible to quantify exactly the expected amount of reduction nutrient emissions, hazardous substances, microbiological contamination and adverse environmental effects of recommended projects. Nevertheless, all projects in case of their realisation will be of great importance for the improvement of water quality and environment itself.	*No separate description*	*No separate description*	*No separate description*	*No separate description*	*No separate description*	*No separate description*
	Effects Germany	**Effects Austria**	**Effects Czech Republic**	**Effects Slovak Republic**	**Effects Hungary**	**Effects Slovenia**	**Effects Croatia**	**Effects Yugoslavia**	**Effects Bosnia**	**Effects Romania**	**Effects Bulgaria**	**Effects Moldava**	**Effects Ukraine**
Adverse Environmental Effects	No adverse environmental effects.	*The National Action Plan does not treat this aspect. Only the measures have been described, not the possible negative impacts*	*No separate description*	*There is no real description of possible Adverse Environmental Effects caused by the implementation of the proposed projects.*	Local adverse environmental effects are not unlikely in connection with the implementation of the pollution reduction projects. EIA is needed according to Hungarian regulations for their minimisation.	• Identification of existing condition, assessment and control • Exchange of information and education of staff • Production of fundamental and application research • Restoration of monitoring for the underground waters pollution in irrigation areas • Abatement of stock-breeding pollution	There are no particular adverse environmental effects of the recommended projects. The appropriate disposal of a sludge from WWTPs of municipalities represent one of the condition to be fulfilled in order to prevent adverse effect on environment.	Some-long term adverse effects are detected and remedy and sanitation programs should be developed.	Adverse environmental impacts are not expected during the implementation of the planned measures for water pollution reduction.	There are no significant environmental effects of the actual and planned measures of water pollution reduction of water management. It goes without saying that the actual and planned measures will have an important positive effect on human health improvement, economic development in the region, as well as recreational function will be put into value	*No statement concerning adverse environmental effects.*	*No appropriate statement concerning possible adverse environmental effects has been given.*	*No appropriate statement concerning possible adverse environmental effects has been given.*
	Effects Germany	**Effects Austria**	**Effects Czech Republic**	**Effects Slovak Republic**	**Effects Hungary**	**Effects Slovenia**	**Effects Croatia**	**Effects Yugoslavia**	**Effects Bosnia**	**Effects Romania**	**Effects Bulgaria**	**Effects Moldava**	**Effects Ukraine**
Transboundary Effects	*No separate description*	*No separate description*	*No separate description*	*No separate description*	The estimated pollution input/output balance is roughly equal now. Considerable output reduction is waited after the implementation of –the pollution reduction projects and via the implementation of the National Environmental Program.	*No separate description*	*No separate description*	*No separate description*	*No separate description*	By implementing the short term projects (high priority), 2,8 kt/y of N and 0.62 kt/y of P will be reduced. 97 % of lead and 99.4 % of Zinc will be removed. By implementing the proposed projects about 50 % of cyanides and 94 % of phenols are expected to be reduced.	The contribution of the Bulgarian tributaries is insignificant. Due to its geographic characteristics of the Bulgarian part of the Danube river basin there is no transboundary effect caused by contamination of local rivers	*No separate description*	Assessment of significant transboundary impact in “Updating Hot Spots” and “Ranking Hot Spots” in section B.1 of chapter “Water Quality”.

Source: National Reviews, Part D: Water Engineering

Overview: Cost Estimation of Programs and Projects

	Cost Estimation	Cost Estimation	Cost Estimation	Cost Estimation	Cost Estimation	Cost Estimation	Cost Estimation	Cost Estimation	Cost Estimation	Cost Estimation	Cost Estimation	Cost Estimation	Cost Estimation
	Germany	**Austria**	**Czech Republic**	**Slovak Republic**	**Hungary**	**Slovenia**	**Croatia**	**Yugoslavia**	**Bosnia**	**Romania**	**Bulgaria**	**Moldava**	**Ukraine**
	The federal states Bavaria and Baden-Württemberg provide funds of more than 220 Mio. USD annually for waste water projects in the Danube river basin.	*The National Action Plan does not treat this aspect. Only the measures have been described, not the possible costs.*	There are some national and local financial sources and funds available, but the support from foreign funds is very needed. Total needed amount = 57.4 million US $.	Municipal sector: 105.5 mil. US$ Industrial sector: 101.7 mil. US$ Landfills: 43.5 mil. US$	Estimation of total yearly expenditure of national water pollution reduction related programmes: 550 Mil USD. Cost of the proposed project portfolio: 161 mil USD.	Estimation of total costs of ongoing projects: ***1592 Mio SIT*** Investment costs of long term investment program of WWTP: ***451 Mio DEM*** Investment costs of short term investment program of WWTP: ***340 Mio DEM***	Municipal hot spots: ***614 Mio US$*** Industrial hot spots ***5,5 Mio US$*** Agricultural hot spots: ***0,104 Mio US$*** Dump Sites: ***45 Mio US$***	*Exact cost estimation is missing*	*The costs for every single project have been given in a table. No figure for total costs.*	The total cost of the projects is ***297 million US$*** of which about 27 percent are provided for municipal hot spots, 14 percent for agricultural hot spots and 59 % for industrial hot spots. About 96 % of the total cost proposed for high priority are for structural projects and the rest for non structural ones.	Total Costs for investment in US$ ≈ 400 mil. Total costs for O&M in US$ 32 mil. *(the accompanying period of time is not given)*	*The costs for every single project have been given*	Total costs for existing and planned projects: ***184 mil. US$***

Source: National Reviews, Part D: Water Engineering

Overview: Planning and Implementing Capacities

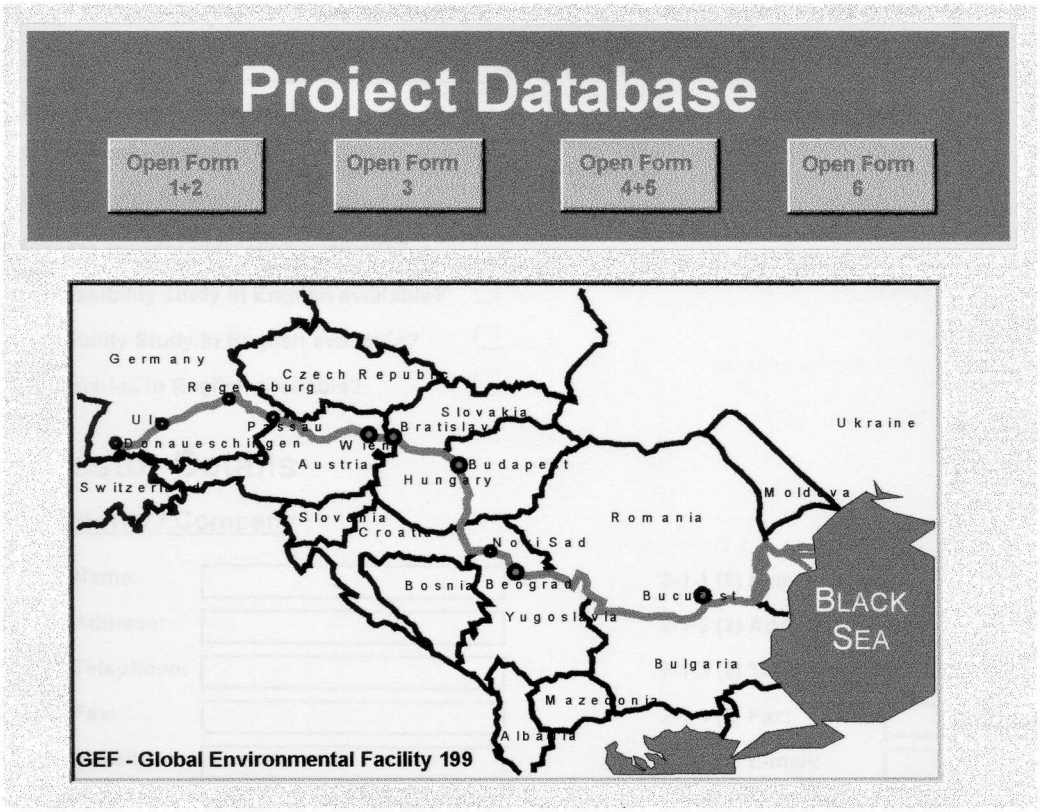
	Capacities **Germany**	Capacities **Austria**	Capacities **Czech Republic**	Capacities **Slovak Republic**	Capacities **Hungary**	Capacities **Slovenia**	Capacities **Croatia**	Capacities **Yugoslavia**	Capacities **Bosnia**	Capacities **Romania**	Capacities **Bulgaria**	Capacities **Moldava**	Capacities **Ukraine**
Planning Capacities	*The German Danube Action Plan does not treat this aspect.*	*The National Action Plan does not treat this aspect.*	According to opinions of Czech authorities, specialists, experts, project or research workers and scientists the actual planning capacities of institutions, consulting and engineering companies or individual consultants have been sufficient for the preparation of project documents for bankable projects.	• Planing capacities on the country level is represented mainly by the Ministries • Planing Capacities on the river basin level is represented by river basin authorities • Planing capacities on regional level	*No separate description*	Capacity of civil engineering is big enough for the purpose of planning and implementation of all installation and construction concerned.	There are numerous engineering companies and other institutions in Croatia which are able for the preparation of project documents concerning water – pollution reduction.	The capacities for the planning of structural and non-structural projects are fully competent in terms of both quality and quantity, to respond all challenges. Foreign assistance and co-operation is a method of work in which institutions and individuals have gained years-long experience.	*Chapter not exactly according to exemplary table of contents: Please set out Planning and Implementing capacities relevant for the foreseen projects, do not describe only already planned and implemented capacities*	Generally one can say that in Romania there is a certain institutional capacity in the field of preparation structural projects for water pollution reduction and less experience in preparing non-structural projects. There are about 18.000 higher education employees in engineering sciences in Romania.	Bulgarian environmental institutions are technically strong but analytically and managerially weak. Currently in the country exist a number of state, municipal and private companies, authorities, research institutes and NGOs capable to undertake project preparation in the field of water pollution reduction. Main problem: only a few of them are really capable to prepare project documents for bankable projects according BAT and BEP.	Moldavan Institutions have accumulated a lot of experience in the designing and developing of different projects in co-operation with different international and local institutions. Different workshops, seminars and training courses in the frame of different international activities and projects have strongly increased planning capacities of local authorities and institutions.	The compilation of actual planning capacities of authorities, institutions, companies etc. cannot clearly described. At the moment capacity of Ukrainian institutions and engineering companies in project proposal, design, business plan development, preparation of project documents are sufficient for –preparation of bankable documents but cannot be funded properly without foreign assistance.
	Capacities **Germany**	Capacities **Austria**	Capacities **Czech Republic**	Capacities **Slovak Republic**	Capacities **Hungary**	Capacities **Slovenia**	Capacities **Croatia**	Capacities **Yugoslavia**	Capacities **Bosnia**	Capacities **Romania**	Capacities **Bulgaria**	Capacities **Moldava**	Capacities **Ukraine**
Implementing Capacities	*The German Danube Action Plan does not treat this aspect.*	*The National Action Plan does not treat this aspect.*	It is sure that performance quality of Czech firms would be improved in a very short period of time. The co-operation with foreign companies for turn key projects will be very useful.	250 firms are working in water industry Civil firms have a huge amount of capacities for construction. But there is potential space for foreign companies for turn-key projects. ***Non structural projects:*** There are several firms with high professional level	*No separate description*	Capacity of civil engineering is big enough for the purpose of planning and implementation of all installation and construction concerned.	There are numerous construction companies in Croatia which are capable for the construction of treatment plants for industrial and municipal waste water. The implementing capacities of construction companies might be considered as a limited if the number of projects is taken into account. They are mainly capable of conducting the construction works, whereas assistance with implementation of technology for purification could be helpful.	***Structural projects***: As far as the volume of all necessary capital works is concerned it can be stated that the project design and construction components can be completed with the exclusive engagement of domestic capacities As for equipment, especially measurement, regulation and automation, it will be necessary to co-operate with foreign equipment suppliers ***Non-structural projects:*** In line with the legal definition of non-structural projects, there is a well-developed structure for the preparation and implementation of the projects.	*Chapter not exactly according to exemplary table of contents: Please set out Planning and Implementing capacities relevant for the foreseen projects, do not describe only already planned and implemented capacities*	***Structural projects:*** Romania has good potential for the construction of treatment plants for municipal and industrial waste water. There are construction companies in each county, which could fulfil the requirements for every project implementation. Co-operation is needed for training with the BAT, new equipment for procurement etc. Special electric regulation items (measurement devices etc.) are needed ***Non structural projects:*** There is a need for international co-operation for implementation of non-structural projects.	***Structural projects:*** n Bulgaria exist a number of construction firms capable to carry out quite sophisticated hydro-technical or civil construction projects. There are also private firms good and strong enough to perform such type of works. Two major problems: • Insufficient funding for water pollution reduction project • Approximation of the investment process to the European standards. ***Non structural projects:*** There is a good field for co-operation in non-structural projects.	***Structural projects:*** Actual implementing capacities strongly depend on financial situation for the project implementation. Experience accumulated in the construction practice shows that there were no significant problems in the implementation of the projects developed with technical assistance with international donors. ***Non structural projects:*** Generally Moldavan Institutions have good capacities for the implementation of non-structural projects	***Structural projects:*** On whole the treatment plants for municipal and industrial wastewater can be constructed by Ukrainian companies if funding will be sufficient. The co-operation with foreign companies may be very useful but not always crucial. ***Non-structural projects:*** For those projects that include inventories, surveys, research or development of regulatory norms and standards, as –well as NGO development the financial support is needed from international co-operation.

Source: National Reviews, Part D: Water Engineering

Annex 2.

Danube River Basin Project Data Base

Danube River Basin Pollution Reduction Programme



1 Project Title

Project-No: 1

1-1 Project Title:

1-2 Country:

1-3 Date of first setting up:

1-4 Date of last upgrade:

1-5 Language of Project Documents:

1-6 Project concept in English available? ☐

1-7 Prefeasibility study in English available? ☐

1-8 Feasibility Study in English available? ☐

1-9 Summaries in English available? ☐

2 Investor Details

2.1 Authority / Company

2-1-1 (1) Name:

2-1-2 (1) Address:

2-1-3 (1) Telephone:

2-1-4 (1) Fax:

2-1-5 (1) E-mail:

2-1-1 (2) Name:

2-1-2 (2) Address:

2-1-3 (2) Telephone:

2-1-4 (2) Fax:

2-1-5 (2) E-mail:

2.2 Contact Persons

2-2-1 Responsable persons for the project:

2.3 Legal / Financial Status

2-3-1 Public authority ☐ 2-3-2 Private company ☐ 2-3-3 State company ☐

2-3-4 Legal status of the investor:

2.4 Authority / Company Profile

2-4-1 Task of business:

2-4-2 Annual budget of auth/turnover of company:

2-4-3 Number of persons employed:

2.5 Planning / Implementing Extent / Capacity of the Investor

2-5-1 Authority's own capacity to plan and implement the project:

2.6 Names of Advisors / Consultants

2-6-1 Advisor/consultant #1:

2-6-2 Advisor/consultant #2:

2-6-3 Advisor/consultant #3:

2.7 Institutions / Enterprises beside the Investor

2-7-1 Planning/consulting:

2-7-2 Construction:

2-7-3 Licensing/monitoring:

3 Project Description

Project-No: 1

3.1 Project Outline

3-1-1 Main components to avoid/mitigate water pollution:

3-1-2 Structural project ☐ 3-1-3 Non-structural project ☐ 3-1-4 Hot Spot ☐

3-1-5 Sector: 3-1-6 Priority: 3-1-7 Order of priority:

3-1-8 Sub basin areas: 3-1-9 Significant impact areas:

3-1-10 Beneficiaries downstream the emission:

3-1-11 Number of beneficiaries:

3-1-12 Stakeholders:

3-1-13 Number of stakeholders:

3-1-14 Number of inhabitants connected to the WWTP:

3-1-15 Name of Location:

3-1-16 Longitude:

3-1-17 Latitude:

3-1-18 Existing use of site:

3-1-19 Raw water load (TPE):

3-1-20 Current capacity of WWTP (TPE):

3-1-21 Final capacity of WWT (TPE):

3-1-22 Waste water volume discharged (Tm^3/a):

3-1-23 River flow rate (mean annual average m^3/day):

3-1-24 River low flow rate (m^3/s):

3-1-25 Distance to national border downstream (km):

3.2 Primary Needs for the Project

3-2-1 Health benefits:

3-2-2 Aquatic environment:

3-2-3 Recreation:

3-2-4 Aesthetics:

3-2-5 Biodiversity:

3-2-6 Economic development:

3-2-7 Transboundary effects:

3-2-8 (1) Total load discharged into receiving water_ BOD (t/a):		3-2-8 (2) BOD (mg/l):	
3-2-9 (1) Total load discharged into receiving water_ COD (t/a):		3-2-9 (2) COD (mg/l):	
3-2-10 (1) Total load discharged into receiving water_ N (t/a):		3-2-10 (2) N (mg/l):	
3-2-11 (1) Total load discharged into receiving water_ P (t/a):		3-2-11 (2) P (mg/l):	
3-2-12 (1) Load reduction_BOD (t/a):		3-2-12 (2) BOD (mg/l):	
3-2-13 (1) Load reduction_COD (t/a):		3-2-13 (2) COD (mg/l):	
3-2-14 (1) Load reduction_N (t/a):		3-2-14 (2) N (mg/l):	
3-2-15 (1) Load reduction_P (t/a):		3-2-15 (2) P (mg/l):	
3-2-16 (1) Estimated level of remaining pollution_ BOD (t/a):		3-2-16 (2) BOD (mg/l):	
3-2-17 (1) Estimated level of remaining pollution_ COD (t/a):		3-2-17 (2) COD (mg/l):	
3-2-18 (1) Estimated level of remaining pollution_ N (t/a):		3-2-18 (2) N (mg/l):	
3-2-19 (1) Estimated level of remaining pollution_ P (t/a):		3-2-19 (2) P (mg/l):	

3.3 Status of Project Preparation/Implementation

3-3-1 Project concept ☐

3-3-2 Prefeasibility level ☐

3-3-3 Feasibitliy level ☐

3-3-4 State of funding:

3-3-5 Under construction/implementation ☐

3-3-6 Date of start of construction - Biological treatment:

3-3-7 Date of start of construction - N/P elimination:

3-3-8 Date of start of operation - Biological treatment:

3-3-9 Date for start of operation - N/P elimination:

3.4 Proposed Techniques

3-4-1 Discharge via sewage system into the water, no treatment ☐

3-4-2 Mechanical treatment ☐

3-4-3 Complete biological treatment ☐

3-4-4 N-elimination ☐

3-4-5 P-elimination ☐

3-4-6 Sludge treatment ☐

3.5 Ownership of Project Site

3-5-1 Status:

3-5-2 Proprietary rights:

3.6 Specific Project Items

3-6-1 Additional remarks on project description:

4 Project Effects and Interactions

All currencies in million USD

Project-No: 1

4.1 Public's Expression of Interest

4-1-1 Description of public participation/involvement measures:

4-1-2 Attitude of concerned people to the project:

4-1-3 Results of social acceptance assessment:

4.2 Environmental Impact Assessment

4-2-1 EIA ☐

4-2-2 Planned ☐

4-2-3 In progress ☐

4-2-4 Completed ☐

4-2-5 Accepted ☐

4-2-6 Rejected ☐

4.3 Sensitivity of Locality / Receptor

4-3-1 Description of the area:

4.4 Primary Effects of Project

4-4-1 Local:

4-4-2 Regional/national:

4-4-3 International/transboundary:

5 Economic Project Justification

5.1 Economic Project Benefits

5-1-1 Saved investment cost:

5-1-2 Employment effects during construction period (no of empl):

5-1-3 Employment effects during operation period (no of empl):

5-1-4 Other economic benefits:

5.2 Economic Internal Rate of Return (EIRR)

5-2-1 Has an EIRR been calculated? ☐

5-2-2 Amount of EIRR (%):

6 Financial Viability

All currencies in million USD

Project-No: 1

6.1 Estimated Investment Cost

6-1-1 Nature of cost estimate:

6-1-2 Total investment cost:

6-1-3 Incremental cost:

6-1-4 Cost of land:

6-1-5 Cost of construction:

6-1-6 Cost of machinery:

6-1-7 Cost of planning and supervision:

6-1-8 Estimated years of operation:

6-1-9 Year of cost estimate:

6-1-10 Exchange rate to USD in year of cost estimate:

6.2 Estimated Operational Cost

6-2-1 Nature of cost estimate:

6-2-2 Expected annual O+M cost (without inflation):

6-2-3 Replacement cost:

6-2-4 Year of cost estimate:

6-2-5 Exchange rate to USD in year of cost estimate:

6.3 Estimate of Revenues

6-3-1 Nature of cost estimate:

6-3-2 Expected annual revenues (without inflation):

6-3-3 Year of estimate:

6-3-4 Exchange rate to USD in year of cost estimate:

6.4 Financial Internal Rate of Return (FIRR)

6-4-1 Has an FIRR been calculated? ☐

6-4-2 Amount of FIRR (%):

6.5 Anticipated / Proposed Funding Scheme

6-5-1 Equity of project owner - secured:	
6-5-2 Equity of project owner - requested:	
6-5-3 National Environmental Fund - secured:	
6-5-4 National Environmental Fund -requested:	
6-5-5 Water Management Fund - secured:	
6-5-6 Water Management Fund - requested:	
6-5-7 Public loan - central budget - secured:	
6-5-8 Public loan - central budget - requested:	
6-5-9 Pubilc loan - regional budget - secured:	
6-5-10 Public loan - regional budget - requested:	
6-5-11 Public loan - municipal budget - secured:	
6-5-12 Public loan - municipal budget - requested:	
6-5-13 Public grant - central budget - secured:	
6-5-14 Public grant - central budget - requested:	
6-5-15 Public grant - regional budget - secured:	
6-5-16 Pubilc grant - regional budget - requested:	
6-5-17 Public grant - municipal budget - secured:	
6-5-18 Public grant - municipal budget - requested:	
6-5-19 International loan - secured:	
6-5-20 International loan - requested:	
6-5-21 International grant - secured:	
6-5-22 International grant - requested:	
6-5-23 Commercial bank loan - secured:	
6-5-24 Commercial bank loan - requested:	
6-5-25 Other sources (Name):	
6-5-26 Other sources - secured:	
6-5-27 Other sources - requested:	

Annex 3.

Summary/main contents of the proposed EU-directive: “Framework for a community action in the field of water policy”

Developments of the Water Framework Directive

Europe's citizens are increasingly demanding cleaner water

- cleaner water for drinking
- cleaner water for bathing
- cleaner water as part of their environment, their local and regional heritage.

The increasing demand by citizens and environmental organisations for cleaner rivers and lakes, groundwater and coastal beaches is evident. This demand by citizens is one of the main reasons why the Commission has made water protection one of the priorities of its work. A new European Water Policy will have to get polluted waters clean again, and ensure clean waters are kept clean. In achieving these objectives, the roles of citizens and citizens' groups will be crucial. This is why a new European Water Policy has to get citizens more involved.

A thorough restructuring process concerning European Water Policy is on the way, and a new Water Framework Directive to be adopted this year, will be the operational tool, setting the objectives for water protection well into the next century.

The following will provide an overview on development, present state and future of European Water Policy.

An early beginning

Early European water legislation began, in a "first wave", with standards for those of our rivers and lakes used for drinking water abstraction in 1975, and culminated in 1980 in setting binding quality targets for our drinking water. It also included quality objective legislation on fish waters, shellfish waters, bathing waters and groundwaters. Its main emission control element was the Dangerous Substances Directive.

Addressing pollution from urban wastewater and from agriculture

In 1988 the Frankfurt ministerial seminar on water reviewed the existing legislation and identified a number of improvements that could be made and gaps that could be filled. This resulted in the second phase of water legislation, the first results of this were, in 1991, the adoption of

- the Urban Wastewater Treatment Directive, providing for secondary (biological) wastewater treatment, and even more stringent treatment where necessary.
- the Nitrates Directive, addressing water pollution by nitrates from agriculture.

Other legislative results of these developments were Commission proposals for action on

- a new Drinking Water Directive, reviewing the quality standards and, where necessary, tightening them (final adoption foreseen for 1998),
- a Directive for Integrated Pollution and Prevention Control (IPPC), adopted in 1996.

The arrival of this second wave of legislation has meant that everyone involved in European Community water legislation (e.g. the Council, the European Parliament, the Member States, regional and local authorities, water users, green groups and consumer groups) have found themselves "drowning" in water-related proposals. Just as the real problems and costs of implementing the Nitrates Directive and the Urban Wastewater Treatment Directive were being faced, the Commission laid on the table four more Directives and an Action Programme.

Getting Europe's waters cleaner, getting the citizen involved: the new European water policy

Pressure for a fundamental rethink of Community water policy came to a head in mid-1995: The Commission, which had already been considering the need for a more global approach to water policy, accepted requests from the European Parliament's environment committee and from the Council of environment ministers.

Whilst EU actions such as the Drinking Water Directive and the Urban Wastewater Directive can duly be considered milestones, European Water Policy had to address the increasing awareness of citizens and other involved parties for their water. At the same time water policy and water management are to address problems in a coherent way. This is why the new European Water Policy was developed in an open consultation process involving all interested parties.

The Communication was formally addressed to the Council and the European Parliament, but at the same time invited comment from all interested parties, such as local and regional authorities, water users and non-governmental organisations (NGOs). A score of organisations and individuals responded in writing, most of the comments welcoming the broad outline given by the Commission.

As the culmination of this open process a two day Water Conference was hosted in May 1996. This Conference was attended by some 250 delegates including representatives of Member States, regional and local authorities, enforcement agencies, water providers, industry, agriculture and, not least, consumers and environmentalists.

The outcome of this consultation process was a widespread consensus that, while considerable progress had been made in tackling individual issues, the current water policy was fragmented, in terms both of objectives and of means. All parties agreed on the need for a single piece of framework legislation to resolve these problems. In response to this, the Commission presented a Proposal for a Water Framework Directive with the following key aims:

- to incorporate all requirements for management of water status into one single system
- to coordinate all the different objectives for which water is protected (ecology, drinking water, bathing water, particular habitats) and to fill any gaps
- to coordinate all the measures taken on individual problems and sectors to achieve the objectives so defined, and to define the relationship between emission limit value measures and quality standards
- to increase public participation in water policy to provide for greater transparency, with the advantages in enforceability which will result.

The outline below shows how these elements are made operational within the Directive.

A single system of water management: River basin management

The best model for a single system of water management is management by river basin - the natural geographical and hydrological unit - instead of according to administrative or political boundaries. Initiatives taken forward by the States concerned for the Maas, Schelde or Rhine river basins have served as positive examples of this approach, with their cooperation and joint objective-setting across Member State borders, or in the case of the Rhine even beyond the EU territory. While several Member States already take a river basin approach, this is at present not the case everywhere. For each river basin district - some of which will traverse national frontiers - a "river basin management plan" will need to be established and updated every six years, and this will provide the context for the co-ordination requirements identified above.

Co-ordination of objectives - good status for all waters by 2010

There are a number of objectives in respect of which the quality of water is protected. The key ones at European level are general protection of the aquatic ecology, specific protection of unique and valuable habitats, protection of drinking water resources, and protection of bathing water. All these objectives must be integrated for each river basin. It is clear that the last three – special habitats, drinking water areas and bathing water – apply only to specific bodies of water (those supporting special wetlands; those identified for drinking water abstraction; those generally used as bathing areas). In contrast, ecological protection should apply to all waters: the central requirement of the Treaty is that the environment be protected to a high level in its entirety.

Surface water

Ecological protection

For this reason, a general requirement for ecological protection, and a general minimum chemical standard, was introduced to cover all surface waters. These are the two elements "good ecological status" and "good chemical status". Good ecological status is defined in Annex V of the Water Framework Proposal, in terms of the quality of the biological community, the hydrological characteristics and the chemical characteristics. As no absolute standards for biological quality can be set which apply across the Community, because of ecological variability, the controls are specified as allowing only a slight departure from the biological community which would be expected in conditions of minimal anthropogenic impact. A set of procedures for identifying that point for a given body of water, and establishing particular chemical or hydromorphological standards to achieve it, is provided, together with a system for ensuring that each Member State interprets the procedure in a consistent way (to ensure comparability). The system is somewhat complicated, but this is inevitable given the extent of ecological variability, and the large number of parameters, which must be dealt with.

Chemical protection

Good chemical status is defined in terms of compliance with all the quality standards established for chemical substances at European level. The Directive also provides a mechanism for renewing these standards and establishing new ones by means of a prioritisation mechanism for hazardous chemicals. This will ensure at least a minimum chemical quality, particularly in relation to very toxic substances, everywhere in the Community.

Other uses

As mentioned above, the other uses or objectives for which water is protected apply in specific areas, not everywhere. Therefore, the obvious way to incorporate them is to designate specific protection zones within the river basin which must meet these different objectives. The overall plan of objectives for the river basin will then require ecological and chemical protection everywhere as a minimum, but where more stringent requirements are needed for particular uses, zones will be established and higher objectives set within them.

There is one other category of uses which does not fit into this picture. It is the set of uses which adversely affect the status of water but which are considered essential on their own terms – they are overriding policy objectives. The key examples are flood protection and essential drinking water supply, and the problem is dealt with by providing derogations from the requirement to achieve good status for these cases, so long as all appropriate mitigation measures are taken. Less clear-cut cases are navigation and power generation, where the activity is open to alternative approaches (transport can be switched to land, other means of power generation can be used). Derogations are

provided for those cases also, but subject to three tests: that the alternatives are technically impossible, that they are prohibitively expensive, or that they produce a worse overall environmental result.

Groundwater

Chemical status

The case of groundwater is somewhat different. The presumption in relation to groundwater should broadly be that it should not be polluted at all. For this reason, setting chemical quality standards may not be the best approach, as it gives the impression of an allowed level of pollution to which Member States can fill up. A very few such standards have been established at European level for particular issues (nitrates, pesticides and biocides), and these must always be adhered to. But for general protection, we have taken another approach. It is essentially a precautionary one. It comprises a prohibition on direct discharges to groundwater, and (to cover indirect discharges) a requirement to monitor groundwater bodies so as to detect changes in chemical composition, and to reverse any anthropogenically induced upward pollution trend. Taken together, these should ensure the protection of groundwater from all contamination, according to the principle of minimum anthropogenic impact.

Quantitative status

Quantity is also a major issue for groundwater. Briefly, the issue can be put as follows. There is only a certain amount of recharge into a groundwater each year, and of this recharge, some is needed to support connected ecosystems (whether they be surface water bodies, or terrestrial systems such as wetlands). For good management, only that portion of the overall recharge not needed by the ecology can be abstracted – this is the sustainable resource, and the Directive limits abstraction to that quantity.

One of the innovations of the Directive is that it provides a framework for integrated management of groundwater and surface water for the first time at European level.

Co-ordination of measures

There are a number of measures taken at Community level to tackle particular pollution problems. Key examples are the Urban Wastewater Treatment Directive and the Nitrates Directive, which together tackle the problem of eutrophication (as well as health effects such as microbial pollution in bathing water areas and nitrates in drinking water); and the Integrated Pollution Prevention and Control Directive, which deals with chemical pollution. The aim is to co-ordinate the application of these so as to meet the objectives established above. This is done as follows.

First of all, the objectives are established for the river basin as outlined in the previous section. Then an analysis of human impact is conducted so as to determine how far from the objective each body of water is. At this point, the effect on the problems of each body of water of full implementation of all existing legislation is considered. If the existing legislation solves the problem, well and good, and the objective of the framework Directive is attained. However, if it does not, the Member State must identify exactly why, and design whatever additional measures are needed to satisfy all the objectives established. These might include stricter controls on polluting emissions from industry and agriculture, or urban wastewater sources, say. This should ensure full co-ordination.

The combined approach

But there is a further aspect. Historically, there has been a dichotomy in approach to pollution control at European level, with some controls concentrating on what is achievable at source, through the application of technology; and some dealing with the needs of the receiving environment in the form of quality objectives. Each approach has potential flaws. Source controls alone can allow a cumulative pollution load which is severely detrimental to the environment, where there is a concentration of pollution sources. And quality standards can underestimate the effect of a particular substance on the ecosystem, due to the limitations in scientific knowledge regarding dose-response relationships and the mechanics of transport within the environment.

For this reason, a consensus has developed that both are needed in practice - a combined approach. The Water Framework Directive formalises this. It does so as follows. On the source side, it requires that as part of the basic measures to be taken in the river basin, all existing technology-driven source-based controls must be implemented as a first step. But over and above this, it also sets out a framework for developing further such controls. The framework comprises the development of a list of priority substances for action at EU level, prioritised on the basis of risk; and then the design of the most cost-effective set of measures to achieve load reduction of those substances, taking into account both product and process sources.

On the effects side, it co-ordinates all the environmental objectives in existing legislation, and provides a new overall objective of good status for all waters, and requires that where the measures taken on the source side are not sufficient to achieve these objectives, additional ones are required.

The river basin management plan

All the elements of this analysis must be set out in a plan for the river basin. The plan is a detailed account of how the objectives set for the river basin (ecological status, quantitative status, chemical status and protected area objectives) are to be reached within the timescale required. The plan will include all the results of the above analysis: the river basin's characteristics, a review of the impact of human activity on the status of waters in the basin, estimation of the effect of existing legislation and the remaining "gap" to meeting these objectives; and a set of measures designed to fill the gap. One additional component is that an economic analysis of water use within the river basin must be carried out. This is to enable there to be a rational discussion on the cost-effectiveness of the various possible measures. It is essential that all interested parties are fully involved in this discussion, and indeed in the preparation of the river basin management plan as a whole. Which brings me to the final major element of the proposal, the public participation requirements.

Public participation

In getting our waters clean, the role of citizens and citizens' groups will be crucial.

There are two main reasons for an extension of public participation. The first is that the decisions on the most appropriate measures to achieve the objectives in the river basin management plan will involve balancing the interests of various groups. The economic analysis requirement is intended to provide a rational basis for this, but it is essential that the process is open to the scrutiny of those who will be affected.

The second reason concerns enforceability. The greater the transparency in the establishment of objectives, the imposition of measures, and the reporting of standards, the greater the care Member States will take to implement the legislation in good faith, and the greater the power of the citizens to influence the direction of environmental protection, whether through consultation or, if disagreement persists, through the complaints procedures and the courts. Caring for Europe's waters will require more involvement of citizens, interested parties, non-governmental

organisations (NGOs). To that end the Water Framework Directive will require information and consultation when river basin management plans are established: the river basin management plan must be issued in draft, and the background documentation on which the decisions are based must be made accessible. Furthermore a biannual conference in order to provide for a regular exchange of views and experiences in implementation will be organised. Too often in the past implementation has been left unexamined until it is too late – until Member States are already woefully behind schedule and out of compliance. The Framework Directive, by establishing very early on a network for the exchange of information and experience between water professionals throughout the Community will ensure this does not happen.

Streamlining legislation: seven old directives to be repealed

One advantage of the framework directive approach, in its own way a significant one, is that it will rationalise the Community's water legislation by replacing seven of the "first wave" directives: those on surface water and is two related directives on measurement methods and sampling frequencies and exchanges of information on fresh water quality; the fish water, shellfish water, and groundwater directives; and the directive on dangerous substances discharges. The operative provisions of these directives will be taken over in the framework directive, allowing them to be repealed.

Getting the prices right: full cost recovery pricing

There is one further element of the proposal which deserves attention. The need to conserve adequate supplies of a resource for which demand is continuously increasing is one of the drivers behind what is arguably one of the Directive’s most important innovations - the introduction of "full cost recovery" pricing. By 2010 Member States will be required to ensure that the price charged to water consumers - such as for the abstraction and distribution of fresh water and the collection and treatment of wastewater – integrates the true costs. Whereas this principle has a long tradition in some countries, this is not the case in others. As set out in the directive, this is a mandatory goal, but we have tried to take into account the cases where such an approach is not possible, and have provided criteria for the key cases.

The main ones are: derogations in order to provide a basic water services to households at an affordable price; and derogations for situations where there is both a social disadvantage (defined in terms of eligibility for structural fund support) and a climatic or geographic issue which makes water provision demonstrably more expensive than normal. There are clearly overriding social objectives which necessitate these provisions. Their application would have to be clearly justified by the Member State concerned, and would be subject to the test of reasonableness, which could be pursued before the courts. But transparency will provide a more direct means of enforcement. Making clear the size and nature of the subsidies provided to various sectors will provide the impetus within a society for the redistribution of the cost burden in a more equitable way. This, together with the impetus to a more efficient use of a resource which comes from pricing it at its full value, will lead to a more rational approach to the whole question of the exploitation of water resources.

Conclusion

Much progress has been made in water protection in Europe, in individual Member States, but also in tackling significant problems at European level. But Europe's waters are still in need of increased efforts to get them clean or to keep them clean. After 25 years of European water legislation, this demand is expressed, not only by the scientific community and other experts, but to an ever increasing extent by citizens and environmental organisations. We should take up the challenge of water protection, one of the great challenges for the European Union, as it approaches the new millennium. Let us seize the initiative generated by the present political process on the Water Framework Directive for the benefit of all Europe’s citizens and waters:

•Getting Europe's waters cleaner •Getting the citizens involved.

Annex 4.

Calculation scheme of dynamic unit cost per ton of pollution reduction for a municipal wastewater treatment plant

ANNEX 4.1-A: CALCULATION OF DYNAMIC UNIT COST PER TON OF POLLUTION LOAD REDUCTION
MWWTP - ALTERNATIVE (A)
UNSTAGED IMPLEMENTATION - MECHANICAL/ BIOLOGICAL TREATMENT STANDARD
(EVALUATION PERIOD 1999-2030 - COST IN MILLION US$ - PRICE LEVEL 1999)

Year	Investment Cost			Maintenance & Operation Cost				Total Project Cost	Aggreg. Annual Pollutant Reduction	Unit Cost Per T of Pollutant Reduction
	Civil Works	E&M	Total	Mainte-nance Cost	Operation Cost	Adminis-tration Cost	Total Current Cost			
	(M US$)	(M US$)	(M US$)	(M US$)	(M US$)	(M US$)	(M US$)	(M US$)	(Ton)	(USD/T)
1999	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	
2000	8,0	8,0	16,0	0,0	0,0	0,0	0,0	16,0	0	
2001	10,0	10,0	20,0	0,0	0,0	0,0	0,0	20,0	0	
2002	12,0	12,0	24,0	0,0	0,0	0,0	0,0	24,0	0	
2003			0,0	1,0	2,0	0,5	3,5	3,5	200	
2004			0,0	1,0	2,0	0,5	3,5	3,5	202	
2005			0,0	1,0	2,1	0,5	3,6	3,6	204	
2006			0,0	1,0	2,1	0,5	3,6	3,6	206	
2007			0,0	1,0	2,2	0,5	3,7	3,7	208	
2008			0,0	1,0	2,2	0,5	3,7	3,7	210	
2009			0,0	1,0	2,3	0,5	3,8	3,8	212	
2010			0,0	1,0	2,3	0,5	3,8	3,8	214	
2011			0,0	1,0	2,3	0,5	3,8	3,8	217	
2012			0,0	1,0	2,4	0,5	3,9	3,9	219	
2013			0,0	1,0	2,4	0,5	3,9	3,9	221	
2014			0,0	1,0	2,5	0,5	4,0	4,0	223	
2015			0,0	1,0	2,5	0,5	4,0	4,0	225	
2016			0,0	1,0	2,6	0,5	4,1	4,1	228	
2017			0,0	1,0	2,6	0,5	4,1	4,1	230	
2018			0,0	1,0	2,7	0,5	4,2	4,2	232	
2019			0,0	1,0	2,7	0,5	4,2	4,2	235	
2020			0,0	1,0	2,8	0,5	4,3	4,3	237	
2021			0,0	1,0	2,9	0,5	4,4	4,4	239	
2022			0,0	1,0	2,9	0,5	4,4	4,4	242	
2023			0,0	1,0	3,0	0,5	4,5	4,5	244	
2024			0,0	1,0	3,0	0,5	4,5	4,5	246	
2025			0,0	1,0	3,1	0,5	4,6	4,6	249	
2026			0,0	1,0	3,2	0,5	4,7	4,7	251	
2027			0,0	1,0	3,2	0,5	4,7	4,7	254	
2028			0,0	1,0	3,3	0,5	4,8	4,8	256	
2029			0,0	1,0	3,3	0,5	4,8	4,8	259	
2030			0,0	1,0	3,4	0,5	4,9	4,9	262	
Resid.Val.										
PV at 0%	30,0	30,0	60,0	28,0	74,1	14,0	116,1	176,1	6426	27405
PV at 5%	25,8	25,8	51,5	12,3	30,5	6,1	48,9	100,4	6426	15626
PV at 8%	23,6	23,6	47,2	8,1	19,6	4,1	31,7	79,0	6426	12290
PV at 12%	21,1	21,1	42,2	5,1	11,8	2,5	19,4	61,6	6426	9592

ANNEX 4.1-B: CALCULATION OF DYNAMIC UNIT COST PER TON OF POLLUTION LOAD REDUCTION
MWWTP - ALTERNATIVE (B)
IMPROVED EFFLUENT STANDARD IN STAGE II
(EVALUATION PERIOD 1999-2030 - COST IN MILLION US$ - PRICE LEVEL 1999)

Year	Investment Cost			Maintenance & Operation Cost				Total Project Cost	Aggreg. Annual Pollutant Reduction	Unit Cost Per T of Pollutant Reduction
	Civil Works	E&M	Total	Mainte-nance Cost	Operation Cost	Adminis-tration Cost	Total Current Cost			
	(M US$)	(M US$)	(M US$)	(M US$)	(M US$)	(M US$)	(M US$)	(M US$)	(Ton)	(USD/T)
1999	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	
2000	8,0	6,0	14,0	0,0	0,0	0,0	0,0	14,0	0	
2001	10,0	8,0	18,0	0,0	0,0	0,0	0,0	18,0	0	
2002	12,0	10,0	22,0	0,0	0,0	0,0	0,0	22,0	0	
2003			0,0	1,0	2,0	0,5	3,5	3,5	200	
2004			0,0	1,0	2,0	0,5	3,5	3,5	202	
2005			0,0	1,0	2,1	0,5	3,6	3,6	204	
2006			0,0	1,0	2,1	0,5	3,6	3,6	206	
2007			0,0	1,0	2,2	0,5	3,7	3,7	208	
2008			0,0	1,0	2,2	0,5	3,7	3,7	210	
2009			0,0	1,0	2,3	0,5	3,8	3,8	212	
2010			0,0	1,0	2,3	0,5	3,8	3,8	214	
2011			0,0	1,0	2,3	0,5	3,8	3,8	217	
2012			0,0	1,0	2,4	0,5	3,9	3,9	219	
2013	10,0	6,0	16,0	1,0	2,4	0,5	3,9	19,9	221	
2014	10,0	6,0	16,0	1,0	2,5	0,5	4,0	20,0	223	
2015			0,0	1,5	5,0	0,8	7,2	7,2	297	
2016			0,0	1,5	5,1	0,8	7,3	7,3	300	
2017			0,0	1,5	5,2	0,8	7,4	7,4	303	
2018			0,0	1,5	5,3	0,8	7,5	7,5	306	
2019			0,0	1,5	5,4	0,8	7,6	7,6	309	
2020			0,0	1,5	5,5	0,8	7,7	7,7	312	
2021			0,0	1,5	5,6	0,8	7,9	7,9	315	
2022			0,0	1,5	5,7	0,8	8,0	8,0	318	
2023			0,0	1,5	5,8	0,8	8,1	8,1	321	
2024			0,0	1,5	5,9	0,8	8,2	8,2	325	
2025			0,0	1,5	6,1	0,8	8,3	8,3	328	
2026			0,0	1,5	6,2	0,8	8,4	8,4	331	
2027			0,0	1,5	6,3	0,8	8,6	8,6	334	
2028			0,0	1,5	6,4	0,8	8,7	8,7	338	
2029			0,0	1,5	6,6	0,8	8,8	8,8	341	
2030			0,0	1,5	6,7	0,8	8,9	8,9	345	
Resid.Val.										
PV at 0%	50,0	36,0	86,0	36,0	119,5	18,0	173,5	259,5	7658	33889
PV at 5%	35,2	26,2	61,4	14,7	44,3	7,4	66,4	127,8	7658	16686
PV at 8%	29,7	22,5	52,2	9,4	26,7	4,7	40,8	93,0	7658	12139
PV at 12%	24,6	18,9	43,5	5,6	14,9	2,8	23,3	66,8	7658	8726

ANNEX 4.2-A: CALCULATION OF FINANCIAL INTERNAL RATE OF RETURN (FIRR)
MWWTP - ALTERNATIVE (A)
UNSTAGED IMPLEMENTATION - MECHANICAL/ BIOLOGICAL TREATMENT STANDARD
(EVALUATION PERIOD 1999-2030 - COST IN MILLION US$ - PRICE LEVEL 1999)

YEAR	INVESTMENT COST			Total Current Cost	Total Project Cost	Annual Volume of Sewage	Average Revenue per m3	Annual Project Revenues	Total Project Net Revenues
	Civil Works	E&M	Total						
	(M US$)	(M US$)	(M US$)	(M US$)	(M US$)	(M m3)	(USD/m3)	(M USD)	(M USD)
1999	0,0	0,0	0,0	0,0	0,0	0,0	0,5	0,0	0,0
2000	8,0	8,0	16,0	0,0	16,0	0,0	0,5	0,0	-16,0
2001	10,0	10,0	20,0	0,0	20,0	0,0	0,5	0,0	-20,0
2002	12,0	12,0	24,0	0,0	24,0	0,0	0,5	0,0	-24,0
2003			0,0	3,5	3,5	20,0	0,5	10,0	6,5
2004			0,0	3,5	3,5	20,2	0,5	10,1	6,6
2005			0,0	3,6	3,6	20,4	0,5	10,2	6,6
2006			0,0	3,6	3,6	20,6	0,5	10,3	6,7
2007			0,0	3,7	3,7	20,8	0,5	10,4	6,7
2008			0,0	3,7	3,7	21,0	0,5	10,5	6,8
2009			0,0	3,8	3,8	21,2	0,5	10,6	6,8
2010			0,0	3,8	3,8	21,4	0,5	10,7	6,9
2011			0,0	3,8	3,8	21,7	0,5	10,8	7,0
2012			0,0	3,9	3,9	21,9	0,5	10,9	7,0
2013			0,0	3,9	3,9	22,1	0,5	11,0	7,1
2014			0,0	4,0	4,0	22,3	0,5	11,2	7,2
2015			0,0	4,0	4,0	22,5	0,5	11,3	7,3
2016			0,0	4,1	4,1	22,8	0,5	11,4	7,3
2017			0,0	4,1	4,1	23,0	0,5	11,5	7,4
2018			0,0	4,2	4,2	23,2	0,5	11,6	7,4
2019			0,0	4,2	4,2	23,5	0,5	11,7	7,5
2020			0,0	4,3	4,3	23,7	0,5	11,8	7,5
2021			0,0	4,4	4,4	23,9	0,5	12,0	7,6
2022			0,0	4,4	4,4	24,2	0,5	12,1	7,7
2023			0,0	4,5	4,5	24,4	0,5	12,2	7,7
2024			0,0	4,5	4,5	24,6	0,5	12,3	7,8
2025			0,0	4,6	4,6	24,9	0,5	12,4	7,8
2026			0,0	4,7	4,7	25,1	0,5	12,6	7,9
2027			0,0	4,7	4,7	25,4	0,5	12,7	8,0
2028			0,0	4,8	4,8	25,6	0,5	12,8	8,0
2029			0,0	4,8	4,8	25,9	0,5	13,0	8,2
2030			0,0	4,9	4,9	26,2	0,5	13,1	8,2
Resid.Val.									0,0
FIRR									10%

ANNEX 4.2-B: CALCULATION OF FINANCIAL INTERNAL RATE OF RETURN (FIRR)
MWWTP - ALTERNATIVE (B)
IMPROVED EFFLUENT STANDARD IN STAGE II
(EVALUATION PERIOD 1999-2030 - COST IN MILLION US$ - PRICE LEVEL 1999)

YEAR	INVESTMENT COST			Total Current Cost	Total Project Cost	Annual Volume of Sewage	Average Revenue per m3	Annual Project Revenues	Total Project Net Revenues
	Civil Works	E&M	Total						
	(M US$)	(M US$)	(M US$)	(M US$)	(M US$)	(M m3)	(USD/m3)	(M USD)	(M USD)
1999	0,0	0,0	0,0	0,0	0,0	0,0	0,5	0,0	0,0
2000	8,0	6,0	14,0	0,0	14,0	0,0	0,5	0,0	-14,0
2001	10,0	8,0	18,0	0,0	18,0	0,0	0,5	0,0	-18,0
2002	12,0	10,0	22,0	0,0	22,0	0,0	0,5	0,0	-22,0
2003			0,0	3,5	3,5	20,0	0,5	10,0	6,5
2004			0,0	3,5	3,5	20,2	0,5	10,1	6,6
2005			0,0	3,6	3,6	20,4	0,5	10,2	6,6
2006			0,0	3,6	3,6	20,6	0,5	10,3	6,7
2007			0,0	3,7	3,7	20,8	0,5	10,4	6,7
2008			0,0	3,7	3,7	21,0	0,5	10,5	6,8
2009			0,0	3,8	3,8	21,2	0,5	10,6	6,8
2010			0,0	3,8	3,8	21,4	0,5	10,7	6,9
2011			0,0	3,8	3,8	21,7	0,5	10,8	7,0
2012			0,0	3,9	3,9	21,9	0,5	10,9	7,0
2013	10,0	6,0	16,0	3,9	19,9	22,1	0,5	11,0	-8,9
2014	10,0	6,0	16,0	4,0	20,0	22,3	0,5	11,2	-8,8
2015			0,0	7,2	7,2	22,5	0,5	11,3	4,1
2016			0,0	7,3	7,3	22,8	0,5	11,4	4,1
2017			0,0	7,4	7,4	23,0	0,5	11,5	4,1
2018			0,0	7,5	7,5	23,2	0,5	11,6	4,1
2019			0,0	7,6	7,6	23,5	0,5	11,7	4,1
2020			0,0	7,7	7,7	23,7	0,5	11,8	4,1
2021			0,0	7,9	7,9	23,9	0,5	12,0	4,1
2022			0,0	8,0	8,0	24,2	0,5	12,1	4,1
2023			0,0	8,1	8,1	24,4	0,5	12,2	4,1
2024			0,0	8,2	8,2	24,6	0,5	12,3	4,1
2025			0,0	8,3	8,3	24,9	0,5	12,4	4,1
2026			0,0	8,4	8,4	25,1	0,5	12,6	4,2
2027			0,0	8,6	8,6	25,4	0,5	12,7	4,1
2028			0,0	8,7	8,7	25,6	0,5	12,8	4,1
2029			0,0	8,8	8,8	25,9	0,5	13,0	4,2
2030			0,0	8,9	8,9	26,2	0,5	13,1	4,2
Resid.Val.									0,0
FIRR									7%

Annex 5.

Tables of proposed projects of respective countries and sectors according to the data base (Country tables)

List of Projects per Country

Column	Explanation
2	ID-No: Identification Number in the Database
3	Priority of projects given by countries - High, Medium, Low or Nonstructural Project
7	Dilution Factor = Discharge of WWTP / River Low Flow Rate
8	Sub-river Basin: according to the report "Thematic Maps of the Danube River Basin - Social and Economic Characteristics, with particular attention to Hot Spots, Significant Impact Areas and Hydraulic Structures"
9	Significant Impact Area: according to the report "Thematic Maps of the Danube River Basin"
14	Load Reduction of Organic Matter Indicator: LROM = highest value of either (2*BOD) or COD
15	Nutrient Load Reduction Indicator: NLR = N+P
17	Incremental Percentage = instead of missing data for Incremental Costs (18) a percentage is given by countries (*) or is estimated from Total Investment Costs for Nutrient removal Project category: 1. new sewer and new WWTP 5% 2. extension of sewer and extension of existing WWTP 20% 3. existing sewer (or extension) and new WWTP 30% 4. extension of capacity of existing WWTP 50% 5. extension of WWTP predominantly for nutrient reduction 90% For other projects the percentage is estimated landfills (industrial, municipal) technology change in industry 20% remedial measures in agricultu 50%
18	Incremental Costs = Incremental Percentage*Total Investment Costs
19	Baseline Costs = Total Investment Costs - Incremental Costs
20	Specific Incremental Costs = Incremental Costs / NLR
22	Specific Baseline costs = Baseline Costs / LROM

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Germany

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	D01	High	Abwasserzweckverband Oberes Laucherttal				1 Upper Danube			2	16		2	16	2,29	90	2,06	0,23	128.531	7	114.250	5			142.813
Municipalities	D02	High	Mergelstetten - Brenz				1 Upper Danube		40	140	110	5	140	115	9,72	90	8,74	0,97	76.030	6	6.939	2			84.478
Municipalities	D03	High	Leutkirch - Eschach, Iller				1 Upper Danube		1	9	64		9	64	4,57	90	4,11	0,46	64.266	4	50.778	3			71.406
Municipalities	D04	High	Zweckverband Obere Iller, Sonthofen				1 Upper Danube		33	326	145	5	326	150	7,43	90	6,69	0,74	44.580	3	2.279	1			49.533
Municipalities	D05	High	Munchen I - Isar				1 Upper Danube		1	36	2.704	3	36	2.707	28,57	90	25,71	2,86	9.499	1	79.361	4			10.554
Municipalities	D06	High	Munchen II - Isar				1 Upper Danube				1.150			1.150	20,00	90	18,00	2,00	15.652	2					17.391
Municipalities	D07	High	Zweckverband Starnberger See - Isar				1 Upper Danube				152			152	22,86	90	20,57	2,29	135.355	8					150.395
Municipalities	D08	High	Zweckverband Chiemsee - Inn				2 Inn				68			68	5,14	90	4,63	0,51	68.069	5					75.632
	Subtotal								**75**	**513**	**4.409**	**13**	**513**	**4.422**	**100,57**		**90,52**	**10,06**							
Industry	D09	High	ESSO AG Ingolstadt - Donau				1 Upper Danube			20	390			390	0,57	20	0,11	0,46	293	1					1.464
Industry	D10	High	WNC - Nitrochemie GmBH Aschau - Inn				2 Inn			760	245	40	760	285	5,71	20	1,14	4,57	4.010	2	6.015				20.049
	Subtotal								**0**	**780**	**635**	**40**	**760**	**675**	**6,29**		**1,26**	**5,03**							
Wetlands	D11	High	Floodplains next to Ingolstadt				1 Upper Danube				113	11		124	101,25		78,75	22,50	635.081	2					816.532
Wetlands	D12	High	Mouth of Isar				1 Upper Danube				98	10		108	25,35		5,85	19,50	54.167	1					234.722
	Subtotal								**0**	**0**	**211**	**21**	**0**	**232**	**126,60**		**84,60**	**42,00**							
Total Country									**75**	**1.293**	**5.255**	**74**	**1.273**	**5.329**	**233,46**		**176,37**	**57,09**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Austria

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m³/s)	(m³/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	A01	High	Wien - HKA - extension and upgrade of NP removal				3 Austrian Danube	3 Szigetköz	5.500	10.000	2.000		11.000	2.000	470,09	90	423,08	47,01	211.541	4	4.274	1			235.045
Municipalities	A02	High	Linz - Asten - extension and upgrade of NP removal				3 Austrian Danube	3 Szigetköz		1.278	770	64	1.278	834	55,55	90	50,00	5,56	59.946	2	4.347	2			66.607
Municipalities	A03	High	Graz - extension and upgrade of NP removal				7 Drava-Mura	7 Lower Mura - Drava	240	750	1.180	340	750	1.520	42,73	90	38,46	4,27	25.301	1	5.697	3			28.112
Municipalities	A04	High	Klagenfurt - upgrade of N removal				7 Drava-Mura	6 Middle Drava			90			90	7,69	90	6,92	0,77	76.900	3					85.444
Subtotal									**5.740**	**12.028**	**4.040**	**404**	**13.028**	**4.444**	**576,06**		**518,45**	**57,61**							
Industry	A05	High	PCA Fine Paper Hallein				2 Inn		5.500	4.500			11.000		38,46	20	7,69	30,77			2.797				
Industry	A06	High	Biochemie GmbH Kundl				2 Inn				470			470	42,73	20	8,55	34,18	18.183						90.915
Subtotal									**5.500**	**4.500**	**470**	**0**	**11.000**	**470**	**81,19**		**16,24**	**64,95**							
Wetlands	A07	High	Drösinger Wald				4 Morava	2 Lower Morava			165	17		182	42,90		9,90	33,00	54.396						54.396
Subtotal									**0**	**0**	**165**	**17**	**0**	**182**	**42,90**		**9,90**	**33,00**							
Total Country									**11.240**	**16.528**	**4.675**	**421**	**24.028**	**5.096**	**700,15**		**544,59**	**155,56**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Czech Republic

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m³/s)	(m³/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	CZ01	High	Extension of Municipal Waste Water Treatment Plant for the City of Brno (in Modrice)	1,430	2,870	0,498	4 Morava	1 Middle Morava	118	705	277	62	705	339	39,70	90	35,73	3,97	105.492	5	5.631	6	1,978	1	117.213
Municipalities	CZ02	High	Extension and Intensification of Waste Water Treatment Plant in Zlin - Malenovice	0,360	0,220	1,636	4 Morava	1 Middle Morava	137	377	237	23	377	260	10,80	90	9,72	1,08	37.385	3	2.865	3	1,767	2	41.538
Municipalities	CZ03	High	Reconstruction of the Technology in Waste Water Treatment Plant Uherske Hradiste	0,100	8,010	0,012	4 Morava	1 Middle Morava	4	108	74	12	108	85	5,00	50	2,50	2,50	29.274	1	23.148	7	0,031	4	58.548
Municipalities	CZ04	High	Intensification and Extension of Waste Water Treatment Plant Hodonin	0,080	8,500	0,009	4 Morava	1 Middle Morava	15	75	60	10	75	70	2,32	90	2,09	0,23	29.829	2	3.093	4	0,002	7	33.143
Municipalities	CZ09	Medium	M. Breclav - Reconstruction and intensification of WWTP (NP removal)	0,116	14,100	0,008	4 Morava	1 Middle Morava	23	218	35	1	218	36	10,06	90	9,05	1,01	251.500	8	4.615	5	0,008	6	279.444
Municipalities	CZ10	Medium	Prerov - WWTP reconstruction - biological stage and NP removal	0,203	1,600	0,127	4 Morava	1 Middle Morava	138	1.015	94	1	1.015	95	8,66	90	7,79	0,87	82.215	4	853	1	0,110	3	91.350
Municipalities	CZ18	Low	WWTP Kromeriz reconstruction - biological stage and N+P removal	0,115	7,450	0,015	4 Morava	1 Middle Morava	81	352	70	2	352	72	9,20	90	8,28	0,92	115.000	6	2.614	2	0,014	5	127.778
Municipalities	CZ19	Low	WWTP Prostejov reconstruction - biological stage and N+P removal	0,211	0,160	1,319	4 Morava	1 Middle Morava	0	0	75	3	0	78	13,12	90	11,81	1,31	151.385	7					168.205
Municipalities	CZ20	Low	WWTP Znojmor reconstruction - biological stage and N+P removal	0,156	3,150	0,050	4 Morava	2 Lower Morava	0	0	20	2	0	22	6,77	90	6,09	0,68	276.955	9					307.727
Subtotal									**516**	**2.850**	**942**	**115**	**2.850**	**1.057**	**105,63**		**93,07**	**12,56**							
Industry	CZ05	High	Intensification of Waste Water Treatment Plant Kozeluzny Otrokovice	0,170	7,890	0,022	4 Morava	1 Middle Morava	78	442	30	4	442	34	2,41	50	1,21	1,21	35.441	2	2.726	2	0,026	2	70.882
Industry	CZ11	Medium	Tanex Vladislav - WWTP reconstruction and N removal	0,004	0,800	0,005	4 Morava	2 Lower Morava	3	15	10	0	15	10	0,30	90	0,27	0,03	27.000	1	2.000	1	0,000	3	30.000
Industry	CZ21	Low	IWWTP Snaha Brtnice reconstruction	0,002	0,050	0,040	4 Morava		28	40	0	0	56	0	0,70	50	0,35	0,35			6.250	3	0,014	1	
Subtotal									**109**	**497**	**40**	**4**	**513**	**44**	**3,41**		**1,83**	**1,59**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Czech Republic

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m³/s)	(m³/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Agriculture	CZ07	High	Remedial Measures and Reduction of Slurry Production in the Pig Farm "Gigant Dubnany"	0,005		#•••/0!	4 Morava	1 Middle Morava	13	17	50	5	26	55	4,60	50	2,30	2,30	41.818		88.462		#•••/0!		83.636
Agriculture	CZ08	High	Milotice - Remedial measures in Pig Farm	0,006	0,080	0,075	4 Morava	1 Middle Morava			60	7		67		50									
Agriculture	CZ12	Medium	Remedial measures in Pig Farm Kunovice	0,002	0,230	0,009	4 Morava	1 Middle Morava			19	2		21		50									
Agriculture	CZ13	Medium	Remedial measures in Pig Farm Velke Nemcice	0,002	3,110	0,001	4 Morava	1 Middle Morava			15	1		16		50									
Agriculture	CZ22	Low	Remedial measures in Pig Farm Strachotice	0,002	3,180	0,001	4 Morava	1 Middle Morava			15	1		16		50									
Agriculture	CZ15	NST	Definition of obligatory agrotechnical and organizational measures for soil erosion reduction				4 Morava								16,70			16,70							
Agriculture	CZ16	NST	Minimization of output of harmful substances from animal husbandry farms				4 Morava								3,30			3,30							
Agriculture	CZ17	NST	Introduction of nature regeneration of forests				4 Morava								6,60			6,60							
Subtotal									**13**	**17**	**159**	**16**	**26**	**175**	**31,20**		**2,30**	**28,90**							
Wetlands	CZ14	High	Floodplains next to Hodonin				4 Morava	1 Middle Morava			520	52		572	70,58		31,19	39,39	54.528						123.392
Subtotal									**0**	**0**	**520**	**52**	**0**	**572**	**70,58**		**31,19**	**39,39**							
Total Country									**638**	**3.364**	**1.661**	**187**	**3.389**	**1.848**	**210,82**		**128,38**	**82,44**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Slovakia

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m³/s)	(m³/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	SK01	High	Kosice - expansion of WWTP 2nd stage of construction	1,250	4,380	0,285	9 Tisa	14 Sajo-Hornad		2.388	447	107	2.388	554	25,71	50	12,86	12,86	23.220	6	5.384	1	3,67	2	46.440
Municipalities	SK02	High	Nitra - construction and expansion of WWTP	0,370	3,500	0,106	5 Váh-Hron	4 Danube Bend			370	77		447	15,77	50	7,89	7,89	17.657	4			0,83	1	35.313
Municipalities	SK03	Medium	Expansion of WWTP Banska Bystrica				5 Váh-Hron	4 Danube Bend			346	72		417	16,96	50	8,48	8,48	20.311	5					40.623
Municipalities	SK04	Medium	Upgrading of WWTP Michalovce				9 Tisa	13 Bodrog-Tisza	56		219		112	219	3,26	50	1,63	1,63	7.453	2	14.540	3			14.906
Municipalities	SK05	Medium	Svidnik-sewer network and WWTP				9 Tisa	13 Bodrog-Tisza	120	100	64	6	240	70	11,71	5	0,59	11,13	8.379	3	46.368	4			167.582
Municipalities	SK06	Medium	Trencin-sewer system and WWTP				5 Váh-Hron	4 Danube Bend	268	378	199	50	536	249	7,63	5	0,38	7,25	1.531	1	13.520	2			30.622
Municipalities	SK07	Medium	Expansion of WWTP Humenné				9 Tisa	13 Bodrog-Tisza	54		148		108	148	17,08	50	8,54	8,54	57.586	7	79.074	5			115.172
Municipalities	SK08	Low	Topolcany - WWTP upgrading				5 Váh-Hron	4 Danube Bend							0,98	90	0,88	0,10							
Municipalities	SK09	Low	Roznava-expansion of WWTP				9 Tisa	14 Sajo-Hornad							2,62	50	1,31	1,31							
Municipalities	SK10	Low	Liptovsky Mikulas - reconstruction of wastewater treatment plant 2nd stage				5 Váh-Hron	4 Danube Bend							2,29	90	2,06	0,23							
Municipalities	SK36	NST	Water management transformation process - the support of municipal authorities												0,02			0,02							
Subtotal									**498**	**2.866**	**1.792**	**312**	**3.384**	**2.104**	**104,02**		**44,60**	**59,42**							
Industry	SK12	High	Removal of chlorinated hydrocarbons in the production of propylenoxid - Novaky Chemical Plant				5 Váh-Hron	4 Danube Bend							0,86	20	0,17	0,69							
Industry	SK13	High	Reconstruction of wastewater treatment plant in Bukocel, a.s.	0,330	1,000	0,330	9 Tisa	13 Bodrog-Tisza	102				204		5,71	50	2,86	2,86					0,94	1	
Industry	SK14	Medium	Reconstruction of wastewater treatment plant - Povazske Chemical Plant				5 Váh-Hron	4 Danube Bend							0,63	90	0,56	0,06							
Industry	SK16	Medium	Reconstruction of caprolactam holding tanks - Povazske chemical plant				5 Váh-Hron	4 Danube Bend							1,64	20	0,33	1,31							
Industry	SK17	Medium	Reconstruction of methylmethacrylate holding tanks - Povazske chemical plant				5 Váh-Hron	4 Danube Bend							0,75	20	0,15	0,60							
Industry	SK18	Medium	Project 2000, Chemical plant Strazske				9 Tisa	13 Bodrog-Tisza							2,00	20	0,40	1,60							
Industry	SK19	Medium	Barrelling the chemicals for production - Chemical plant Strazske				9 Tisa	13 Bodrog-Tisza							0,46	20	0,09	0,37							
Industry	SK20	Medium	Reconstruction of activated sludge tanks of wastewater treatment plant - Chemical plant Strazske				9 Tisa	13 Bodrog-Tisza							0,43	50	0,22	0,22							
Industry	SK21	Medium	Reconstruction of sewer system - Chemical plant Strazske				9 Tisa	13 Bodrog-Tisza							2,86		0,00	2,86							
Industry	SK37	Medium	Istrochem Bratislava				6 Pannonian Central Danube	4 Danube Bend								20									
Industry	SK15	Low	Reconstruction of ammonium storehouse Varin				5 Váh-Hron	4 Danube Bend							1,82	20	0,36	1,46							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Slovakia

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	SK22	Low	The reduction of discharged wastewater pollution to the Danube River, AssiDomän Packaging Sturovo, a.s.				6 Pannonian Central Danube	3 Szigetköz	1.650	1.350			3.300		9,08	50	4,54	4,54			1.375	1			
Industry	SK23	Low	Construction of wastewater treatment plant with reconstruction and expansion of sewer network, Bucina Zvolen				5 Váh-Hron	4 Danube Bend							2,69	30	0,81	1,88							
Industry	SK24	Low	Wastewater treatment plant reconstruction, Biotika Slovenska Lupca				5 Váh-Hron	4 Danube Bend							1,43	50	0,71	0,71							
Industry	SK25	Low	Centralise the collection and treatment of wastewater polluted by chrome, Kozeluzne Bosany				5 Váh-Hron	4 Danube Bend							2,31	20	0,46	1,84							
Industry	SK26	Low	Biological wastewater treatment / Wastewater treatment in Harmanecke Papierne, a.s. Harmanec				5 Váh-Hron	4 Danube Bend	105	300			300		2,29	30	0,69	1,60			5.332	2			
Industry	SK27	Low	Sludge disposal upgrading in Wastewater Treatment Plant, VSZ Kosice				9 Tisa	14 Sajo-Hornad							3,29	50	1,65	1,65							
Industry	SK28	Low	Reduction of contamination of groundwater and revitalisation of landfill in Krompachy				9 Tisa	13 Bodrog-Tisza								20									
Industry	SK29	Low	Final landfill Chalmová - VI. construction				5 Váh-Hron	4 Danube Bend							9,58	20	1,92	7,66							
Industry	SK30	Low	Reconstruction of wet waste tip, VSZ Kosice				9 Tisa	14 Sajo-Hornad							0,61	20	0,12	0,49							
Industry	SK31	Low	Reconstruction of dry waste tip and waste liquidation, VSZ Kosice				9 Tisa	14 Sajo-Hornad							14,37	20	2,87	11,50							
Industry	SK32	Low	Reconstruction of industrial landfill, Bukocel Hencovce				9 Tisa	14 Sajo-Hornad							1,43	20	0,29	1,14							
Industry	SK33	Low	Disposal of wastes from the PCB production, Chemko Strazske				9 Tisa	13 Bodrog-Tisza							10,00	20	2,00	8,00							
Industry	SK11	High	Management of wastewater in NCHZ Nováky, a.s.	0,270	0,550	0,491	5 Váh-Hron	4 Danube Bend							0,34	20	0,07	0,27					0,13	2	
Subtotal									**1.857**	**1.650**	**0**	**0**	**3.804**	**0**	**74,55**		**21,26**	**53,30**							
Wetlands	SK38	High	Mouth of Bodrog - Revitalization fo wetland of the Bodrog river basin				9 Tisa	13 Bodrog-Tisza			113	11		124	9,00		1,13	7,88	9.091						72.599
Wetlands	SK34	Low	Floodplain Meadow Restoration in the Lower Morava River				4 Morava	2 Lower Morava																	
Subtotal									**0**	**0**	**113**	**11**	**0**	**124**	**9,00**		**1,13**	**7,88**							
Other Measures	SK35	NST	Analysis of sediments quality and disposal of extracted sediments within the slovak part of the Danube river basin				5 Váh-Hron								0,57			0,57							
Subtotal									**0**	**0**	**0**	**0**	**0**	**0**	**0,57**		**0,00**	**0,57**							
Total Country									**2.355**	**4.516**	**1.905**	**323**	**7.188**	**2.228**	**188,15**		**66,99**	**121,16**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Hungary

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m³/s)	(m³/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	H01	High	Expansion of wastewater treatment plant at North Budapest				6 Pannonian Central Danube	5 Gemenc-Kopacki Rit	28.000	56.000	308	183	56.000	491	32,25	50	16,13	16,13	32.841	3	288	2			65.682
Municipalities	H02	High	Expansion of wastewater treatment plant at South Pest				6 Pannonian Central Danube	5 Gemenc-Kopacki Rit	18.700	37.400	203	122	37.400	325	27,89	90	25,10	2,79	77.234	5	75	1			85.815
Municipalities	H03	High	Györ town wastewater treatment plan development and extension of the II. Treatment phase and sludge management	0,430			6 Pannonian Central Danube	4 Danube Bend	1.100	2.200	273	43	2.200	316	12,67	50	6,34	6,34	20.047	2	2.880	5			40.095
Municipalities	H04	High	Construction of the wastewater treatment plant at Dunaujvaros				6 Pannonian Central Danube	5 Gemenc-Kopacki Rit	4.620	9.240	53	32	9.240	85	10,64	30	3,19	7,45	37.553	4	806	4			125.176
Municipalities	H06	High	Construction of the wastewater treatment plant of Szeged, Mechanical treatment I/b Phase	0,400			9 Tisa	18 Lower Mures-Szeged	5.980	11.960	270	30	11.960	300	6,58	30	1,97	4,61	6.580	1	385	3			21.933
Subtotal									**58.400**	**116.800**	**1.107**	**410**	**116.800**	**1.517**	**90,03**		**52,73**	**37,30**							
Industry	H07	High [1]	Water and wastewater development program at the Danube refinery of the MOL Company	0,580			6 Pannonian Central Danube	5 Gemenc-Kopacki Rit	300	1.500			1.500		48,74	20	9,75	38,99			25.995	2			
Industry	H08	High [1]	General reconstruction of the wastewater treatment system of the Nitrokémia Company				6 Pannonian Central Danube	5 Gemenc-Kopacki Rit	380	1.900	420	6	1.900	426	5,85	50	2,93	2,93	6.866		1.539	1			13.732
Industry	H09	High [1]	Salty technological water concentration and christalisation unit development for salt reuse in the frame of the salty water reduction program				9 Tisa	14 Sajo-Hornad							2,93	20	0,59	2,34							
Subtotal									**680**	**3.400**	**420**	**6**	**3.400**	**426**	**57,52**		**13,26**	**44,26**							
Wetlands	H10	High	Area between Gemenec and Kopacki Rit - Rehabilitation and management of the water related ecosystems in the Danube-Drava Region				7 Drava-Mura	5 Gemenc-Kopacki Rit			4.050	405		4.455	303,75		20,25	283,50	4.545	1					68.182
Wetlands	H11	High	Mouth of Bodrog				9 Tisa	13 Bodrog - Tisa			113	11		124	9,00		1,13	7,88	9.091	2					72.599
Subtotal									**0**	**0**	**4.163**	**416**	**0**	**4.579**	**312,75**		**21,38**	**291,38**							
Total Country									**59.080**	**120.200**	**5.690**	**832**	**120.200**	**6.522**	**460,30**		**87,36**	**372,94**							

1 The project focuses on the recution of other important pollutants (salt, oil, micropollutants..).

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Slovenia

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage		Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR												
				(m³/s)	(m³/s)				t/y						(mil USD)	%		(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		18	19	20	21	22	23	24	25	26
Municipalities	SLO06	High	Central Waste Water Treatment Plant Celje - outline solution with new input data	0,122	3,500	0,035	8 Sava	23 Upper Sava	1.880	4.270	283	63	4.270	346	11,80	30	*	3,54	8,26	10.231	2	1.934	3	0,288	5	34.104
Municipalities	SLO08	High	Central Waste Water Treatment Plant of town Krško - outline scheme	0,035	84,000	0,000	8 Sava	27 Middle Sava-Una&Vrbas	310	710	47	11	710	58	2,50	30		0,75	1,75	12.931	4	2.465	6	0,001	13	43.103
Municipalities	SLO09	High	Wastewater treatment plant municipal Lendava	0,026	0,160	0,163	7 Drava-Mura	7 Lower Mura - Drava	460	1.050	69	15	1.050	84	5,00	30	*	1,50	3,50	17.857	9	3.333	11	0,569	4	59.524
Municipalities	SLO10	High	Wastewater treatment plan municipality Ljubljana	0,868	7,700	0,113	8 Sava	23 Upper Sava	10.460	23.750	1.575	350	23.750	1.925	124,20	30	*	37,26	86,94	19.356	10	3.661	12	9,801	1	64.519
Municipalities	SLO12	High	Construction of the Central Waste Water Treatment Plant Maribor and the Consession for the Treatment of Waste Water in Maribor	0,317	98,000	0,003	7 Drava-Mura	7 Lower Mura - Drava	6.270	14.250	945	210	14.250	1.155	57,60	30	*	17,28	40,32	14.961	6	2.829	8	0,130	7	49.870
Municipalities	SLO14	High	Wastewater treatment plant municipality Murska Sobota	0,078	60,000	0,001	7 Drava-Mura	7 Lower Mura - Drava	1.250	2.850	189	42	2.850	231	9,90	30		2,97	6,93	12.857	3	2.432	5	0,009	11	42.857
Municipalities	SLO15	High	Construction of the second phase of Central Waste Treatment Plant of Šaleška dolina (Šalek valley)	0,087	0,900	0,097	7 Drava-Mura	23 Upper Sava	1.050	2.380	158	35	2.380	193	29,14	30	*	8,74	20,40	45.295	13	8.571	13	1,972	2	150.984
Municipalities	SLO19	High	Wastewater Treatment Plant Municipality Rogaška Slatina				8 Sava	24 Sutla							3,64	30	*	1,09	2,55							
Municipalities	SLO11	Medium	Central Waste Water Treatment Plant Ljutomer	0,035	0,120	0,292	7 Drava-Mura	7 Lower Mura - Drava	310	710	49	11	710	60	2,84	30	*	0,85	1,99	14.215	5	2.803	7	0,580	3	47.383
Municipalities	SLO13	Medium	Central Waste Water Treatment Plant Metlika	0,035	9,000	0,004	8 Sava	23 Upper Sava	120	260	17	4	260	21	1,60	50		0,80	0,80	38.095	12	3.077	9	0,003	12	76.190
Municipalities	SLO16	Medium	Central Waste Water Treatment Plant Vrhnika	0,035	2,000	0,018	8 Sava	23 Upper Sava							3,20	30		0,96	2,24					0,039	8	
Municipalities	SLO17	Medium	Upgrading of the central waste water treatment plant Domzale - Kamnik - nitrification/denitrification	0,340	3,500	0,097	8 Sava	23 Upper Sava	4.180	9.500	630	140	9.500	770	13,70	90		12,33	1,37	16.013	7	144	1	0,133	6	17.792
Municipalities	SLO22	Medium	Ptuj	0,182	98,000	0,002	7 Drava-Mura	6 Middle Drava	2.300	5.230	346	77	5.230	423	11,00	30	*	3,30	7,70	7.801	1	1.472	2	0,014	10	26.005
Municipalities	SLO25	Medium	Brezice	0,017	84,000	0,000	8 Sava	23 Upper Sava	210	480	32	7	480	39	2,20	30	*	0,66	1,54	16.923	8	3.208	10	0,000	14	56.410
Municipalities	SLO07	Low	Wastewater treatment plant municipal Crnomelj	0,017		#•••/0!	8 Sava	23 Upper Sava	210	480	32	7	480	39	2,10	50		1,05	1,05	26.923	11	2.188	4	#•••/0!	9	53.846
	Subtotal								**29.010**	**65.920**	**4.372**	**972**	**65.920**	**5.344**	**280,42**			**93,09**	**187,34**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Slovenia

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage		Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR												
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%		(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		18	19	20	21	22	23	24	25	26
Industry	SLO02	High	Wastewater treatment plant Brewery Laško	0,019	3,500	0,005	8 Sava	23 Upper Sava	1.050	2.380	158	35	2.380	193	13,20	5	*	0,66	12,54	3.420	3	5.269	5	0,068	1	68.394
Industry	SLO04	High	Wastewater treatment plant of the Paper Factory ICEC Krško	0,284	84,000	0,003	8 Sava	23 Upper Sava	9.400	21.380	1.418	315	21.380	1.733	17,40	30		5,22	12,18	3.012	2	570	1	0,041	2	10.040
Industry	SLO05	High	Wastewater treatment plant of the Paper Factory Sladkogorska (or Paloma)	0,111	59,000	0,002	7 Drava-Mura	7 Lower Mura - Drava	1.050	2.380	158	35	2.380	193	3,00	30		0,90	2,10	4.663	4	882	2	0,004	4	15.544
Industry	SLO20	High	Wastewater Treatment Plant Pomurka Murska Sobota	0,013	60,000	0,0002	7 Drava-Mura	7 Lower Mura - Drava	310	710	47	11	710	58		30	*									
Industry	SLO21	High	Wastewater Treatment Plant Leather Processing industry of Vrhnika				8 Sava	23 Upper Sava	2.090	4.750	315	70	4.750	385	17,00	20		3,40	13,60	8.831	5	2.863	4	0,000	5	44.156
Industry	SLO03	Low	Wastewater treatment plant of the Brewery Union, Ljubljana	0,013	7,700	0,002	8 Sava	23 Upper Sava	1.460	3.330	220	49	3.330	269	3,90	5	*	0,20	3,71	725	1	1.113	3	0,006	3	14.498
Industry	SLO28	Low	Diary Industry for Ljubljana	0,004	98,000	0,00004	8 Sava	23 Upper Sava	630	1.430	95	21	1.430	116		5										
Industry	SLO29	Low	Diary Industry for Maribor				7 Drava-Mura	6 Middle Drava	730	1.660	110	25	1.660	135		5										
	Subtotal								**16.720**	**38.020**	**2.521**	**561**	**38.020**	**3.082**	**54,50**			**10,38**	**44,13**							
Agriculture	SLO01	High	Construction of the Liquid Manure Treatment Plant Podgrad as a turn-key project	0,003	59,000	0,0001	7 Drava-Mura	7 Lower Mura - Drava	840	1.900	126	28	1.900	154	1,40	20		0,28	1,12	1.812	1	587	1	0,000	2	9.058
Agriculture	SLO18	High	Reconstruction of the Wastewater Treatment Plant for Pig Farmings Nemščak and Jezera of Izakovci.	0,008	60,000	0,0001	7 Drava-Mura	7 Lower Mura - Drava	2.300	5.200	350	80	5.200	430	5,60	20		1,12	4,48	2.605	2	862	2	0,001	1	13.023
Agriculture	SLO24	High	Farm Ihan	0,003	3,500	0,001	8 Sava	23 Upper Sava	2.300	5.230	346	77	5.230	423		20										0
	Subtotal								**5.440**	**12.330**	**822**	**185**	**12.330**	**1.007**	**7,00**			**1,40**	**5,60**							
Total Country									**51.170**	**116.270**	**7.715**	**1.718**	**116.270**	**9.433**	**341,92**			**104,86**	**237,06**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Croatia

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	HR05	High	The sewerage and waste water treatment of city of Vinkovci.				8 Sava	28 Lower Sava-Bosna	190				380		12,00	30	3,60	8,40			22.105	9			
Municipalities	HR12	High	The sewerage and waste water treatment of the National Park Plitvice lakes				8 Sava	25 Kupa							16,00	5	0,80	15,20							
Municipalities	HR14	High	The sewerage and waste water treatment of cities of Karlovac and Duga Resa	0,220			8 Sava	25 Kupa	2.026	1.177	9	16	4.052	25	50,00	30	15,00	35,00	600.000	8	8.638	8			2.000.000
Municipalities	HR19	High	The central waste water treatment plant of city of Zagreb	3,450			8 Sava	26 Middle Sava-Kupa	10.438	29.743	1.320	220	29.743	1.540	256,00	30	76,80	179,20	49.870	4	6.025	7			166.234
Municipalities	HR25	High	The general solution of the sewerage system of city of Osijek	0,290			7 Drava-Mura	5 Gemenc-Kopacki Rit	953	2.671	160	18	2.671	178	5,63	5	0,28	5,35	1.581	1	2.002	2			31.629
Municipalities	HR65	High	The reconstruction of the waste water treatment plant of city of Varazdin	0,260	8,000	0,033	7 Drava-Mura	6 Middle Drava	1.162	1.779	132	1	2.324	133	12,00	50	6,00	6,00	45.113	3	2.582	4	0,20		90.226
Municipalities	HR01	Medium	The sewerage and waste water treatment of city of Slavonski Brod and wider area				8 Sava	27 Middle Sava-Una&Vrbas	201	600	52		600	52	50,00	30	15,00	35,00	288.462	6	58.333	11			961.538
Municipalities	HR04	Medium	The waste water treatment plant of city of Bjelovar.				8 Sava	26 Middle Sava-Kupa	744	1.255			1.488		6,66	50	3,33	3,33			2.238	3			
Municipalities	HR07	Medium	The sewerage and waste water treatment of cities of Grubišno Polje and Mali Zdenci along with PPI "Zdenka" Veliki Zdenci				8 Sava	26 Middle Sava-Kupa	604		16	1	1.208	17	6,21	20	1,24	4,97	73.088	5	4.114	5			365.441
Municipalities	HR13	Medium	The sewerage and waste water treatment of city of Sisak				8 Sava	26 Middle Sava-Kupa	700	919	48	2	1.400	50	60,00	30	18,00	42,00	360.000	7	30.000	10			1.200.000
Municipalities	HR15	Medium	The sewerage and waste water treatment of city of Petrinja and neighbourhood towns				8 Sava	26 Middle Sava-Kupa							31,00	30	9,30	21,70							
Municipalities	HR18	Medium	The waste water treatment plant of city of Sesvete—east				8 Sava	26 Middle Sava-Kupa								5									
Municipalities	HR20	Medium	The waste water treatment plant of city of Sesvete-north-east				8 Sava	26 Middle Sava-Kupa								5									
Municipalities	HR21	Medium	The waste water treatment plant of city of Zaprešic				8 Sava	26 Middle Sava-Kupa								5									
Municipalities	HR23	Medium	The waste water treatment plant of city of Krašic				8 Sava	26 Middle Sava-Kupa							0,55	30	0,17	0,39							
Municipalities	HR28	Medium	The sewerage system and the waste water treatment plant of city of Belišce				7 Drava-Mura	5 Gemenc-Kopacki Rit	1.364	2.538	27	1	2.728	28	4,80	5	0,24	4,56	8.571	2	1.672	1			171.429
Municipalities	HR33	Medium	The sewerage system of town of Cepin				7 Drava-Mura	7 Lower Mura - Drava							11,73	5	0,59	11,15							
Municipalities	HR34	Medium	The retention basin of the waste water treatment plant of Virovitica				7 Drava-Mura	7 Lower Mura - Drava							1,77	50	0,89	0,89							
Municipalities	HR38	Medium	The waste water treatment plant of city of Novi Marof				7 Drava-Mura	7 Lower Mura - Drava							2,34	30	0,70	1,63							
Municipalities	HR40	Medium	The waste water treatment plant of city of Koprivnica				7 Drava-Mura	7 Lower Mura - Drava	604	806			1.208		10,84	50	5,42	5,42			4.487	6			
Municipalities	HR51	Medium	The rehabilitation of the municipal dump site of city of Sisak				8 Sava	26 Middle Sava-Kupa							6,15	20	1,23	4,92							
Municipalities	HR52	Medium	The municipal dump site "Doline" of city of Bjelovar				8 Sava	26 Middle Sava-Kupa							2,24	20	0,45	1,79							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Croatia

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	HR53	Medium	The municipal dump site “Grginac” of city of Bjelovar				8 Sava	26 Middle Sava-Kupa							0,94	20	0,19	0,75							
Municipalities	HR54	Medium	The rehabilitation of the municipal dump site of city of Daruvar				8 Sava	26 Middle Sava-Kupa							1,20	20	0,24	0,96							
Municipalities	HR55	Medium	The rehabilitation of the municipal dump site of city of Nova Gradiška				8 Sava	27 Middle Sava-Una&Vrbas							0,10	20	0,02	0,08							
Municipalities	HR57	Medium	The dump site of Pozeška kotlina region				8 Sava	27 Middle Sava-Una&Vrbas							1,56	20	0,31	1,25							
Municipalities	HR58	Medium	The building of the dump site “Pustošije” Cakovec				7 Drava-Mura	7 Lower Mura - Drava								20									
Municipalities	HR59	Medium	The municipal dump site of city of Slatina				7 Drava-Mura	7 Lower Mura - Drava							0,21	20	0,04	0,16							
Municipalities	HR61	Medium	Regional landfill for Eastern Slavonija				7 Drava-Mura	27 Middle Sava-Una&Vrbas							27,00	20	5,40	21,60							
Municipalities	HR62	Medium	Centre for pre-processing and storage of dangerous waste for Osijek-Baranja county				7 Drava-Mura	5 Gemenc-Kopacki Rit							1,77	20	0,35	1,42							
Municipalities	HR64	Medium	Improvement of sanitary Conditions of landfill in Nemetin – Sarvaš				7 Drava-Mura	7 Lower Mura - Drava								20									
Municipalities	HR06	Low	The waste water treatment plant of city of Velika				8 Sava	26 Middle Sava-Kupa							1,00	30	0,30	0,70							
Municipalities	HR08	Low	The sewerage and waste water treatment of city of Daruvar				8 Sava	26 Middle Sava-Kupa							0,94	20	0,19	0,75							
Municipalities	HR09	Low	The sewerage and waste water treatment of city of Garešnica				8 Sava	26 Middle Sava-Kupa							2,35	5	0,12	2,23							
Municipalities	HR10	Low	The sewerage and waste water treatment of cities of Pakrac and Lipik				8 Sava	26 Middle Sava-Kupa							1,65	20	0,33	1,32							
Municipalities	HR11	Low	The sewerage and waste water treatment of city of Ogulin				8 Sava	25 Kupa							3,35	30	1,01	2,35							
Municipalities	HR16	Low	The central waste water treatment plant of area of cities of Zabok-Orosavlje- Gornja and Donja Stubica				8 Sava	26 Middle Sava-Kupa							27,30	30	8,19	19,11							
Municipalities	HR17	Low	The waste water treatment plant of city of Samobor				8 Sava	26 Middle Sava-Kupa								50									
Municipalities	HR22	Low	The waste water treatment plant of city of Velika Gorica				8 Sava	26 Middle Sava-Kupa							2,20	50	1,10	1,10							
Municipalities	HR24	Low	The waste water treatment plant of city of Našice				7 Drava-Mura	5 Gemenc-Kopacki Rit							1,10	30	0,33	0,77							
Municipalities	HR26	Low	The waste water treatment of city of Đurdenovac				7 Drava-Mura	7 Lower Mura - Drava							2,96	5	0,15	2,81							
Municipalities	HR27	Low	The sewerage system of city of Đurdenovac				7 Drava-Mura	7 Lower Mura - Drava							4,86	5	0,24	4,62							
Municipalities	HR29	Low	The waste water treatment of city of Donji Miholjac				7 Drava-Mura	5 Gemenc-Kopacki Rit							19,00	30	5,70	13,30							
Municipalities	HR30	Low	The waste water treatment plant of city of Orahovica				7 Drava-Mura	7 Lower Mura - Drava							1,10	30	0,33	0,77							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Croatia

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	HR31	Low	The sewerage system of town of Bizovac				7 Drava-Mura	7 Lower Mura - Drava							1,23	5	0,06	1,17							
Municipalities	HR32	Low	The waste water treatment plant of town of Bizovac				7 Drava-Mura	7 Lower Mura - Drava							4,13	5	0,21	3,92							
Municipalities	HR35	Low	The sewerage system and the waste water treatment plant of town of Ilok				7 Drava-Mura	7 Lower Mura - Drava							31,13	5	1,56	29,57							
Municipalities	HR36	Low	The sewerage system and the waste water treatment plant of city of Slatina				7 Drava-Mura	7 Lower Mura - Drava							3,68	30	1,10	2,57							
Municipalities	HR37	Low	The waste water treatment plant of city of Cakovec and nearby towns				7 Drava-Mura	7 Lower Mura - Drava							7,32	30	2,19	5,12							
Municipalities	HR39	Low	The waste water treatment plant of city of Ivanec				7 Drava-Mura	7 Lower Mura - Drava							0,95	30	0,29	0,67							
Municipalities	HR41	Low	The sewerage system and the waste water treatment plant of city of Prelog				7 Drava-Mura	7 Lower Mura - Drava							7,78	30	2,33	5,45							
Municipalities	HR56	Low	The municipal dump site of city of Oriovac				8 Sava	26 Middle Sava-Kupa							0,04	20	0,01	0,04							
Municipalities	HR60	Low	The rehabilitation of the municipal dump site of city of Orahovica				7 Drava-Mura	7 Lower Mura - Drava							0,75	20	0,15	0,60							
Municipalities	HR63	Low	Temporary landfill “Loncarica Velika”				7 Drava-Mura	7 Lower Mura - Drava							2,70	20	0,54	2,16							
Municipalities	HR74	Low	WWTP Vukovar				6 Pannonian Central Danube	5 Gemenc-Kopacki Rit								5									
Municipalities	HR02	High	The sewerage and waste water treatment of city of Zupanja				8 Sava	28 Lower Sava-Bosna	40				80		11,00	30	3,30	7,70			96.250	12			
Municipalities	HR03	High	The sewerage and waste water treatment of city of Kutina and surrounding settlements				8 Sava	26 Middle Sava-Kupa							12,00	30	3,60	8,40							
Subtotal									**19.026**	**41.488**	**1.764**	**259**	**47.882**	**2.023**	**729,20**		**198,90**	**530,29**							
Industry	HR47	High	The waste water treatment plant of “Agroproteinka” d.d.				8 Sava	26 Middle Sava-Kupa								30									
Industry	HR49	High	The waste water treatment plant of food industry “Kvasac-Podravka” d.d. of Koprivnica				7 Drava-Mura	7 Lower Mura - Drava							0,23	50	0,11	0,11							
Industry	HR50	High	The waste water treatment plant of industrial area Danica of Koprivnica				7 Drava-Mura	7 Lower Mura - Drava							4,00	30	1,20	2,80							
Industry	HR68	High	Belisce (paper)	0,060			7 Drava-Mura	5 Gemenc-Kopacki Rit	1.100				2.200			5									
Industry	HR69	High	IPK Osijek sugar factory	0,040			7 Drava-Mura	5 Gemenc-Kopacki Rit								5									
Industry	HR70	High	WWTP Zapresic				8 Sava	26 Middle Sava-Kupa								5									
Industry	HR45	Medium	The waste water treatment of meat industry PIK “Vrbovec”				8 Sava	26 Middle Sava-Kupa								50									
Industry	HR46	Medium	The waste water treatment of meat industry “Gavrilovic” d.o.o. Petrinja				8 Sava	26 Middle Sava-Kupa							0,34	20	0,07	0,27							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Croatia

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m³/s)	(m³/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	HR48	Medium	The building of the system for the collection and treatment of highly polluted waste water of "Petrokemija" d.d. Kutina	0,170			8 Sava	26 Middle Sava-Kupa	47	209			209		0,95	20	0,19	0,76			3.648				
Subtotal									**1.147**	**209**	**0**	**0**	**2.409**	**0**	**5,52**		**1,57**	**3,95**							
Agriculture	HR71	Medium	Farma Senkovac (pig farm)				7 Drava-Mura	5 Gemenc-Kopacki Rit	1.500		7	3	3.000	10		20									
Agriculture	HR72	High	Farma Luzani				8 Sava	27 Middle Sava-Una&Vrbas	3.600			1	7.200	1		20									
Agriculture	HR42	Low	The sewerage system and waste water treatment of the farm "Dubravica" d.d.				8 Sava	26 Middle Sava-Kupa								30									
Agriculture	HR75	Low	Renewal of animal stock at PIK "Belje"				7 Drava-Mura	5 Gemenc-Kopacki Rit								50									
Agriculture	HR43	NST	The erosion and sustainable soil management for middle Croatia region (non-structural project)				8 Sava								0,07			0,07							
Agriculture	HR44	NST	The influence of increased quantity of mineralised nitrogen on its rinse and growth of plants (non-structural project)				8 Sava								0,03			0,03							
Subtotal									**5.100**	**0**	**7**	**4**	**10.200**	**11**	**0,10**		**0,00**	**0,10**							
Wetlands	HR67	High	Area between Gemenc and Kopacki Rit - Preservation and rehabilitation of the Drava river basin wetlands in Baranja region				7 Drava-Mura	6 Middle Drava			4.050	405		4.455	141,75		20,25	121,50	4.545	1					31.818
Wetlands	HR76	High	Mokro Polje				8 Sava	27 Middle Sava-Una&Vrbas			837	84		921	33,48		8,37	25,11	9.091	2					36.355
Subtotal									**0**	**0**	**4.887**	**489**	**0**	**5.376**	**175,23**		**28,62**	**146,61**							
Other Measures	HR66	High	Building up the Lonjsko polje Nature park information and monitoring centre in the war-damaged town Jasenovac				8 Sava	26 Middle Sava-Kupa							4,58			4,58							
Other Measures	HR73	High	Rehabilitation project National Park "Plitvicka Jazera"				8 Sava	25 Kupa																	
Subtotal									**0**	**0**	**0**	**0**	**0**	**0**	**4,58**		**0,00**	**4,58**							
Total Country									**25.273**	**41.697**	**6.658**	**752**	**60.491**	**7.410**	**914,64**		**229,10**	**685,54**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Bosnia - Herzegovina

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m³/s)	(m³/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	BH01	High	Construction of regional sewerage system Tuzla-Lukavac with central waste water treatment plant for cities and industry.		0,010		8 Sava	28 Lower Sava-Bosna	15.840		1.080	160	31.680	1.240	58,00	5	2,90	55,10	2.339	1	1.739	2			46.774
Municipalities	BH02	High	Rehabilitation and reconstruction sewerage and industry waste water treatment plant of city Sarajevo				8 Sava	28 Lower Sava-Bosna	14.850		1.015	150	29.700	1.165	15,00	20	3,00	12,00	2.575	2	404	1			12.876
Municipalities	BH03	High	Construction of regional sewerage system Banja Luka with central waste water treatment plant city and industry				8 Sava	27 Middle Sava-Una&Vrbas	13.500		910	140	27.000	1.050	50,00	5	2,50	47,50	2.381	3	1.759	3			47.619
Municipalities	BH04	Medium	Construction regional sewerage system Gornji Vakuf- Bugojno- Donji Vakuf with central waste water treatment plant for cities and industry.				8 Sava	27 Middle Sava-Una&Vrbas	1.385		95	14	2.770	109	18,50	5	0,93	17,58	8.486	4	6.345	4			169.725
Municipalities	BH05	Medium	Construction of regional sewerage system Sarajevo-Visoko with central waste water treatment plant near Visoko for cities and industry.				8 Sava	28 Lower Sava-Bosna	990		68	10	1.980	78	28,50	5	1,43	27,08	18.269	5	13.674	5			365.385
Municipalities	BH06	Low	Construction of regional sewerage system Travnik-Vitez with central waste water treatment plant near Vitez for cities and industry.				8 Sava	28 Lower Sava-Bosna							10,00	5	0,50	9,50							
Municipalities	BH07	Low	Construction of collecting system Pliva-Jajce with central waste water treatment				8 Sava	27 Middle Sava-Una&Vrbas							6,05	5	0,30	5,75							
Municipalities	BH08	Low	Construction sewerage system Zenica with central waste water treatment plant for city and industry				8 Sava	28 Lower Sava-Bosna							24,00	5	1,20	22,80							
Municipalities	BH09	Low	Construction sewerage system Bijelijina with central waste water treatment plant for city and industry.				8 Sava	30 Lower Sava-Drina							12,00	5	0,60	11,40							
Subtotal									**46.565**	**0**	**3.168**	**474**	**93.130**	**3.642**	**222,05**		**13,35**	**208,70**							
Industry	BH10	High	Reconstruction waste water pre-treatment plant in Chlorine Alkaline Complex in Tuzla				8 Sava	28 Lower Sava-Bosna							2,20	20	0,44	1,76							
Industry	BH11	High	Reconstruction of waste water pre-treatment plant in Coke Chemical Combine Lukavac				8 Sava	28 Lower Sava-Bosna	860	5.250			5.250		2,80	20	0,56	2,24			427	3			
Industry	BH12	High	Reconstruction and improve waste water treatment plant from “Incel” Banja Luka				8 Sava	27 Middle Sava-Una&Vrbas	3.960	19.400			19.400		3,50	50	1,75	1,75			90	1			
Industry	BH13	High	Rehabilitation and reconstruction waste water treatment plant in "Natron" Maglaj				8 Sava	28 Lower Sava-Bosna	7.920				15.840		3,00	50	1,50	1,50			95	2			
Industry	BH14	High	Construction waste water treatment plant for "Celpak" Prijedor				8 Sava	27 Middle Sava-Una&Vrbas	2.380	12.370			12.370		14,00	30	4,20	9,80			792	4			
Industry	BH15	Medium	Reconstruction of industry waste water treatment plant for DD “Zeljezara” Zenica				8 Sava	28 Lower Sava-Bosna							1,60	50	0,80	0,80							
Industry	BH16	Medium	Construction of industrial waste water treatment in the Sodium Factory Lukavac				8 Sava	28 Lower Sava-Bosna							6,00	30	1,80	4,20							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Bosnia - Herzegovina

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m³/s)	(m³/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	BH17	Low	Construction of industrial waste water treatment plant for "Destilacija drveta" Teslic				8 Sava	30 Lower Sava-Drina							5,30	30	1,59	3,71							
Industry	BH18	Low	Construction of Industrial waste water treatment plant for DD “Maglic” Foca				8 Sava	30 Lower Sava-Drina							9,20	30	2,76	6,44							
Subtotal									**15.120**	**37.020**	**0**	**0**	**52.860**	**0**	**47,60**		**15,40**	**32,20**							
Agriculture	BH19	High	Construction of waste water treatment plant for dairy and pigs breeding farm in the Nova Topola.				8 Sava	27 Middle Sava-Una&Vrbas	7.200		1.130	250	14.400	1.380	6,50	30	1,95	4,55	1.413	2	316	2			4.710
Agriculture	BH20	Medium	Construction of waste water treatment plant for pigs breeding farm in the Brcko				8 Sava	30 Lower Sava-Drina	9.900		1.570	350	19.800	1.920	2,30	30	0,69	1,61	359	1	81	1			1.198
Agriculture	BH21	Medium	Construction of waste water treatment plant for dairy farm “Spreca” Kalesija				8 Sava	28 Lower Sava-Bosna	35		5	2	70	7	2,20	30	0,66	1,54	94.286	3	22.000	3			314.286
Agriculture	BH22	Low	Construction of waste water treatment plant for dairy farm “Butmir” Sarajevo				8 Sava	28 Lower Sava-Bosna							1,90	30	0,57	1,33							
Agriculture	BH23	Low	Construction of waste water treatment plant for dairy and pigs breeding farm Bijeljina.				8 Sava	30 Lower Sava-Drina							2,00	30	0,60	1,40							
Subtotal									**17.135**	**0**	**2.705**	**602**	**34.270**	**3.307**	**14,90**		**4,47**	**10,43**							
Wetlands	BH24	High	Area of Mouth of Drina				8 Sava	30 Lower Sava-Drina			2.000	200		2.200	80,00		20,00	60,00	9.091						36.364
Subtotal									**0**	**0**	**2.000**	**200**	**0**	**2.200**	**80,00**		**20,00**	**60,00**							
Total Country									**78.820**	**37.020**	**7.873**	**1.276**	**180.260**	**9.149**	**364,55**		**53,22**	**311,33**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Yugoslavia

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	YU01	High	WWTP "Veliko Selo" - Belgrade (central)	4,630	1.800,0	0,003	10 Banat-Eastern Serbia	31 Sava at Beograde	31.536	65.000	876	1.183	65.000	2.059	215,00	30	64,50	150,50	31.326	12	2.315	2	0,387	17	104.420
Municipalities	YU02	High	WWTP "Ostruznica" - Belgrade	0,160	285,0	0,001	10 Banat-Eastern Serbia	31 Sava at Beograde	1.084		30	41	2.168	71	13,00	30	3,90	9,10	54.930	19	4.197	12	0,005		183.099
Municipalities	YU03	High	City of Novi sad WWTP	0,990	1.410,0	0,001	6 Pannonian Central Danube	8 Danube At Novi Sad	5.657	12.000	148	268	12.000	416	53,00	30	15,90	37,10	38.221	14	3.092	6	0,026	19	127.404
Municipalities	YU04	High	City of Nis WWTP	0,900	3,400	0,265	11 Velika Morava	32 Western & Southern Morava	5.302	11.000	124	260	11.000	384	45,00	30	13,50	31,50	35.156	13	2.864	4	8,338	4	117.188
Municipalities	YU05	High	City of Pristina WWTP	0,520	0,680	0,765	11 Velika Morava	33 Western & Southern Morava	3.563	7.500	86	133	7.500	219	40,00	30	12,00	28,00	54.795	18	3.733	7	21,412	1	182.648
Municipalities	YU07	High	City of Sabac WWTP	0,270	2,850	0,095	8 Sava	31 Sava at Beograde	1.912		43	102	3.824	145	18,00	5	0,90	17,10	6.207	3	4.472	13	1,620	12	124.138
Municipalities	YU08	High	City of Leskovac WWTP	0,400	3,400	0,118	11 Velika Morava	32 Western & Southern Morava	2.874		44	119	5.748	163	25,00	30	7,50	17,50	46.012	15	3.045	5	2,059	9	153.374
Municipalities	YU10	High	Mojkovac Town WWTP	0,020	3,950	0,005	8 Sava	29 Tara Canyon	118		3	5	236	8	3,00	30	0,90	2,10	112.500	22	8.898	22	0,011	20	375.000
Municipalities	YU12	High	Krusevac WWTP	0,320	15,000	0,021	11 Velika Morava	32 Western & Southern Morava	2.779		50	71	5.558	121	24,00	5	1,20	22,80	9.917	9	4.102	11	0,486	16	198.347
Municipalities	YU13	High	Cacak WWTP	0,350	5,350	0,065	11 Velika Morava	32 Western & Southern Morava	2.466		62	125	4.932	187	24,00	5	1,20	22,80	6.417	4	4.623	16	1,492	13	128.342
Municipalities	YU14	High	Novi Pazar WWTP	0,240	1,450	0,166	11 Velika Morava	32 Western & Southern Morava	1.620		38	90	3.240	128		5									
Municipalities	YU15	High	Subotica - upgrading WWTP	0,550			9 Tisa	19 Palic-Ludos Lakes	3.600		550	165	7.200	715	33,00	50	16,50	16,50	23.077	11	2.292	1			46.154
Municipalities	YU16	High	Uzice WWTP	0,200	1,300	0,154	11 Velika Morava	32 Western & Southern Morava	1.399		33	56	2.798	89	14,00	5	0,70	13,30	7.865	7	4.753	17	2,046	10	157.303
Municipalities	YU17	High	Zajecar WWTP	0,180	1,300	0,138	10 Banat-Eastern Serbia	34 Lower Timok	1.315		31	50	2.630	81	14,00	5	0,70	13,30	8.642	8	5.057	19	1,842	11	172.840
Municipalities	YU18	High	Bor WWTP	0,170		#•••/0!	10 Banat-Eastern Serbia	34 Lower Timok	1.258		22	39	2.516	61	14,00	30	4,20	9,80	68.852	20	3.895	9		8	229.508
Municipalities	YU19	High	Pirot WWTP	0,190	1,380	0,138	11 Velika Morava	34 Lower Timok	1.225		36	50	2.450	86	14,00	30	4,20	9,80	48.837	17	4.000	10	1,349	14	162.791
Municipalities	YU51	High	City of Senta WWTP	0,120	1,200	0,100	9 Tisa	19 Palic-Ludos Lakes	1.261		36	50	2.522	86	14,00	30	4,20	9,80	48.837	17	3.886	8	0,980	15	162.791
Municipalities	YU52	High	Blace Town WWTP	0,040	0,050	0,800	11 Velika Morava	32 Western & Southern Morava	310		38	13	620	51	8,00	30	2,40	5,60	47.059	16	9.032	23	4,480	5	156.863
Municipalities	YU53	High	Kolasin Town WWTP	0,030	6,820	0,004	8 Sava	29 Tara Canyon	175		5	7	350	12	3,00	30	0,90	2,10	75.000	21	6.000	20	0,009	21	250.000

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
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Country: Yugoslavia

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	YU54	High	WWTP Vranje	0,300	0,570	0,526	11 Velika Morava	32 Western & Southern Morava	1.853		43	83	3.706	126	18,00	5	0,90	17,10	7.143	5	4.614	15	9,000	3	142.857
Municipalities	YU55	High	WWTP Valjevo	0,280	0,700	0,400	8 Sava	31 Sava at Beograde	1.695		44	110	3.390	154	10,00	5	0,50	9,50	3.247	1	2.802	3	3,800	6	64.935
Municipalities	YU56	High	WWTP Rozaje	0,050	1,150	0,043	11 Velika Morava	32 Western & Southern Morava	355		6	11	710	17	6,00	5	0,30	5,70	17.647	10	8.028	21	0,248	18	352.941
Municipalities	YU06	Medium	City of Zrenjanin WWTP	0,500	1,760	0,284	9 Tisa	32 Western & Southern Morava	3.932		160	214	7.864	374	38,00	5	1,90	36,10	5.080	2	4.591	14	10,256	2	101.604
Municipalities	YU11	Medium	Vrbas/Kula/Crvenka	0,300	3,000	0,100	9 Tisa	21 Vrbas-DTD Canal	3.390		90	143	6.780	233	34,00	5	1,70	32,30	7.296	6	4.764	18	3,230	7	145.923
Municipalities	YU48	NST	Study on Water Quality and Pollution Reduction in Tisza River Watershed				9 Tisa								0,69			0,69							
Municipalities	YU50	NST	Study and Research on the Processes for Nutrients Removal												0,19			0,19							
Subtotal									**80.679**	**95.500**	**2.598**	**3.388**	**164.742**	**5.986**	**680,88**		**160,60**	**520,28**							
Industry	YU20	High	RTB BOR				10 Banat-Eastern Serbia	34 Lower Timok	580	2.170		30	2.170	30	35,00	5	1,75	33,25	58.333	2	15.323	3			1.166.667
Industry	YU21	High	FOPA paper mill, Vladicin Han				11 Velika Morava	32 Western & Southern Morava		15.000			15.000		15,00	5	0,75	14,25			950	1			
Industry	YU22	High	IHP Prahovo (fertilizers)				10 Banat-Eastern Serbia	34 Lower Timok	440	2.020	460	3.800	2.020	4.260	25,00	5	1,25	23,75	293	1	11.757	2			5.869
Industry	YU24	High	TE "Obilic" A and B - Obilic				11 Velika Morava	32 Western & Southern Morava	3.450	9.170			9.170			5									
Industry	YU25	High	"Lepenka" - N. Knzevac				9 Tisa	20 Upper Banat	1.100	3.184	22	8	3.184	30		5									
Industry	YU26	High	Trepca - Topionica				11 Velika Morava	32 Western & Southern Morava								5									
Industry	YU27	High	Trepca - Flotacija				11 Velika Morava	32 Western & Southern Morava								5									
Industry	YU28	High	HI "Zarka" - Sabac				8 Sava	31 Sava at Beograde	200	580	200	280	580	480		5									
Industry	YU09	Low	Eco Filling Station, Novi Sad				6 Pannonian Central Danube	8 Danube At Novi Sad							3,12	20	0,62	2,50							
Industry	YU23	Low	Ash Dump Belgrade				10 Banat-Eastern Serbia	31 Sava at Beograde								20									
Industry	YU42	Low	The Recultivation of Ash Dump Sites				10 Banat-Eastern Serbia	22 Middle Banat-Bega&Birzava							0,25	20	0,05	0,20							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
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Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	YU39	NST	Development of Policy, Methodology and Instruments for Financing of Water Pollution Control												0,07			0,07							
Subtotal									**5.770**	**32.124**	**682**	**4.118**	**32.124**	**4.800**	**78,44**		**4,42**	**74,01**							
Agriculture	YU29	High	FARMACOOP - DD Carmex, Vrbas	0,004			9 Tisa	21 Vrbas-DTD Canal	820		102	38	1.640	140	5,00	20	1,00	4,00	7.143	1	2.439	1			35.714
Agriculture	YU30	High	D. Makovic, Obrenovac	0,003			8 Sava	31 Sava at Beograde	470		58	22	940	80	5,00	20	1,00	4,00	12.500	3	4.255	3			62.500
Agriculture	YU31	High	Neoplanta, Cenej	0,005			9 Tisa	20 Upper Banat	1.160		146	55	2.320	201	8,00	20	1,60	6,40	7.960	2	2.759	2			39.801
Agriculture	YU33	High	DP1. Decembar - pig farm - Zitoradja	0,003			11 Velika Morava	32 Western & Southern Morava	470		58	22	940	80		20									
Agriculture	YU34	High	DP Pik Varvarinsko Polje - Varvarin	0,001			11 Velika Morava	32 Western & Southern Morava	580		73	27	1.160	100		20									
Agriculture	YU35	High	Surcin (Pig farm)	0,004			8 Sava	31 Sava at Beograde	820		102	38	1.640	140		20									
Agriculture	YU36	High	PDP Galad - Kikinda	0,002			9 Tisa	20 Upper Banat								20									
Agriculture	YU37	High	Petrovac na Mlavi - Pig Farm DP "Petrovac"	0,003			10 Banat-Eastern Serbia	33 Danube at Iron Gate	514		64	24	1.028	88		20									
Agriculture	YU40	NST	Management of Irrigation Canals in Vojvodina Region for the purpose of Pollution and Nutrients Reduction				9 Tisa								0,33			0,33							
Agriculture	YU41	NST	The Afforesting for reduction of diffuse pollution				11 Velika Morava								0,75			0,75							
Agriculture	YU45	NST	Establishing of Education Center for Farm and Agricultural Waste Management												0,75			0,75							
Subtotal									**4.834**	**0**	**603**	**226**	**9.668**	**829**	**19,83**		**3,60**	**16,23**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
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Country: Yugoslavia

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Wetlands	YU44	High	Area between Gemenc and Kopacki Rit				6 Pannonian Central Danube	5 Gemenc-Kopacki Rit			900	90		990	31,50		4,50	27,00	4.545	1					31.818
Wetlands	YU57	High	Area of Mouth of Drina				8 Sava	30 Lower Sava-Drina			500	50		550	20,00		5,00	15,00	9.091	2					36.364
Wetlands	YU58	High	Lower Tisza				9 Tisa	20 Upper Banat			1.800	180		1.980	72,00		18,00	54,00	9.091	2					36.364
Wetlands	YU43	NST	Study on floodplains and its contribution in pollution retention and removal				8 Sava								0,21			0,21							
Subtotal									**0**	**0**	**3.200**	**320**	**0**	**3.520**	**123,71**		**27,50**	**96,21**							
Other Measures	YU38	NST	Improvement of Yugoslav Legislative (Regulations, Criteria and Standards) on Water Pollution Control an harmonization with EU												0,08			0,08							
Other Measures	YU46	NST	Study of Iron Gate Reservoirs				10 Banat-Eastern Serbia								1,80			1,80							
Other Measures	YU47	NST	The Improvement of Water Quality Monitoring												0,48			0,48							
Other Measures	YU49	NST	Simulation Model of Sava River Basin				8 Sava								0,26			0,26							
Subtotal									**0**	**0**	**0**	**0**	**0**	**0**	**2,62**		**0,00**	**2,62**							
Total Country									**91.283**	**127.624**	**7.083**	**8.052**	**206.534**	**15.135**	**905,47**		**196,12**	**709,34**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
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Country: Bulgaria

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage		Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR												
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%		(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		18	19	20	21	22	23	24	25	26
Municipalities	BG01	High	Municipally Waste Water Treatment Plant - Lovetch	0,340			12 Mizia-Dobrudzha	38 Ossam at Lovetch	1.382	2.927	69	44	2.927	113	17,83	30	*	5,35	12,48	47.336	9	4.264	8			157.788
Municipalities	BG02	High	Municipally Waste Water Treatment Plant - Vratza	0,430			12 Mizia-Dobrudzha	35 Ogosta at Vratza	784	1.826	258	43	1.826	301	7,60	30	*	2,28	5,32	7.575	1	2.913	3			25.249
Municipalities	BG03	High	Municipally Waste Water Treatment Plant - Sofia	7,430			12 Mizia-Dobrudzha	36 Iskar at Sofija	5.823	12.051	273	551	12.051	824	105,82	30	*	31,75	74,07	38.527	8	6.147	9			128.422
Municipalities	BG04	High	Municipally Waste Water Treatment Plant - Sevlievo	0,170	0,160	1,063	12 Mizia-Dobrudzha	39 Rossitza at Sevlievo	1.014	2.062	136	43	2.062	179	8,91	30	*	2,67	6,24	14.933	3	3.025	5	7		49.777
Municipalities	BG07	High	Municipally Waste Water Treatment Plant - Troyan	0,330			12 Mizia-Dobrudzha	37 Ossam at Troyan	1.634	3.996	121	56	3.996	177	16,98	30	*	5,09	11,89	28.780	7	2.974	4			95.932
Municipalities	BG10	High	Municipal Waste Water treatment Plant Gorna Oryahovitza & Lyaskovetz	0,590			12 Mizia-Dobrudzha	40 Middle Yantra	6.559	14.370	464	247	14.370	711		30	*									0
Municipalities	BG18	High	Construction of solid waste landfill in Pleven or the river Vit				12 Mizia-Dobrudzha									30	*									
Municipalities	BG05	Medium	Municipally Waste Water Treatment Plant - Montana				12 Mizia-Dobrudzha	35 Ogosta at Vratza	2.473	5.577	243	88	5.577	331	18,00	30	*	5,40	12,60	16.314	4	2.259	1			54.381
Municipalities	BG06	Medium	Municipally Waste Water Treatment Plant - Popovo				12 Mizia-Dobrudzha	41 Lom Rivers	971	2.191	81	31	2.191	112	8,73	30	*	2,62	6,11	23.384	6	2.789	2			77.946
Municipalities	BG23	Medium	Kostinbrod and Bojuristhe - several small towns				12 Mizia-Dobrudzha	36 Iskar at Sofija								30	*									
Municipalities	BG08	Low	Municipally Waste Water Treatment Plant - Silistra				12 Mizia-Dobrudzha		516	303	22	92	1.032	114	4,60	30	*	1,38	3,22	12.105	2	3.120	6			40.351
Municipalities	BG09	Low	Municipally Waste Water Treatment Plant - Levski				12 Mizia-Dobrudzha	50 Lower Danube-Siret&Prut	1.126	2.300	152	10	2.300	162	10,26	30	*	3,08	7,18	19.000	5	3.123	7			63.333
Municipalities	BG24	Low	WWTP Russe				12 Mizia-Dobrudzha	41 Lom Rivers	3.883	8.987	603	219	8.987	822		30	*									
Municipalities	BG25	Low	WWTP Svishtov				12 Mizia-Dobrudzha		700	1.512	68	20	1.512	88		30	*									
Municipalities	BG26	Low	WWTP Vidin				12 Mizia-Dobrudzha		1.099	2.314	243	82	2.314	325		30	*									
Municipalities	BG27	Low	WWTP Lom				12 Mizia-Dobrudzha		675	2.266	146	68	2.266	214		30	*									
Subtotal									**28.639**	**62.682**	**2.879**	**1.594**	**63.411**	**4.473**	**198,73**			**59,62**	**139,11**							
Industry	BG11	High	Industrial Waste Water Treatment Plant - Sugar and Alcohol Factory Gorna Oriahovitza	0,300			12 Mizia-Dobrudzha	40 Middle Yantra	5.440	11.360	350	60	11.360	410	3,23	30		0,97	2,26	2.363	1	199	1			7.878
Industry	BG12	High	Industrial Waste Water reatment Plant - Fertilizer plant "CHIMKO" Vratza	0,280			12 Mizia-Dobrudzha	35 Ogosta at Vratza	118	239	121	3	239	124	7,15	30		2,15	5,01	17.298	2	20.941	2			57.661
Industry	BG13	High	Industrial Waste Water Treatment Plant - Pharmaceutical plant "ANTIBIOTIC" Razgrad	0,270			12 Mizia-Dobrudzha	41 Lom Rivers	200	331	9	2	400	11	4,48	90		4,03	0,45	366.545	3	1.120	3			407.273
Industry	BG14	Medium	Industrial Waste Water TreatmentvPlant - Metallurgical Plant "KREMNIKOVTSI"				12 Mizia-Dobrudzha	36 Iskar at Sofija	98	160			196		72,85	50		36,43	36,43			185.842	4			

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
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Country: Bulgaria

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m³/s)	(m³/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	BG15	Low	Industrial Waste Water Treatment Plant - mining complex "Elatzite"				12 Mizia-Dobrudzha	36 Iskar at Sofija							8,18	30	2,45	5,73							
Industry	BG16	NST	Feasibility Study for Inventorying Past Pollution and Elaboration of Upgradeable Database				12 Mizia-Dobrudzha								0,50			0,50							
Industry	BG17	NST	Top management training for Environmental Management Systems (EMS) implementation in Bulgarian industry				12 Mizia-Dobrudzha								0,50			0,50							
Subtotal									**5.856**	**12.090**	**480**	**65**	**12.195**	**545**	**96,89**		**46,03**	**50,87**							
Agriculture	BG20	High	Development of a hydrometric system for the Karaissen irrigation system				12 Mizia-Dobrudzha									5									
Agriculture	BG19	NST	Adoption of EU methods for assesment o pollution load from non-point sources				12 Mizia-Dobrudzha																		
Subtotal									**0**	**0**	**0**	**0**	**0**	**0**	**0,00**		**0,00**	**0,00**							
Wetlands	BG21	High	Balta Potelu				12 Mizia-Dobrudzha				439	44		483	5,27		0,88	4,39	1.818	2					10.911
Wetlands	BG22	High	Area of Bulgarian Danube Islands				12 Mizia-Dobrudzha				750	75		825	9,00		1,50	7,50	1.818	1					10.909
Wetlands	BG28	High	Balta Greaca / Tutrakan				12 Mizia-Dobrudzha	42 Arges at Bucuresti			675	68		743	8,10		1,35	6,75	1.818	1					10.909
Subtotal									**0**	**0**	**1.864**	**187**	**0**	**2.051**	**22,37**		**3,73**	**18,64**							
Total Country									**34.495**	**74.772**	**5.223**	**1.846**	**75.606**	**7.069**	**317,99**		**109,37**	**208,62**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Romania

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m³/s)	(m³/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	RO03	High	Wastewater treatment plant Craiova	1,370			13 Muntenia	50 Lower Danube - Siret&Prut	5.997	5.862	597	245	11.994	842	32,00	5	1,60	30,40	1.900	1	2.535	9			38.005
Municipalities	RO08	High	Expansion of Waste Water Treatment Plant from Mangalia city				13 Muntenia	50 Lower Danube-Siret&Prut							5,40	50	2,70	2,70							
Municipalities	RO09	High	WWTP of Braila Nord city	0,880			13 Muntenia	50 Lower Danube-Siret&Prut	4.526	3.750	822	0	9.052	822	21,90	30	6,57	15,33	7.993	5	1.694	7			26.642
Municipalities	RO10	High	WWTP of Galati city	1,210			13 Muntenia	50 Lower Danube-Siret&Prut	6.028	5.540	812	275	12.056	1.087	29,50	30	8,85	20,65	8.142	6	1.713	8			27.139
Municipalities	RO11	High	WWTP of Zalau city	0,550			9 Tisa	10 Somes	476	846	112	34	952	145	7,00	50	3,50	3,50	24.105	7	3.676	10			48.209
Municipalities	RO12	High	Development of waste water treatment plant of Resita city	0,520			10 Banat	17 Middle Mures	1.502	1.729	241	527	3.004	768	3,50	90	3,15	0,35	4.102	4	117	3			4.557
Municipalities	RO13	High	Development of wastewater treatment plant of Campulung Muscel City	0,270			13 Muntenia	42 Arges at Bucuresti	237	282	37	18	473	55	1,50	90	1,35	0,15	24.545	9	317	5			27.273
Municipalities	RO14	High	Development of wastewater treatment plant of Deva city	0,710			9 Tisa	17 Middle Mures	816	1.156	63	31	1.633	95	5,60	90	5,04	0,56	53.277	10	343	6			59.197
Municipalities	RO51	High	Expansion of WWTP of Timisoara city	3,150			9 Tisa	22 Middle Banat-Bega&Birzava	3.284	2.561	444	101	6.568	545	1,50	90	1,35	0,15	2.477	2	23	1			2.752
Municipalities	RO52	High	WWTP of Iasi city	1,700			14 Prut-Siret	47 Middle Prut	1.390	772	165	354	2.780	519	1,90	90	1,71	0,19	3.295	3	68	2			3.661
Municipalities	RO53	High	WWTP of the city of Bucharest	6,000			13 Muntenia	42 Arges at Bucuresti	42.730	56.566	7.509	1.744	85.460	9.253	250,00	90	225,00	25,00	24.316	8	293	4			27.018
Municipalities	RO15	NST	Guidelines of designing and operation of urban landfill												0,13			0,13							
Subtotal									**66.986**	**79.064**	**10.802**	**3.329**	**133.972**	**14.131**	**359,93**		**260,82**	**99,11**							
Industry	RO36	High	Modernisation of installations from SC LETEA SA.- Bacau				14 Prut-Siret	45 Middle Siret-Bistrita&Trotus		1.699	551	155	1.699	706	1,50	50	0,75	0,75	1.062	1	441	3			2.125
Industry	RO37	High	Wastewater treatment plant at SC CELOHART DONARIS - Braila				13 Muntenia	50 Lower Danube-Siret&Prut	621				1.242		2,70	30	0,81	1,89			1.522	5			
Industry	RO38	High	Wastewater treatment plant of SC COLOROM CODLEA SA				13 Muntenia		113				226		25,30	30	7,59	17,71			78.363	10			
Industry	RO39	High	WWTP expansion at SC ANTIBIOTICE SA - Iasi				14 Prut-Siret	47 Middle Prut	343	547	8	3	686	11	1,80	50	0,90	0,90	82.569	5	1.312	4			165.138
Industry	RO40	High	Works for pollution reduction at UPS GOVORA S.A				13 Muntenia	50 Lower Danube-Siret&Prut							13,60	20	2,72	10,88							
Industry	RO41	High	Modernising the secondary treatment of WWTP – S.C. SIDERCA - CALARASI				13 Muntenia	42 Arges at Bucuresti		18			18		2,50	50	1,25	1,25			69.444	8			
Industry	RO42	High	Modernising WWTP for oil products and slug recovery at PETROBRAZI – PLOIESTI				13 Muntenia	43 Lalomita near Ploiesti							2,80	50	1,40	1,40							
Industry	RO43	High	WWTP at ARPECHIM S.A PITESTI				13 Muntenia	42 Arges at Bucuresti	50				100		13,90	50	6,95	6,95			69.500	9			
Industry	RO44	High	Ecologising the wet process in the platform TÎRGU MURES MANPEL S.A				9 Tisa	16 Upper Mures							1,10	50	0,55	0,55							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Romania

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	RO45	High	Removal of chromium, zinc and phenols from the wastewater – SINTEZA Oradea				9 Tisa	15 Körös							0,33	50	0,17	0,17							
Industry	RO46	High	Modernising WWTP CLUJANA S.A – Cluj-Napoca				9 Tisa	10 Somes							3,00	50	1,50	1,50							
Industry	RO47	High	WWTP system at VIDRA S.A.-ORASTIE				9 Tisa	17 Middle Mures							1,20	30	0,36	0,84							
Industry	RO50	High	Pollution with petroleum products abatement in PLOIESTI Zone (pilot project)				13 Muntenia	43 Lalomita near Ploiesti							3,00	5	0,15	2,85							
Industry	RO54	High	Modernization of wastewater treatment at SC SOMES SA DEJ				9 Tisa	10 Somes	993	3.522	91		3.522	91	0,60	50	0,30	0,30	3.297	3	85	1			6.593
Industry	RO55	High	Completion and modernisation of WWTP at Phoenix Baia Mare				9 Tisa	10 Somes		83			83		1,25	30	0,38	0,88			10.542	7			
Industry	RO56	High	Expansion of discharging facilities and final disposal of waste at SC UPSOM SA OCNA Mures				9 Tisa	16 Upper Mures							0,12	20	0,02	0,10							
Industry	RO57	High	Modernisation of WWTP at SC INDAGRA SA Arad				9 Tisa	18 Lower Mures-Szeged	1.112	2.448	280		2.448	280	1,00	50	0,50	0,50	1.786	2	204	2			3.571
Industry	RO58	High	Modernisation of water treatment installation at SC OLTCHIM SA				13 Muntenia	50 Lower Danube-Siret&Prut							0,66	20	0,13	0,53							
Industry	RO59	High	Modernisation and completion of the WWTP at FIBREX Savinesti				14 Prut-Siret	45 Middle Siret-Bistrita&Trotus							1,16	50	0,58	0,58							
Industry	RO60	High	Modernizing of the industrial WWT at SIDEX Galati				14 Prut-Siret	50 Lower Danube-Siret&Prut	1.774	2.535	755	11	3.548	765	73,20	50	36,60	36,60	47.831	4	10.316	6			95.661
Industry	RO34	Medium	Ecological reconstruction of polluted zone around SC ROMFOSFOCHIM SA Valea Calugareasca				13 Muntenia	43 Lalomita near Ploiesti							2,80	20	0,56	2,24							
Industry	RO35	NST	Self monitoring of big industries												1,12			1,12							
Industry	RO48	NST	Action Program for environment protection in petroleum industry												100,00			100,00							
Industry	RO49	NST	Harmonisation of national legislation with six EU regulations regarding risks and industrial pollution control												0,03			0,03							
Subtotal									**5.006**	**10.852**	**1.685**	**168**	**13.572**	**1.853**	**254,67**		**64,17**	**190,50**							

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	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Agriculture	RO19	High	Agricultural turning to good account of zootechnical waste at ROMSUIN TEST PERIS				13 Muntenia	43 Lalomita near Ploiesti	336	456	245		672	245	1,30	30	0,39	0,91	1.588	4	1.351	4			5.294
Agriculture	RO20	High	Capacity increase of WWTP of COMTM TOMESTI				14 Prut-Siret	47 Middle Prut	35	73	27		73	27	10,00	90	9,00	1,00	338.346	5	13.699	5			375.940
Agriculture	RO62	High	Expansion of WWTP at SC ULMENI				13 Muntenia	42 Arges at Bucuresti	221	488	330	1	488	331	0,98	50	0,49	0,49	1.481	3	1.004	3			2.962
Agriculture	RO63	High	WWTP at SC SUINPROD Independanta jud. Galati				14 Prut-Siret	50 Lower Danube-Siret&Prut	350	409	226		700	226	0,80	30	0,24	0,56	1.062	2	800	2			3.540
Agriculture	RO32	Medium	Dams rehabilitation alongside Danube River from the „Iron Gates“ – km 875 to Isaccea – km 103				10 Banat-Eastern Serbia	33 Danube at Iron Gate							2,85	5	0,14	2,71							
Agriculture	RO33	Medium	Consolidation and rehabilitation of sliding lands in Zalau city				9 Tisa	10 Somes							3,20	5	0,16	3,04							
Agriculture	RO61	Medium	WWTP at CONSUIN BEREGSAU Timis				9 Tisa	22 Middle Banat-Bega&Birzava	1.909	2.586	573		3.818	573	0,60	30	0,18	0,42	314	1	110	1			1.047
Agriculture	RO16	NST	Technologies of reclamation of agricultural soils affected by oil and salty water pollution												0,75			0,75							
Agriculture	RO17	NST	Ecological reconstruction of agricultural soils - Baia Mare				9 Tisa								1,00			1,00							
Agriculture	RO18	NST	Afforestation in the Copsa Mica area				13 Muntenia								3,14			3,14							
Agriculture	RO21	NST	Recycling and management of available waste from breeding farms												2,46			2,46							
Agriculture	RO22	NST	Ecological reconstruction of poor agriculture land												2,74			2,74							
Agriculture	RO23	NST	Monitoring system development of chemical soil pollution in agricultural area												0,68			0,68							
Agriculture	RO24	NST	Biodiversity recovery of agricultural ecosystems affected by dought												2,93			2,93							
Agriculture	RO25	NST	Ecological reconstruction at Zlatna				9 Tisa								2,45			2,45							
Agriculture	RO27	NST	Development of existing forests monitoring ecosystems												0,32			0,32							
Agriculture	RO28	NST	Fight against soil erosion in Tazlau river basin												3,43			3,43							
Subtotal									**2.851**	**4.012**	**1.401**	**1**	**5.751**	**1.402**	**39,62**		**10,60**	**29,01**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
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	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m³/s)	(m³/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Wetlands	RO64	High	Balta Potelu				13 Muntenia				1.024	102		1.126	12,29		2,05	10,24	1.818	2					10.915
Wetlands	RO65	High	Area of Bulgarian Danube Island				13 Muntenia				750	75		825	9,00		1,50	7,50	1.818	1					10.909
Wetlands	RO66	High	Balta Greaca / Tutrakan				13 Muntenia	42 Arges at Bucuresti			2.700	270		2.970	32,40		5,40	27,00	1.818	1					10.909
Wetlands	RO67	High	Kalarasch				13 Muntenia				750	75		825	9,00		1,50	7,50	1.818	1					10.909
Wetlands	RO68	High	Lower Prut				14 Prut-Siret	48 Lower Prut			930	93		1.023	11,16		1,86	9,30	1.818	1					10.909
Wetlands	RO69	High	Polder Pardina				15 Delta-Liman	51 Ukrainian Delta&Liman Lakes			2.250	225		2.475	27,00		4,50	22,50	1.818	1					10.909
Subtotal									**0**	**0**	**8.404**	**840**	**0**	**9.244**	**100,85**		**16,81**	**84,04**							
Other Measures	RO01	NST	Harmonisation of EU regulations of emissions in water with national standards												0,25			0,25							
Other Measures	RO02	NST	Support for reference laboratories												0,93			0,93							
Other Measures	RO04	NST	Water quality territorial laboratories development												0,35			0,35							
Other Measures	RO05	NST	Quality objectives in the activity of water quality protection												0,28			0,28							
Other Measures	RO06	NST	Control and fight against accidental pollution												0,10			0,10							
Other Measures	RO07	NST	Introduction of new instruments for water quality protection												0,26			0,26							
Other Measures	RO26	NST	Protected area monitoring												0,68			0,68							
Other Measures	RO29	NST	Rapid data collection by satellites applied on dangerous hydro-meteo phenomena												0,13			0,13							
Other Measures	RO30	NST	Development of hydrological data base using GIS												0,29			0,29							
Other Measures	RO31	NST	Development of rapid dissemination of information about flood propagation												0,21			0,21							
Subtotal									**0**	**0**	**0**	**0**	**0**	**0**	**3,49**		**0,00**	**3,49**							
Total Country									**74.843**	**93.928**	**22.291**	**4.338**	**153.295**	**26.629**	**758,54**		**352,40**	**406,15**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Moldova

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	MD12	High	Installation of Nutrient Removal Facilities at the Waste Water Treatment Plant Ungheni	0,130			14 Prut-Siret	47 Middle Prut	800	1.600	464		1.600	464		90									
Municipalities	MD14	High	Installation of second and advanced stages of treatment at the WWTP in Cantemir	0,030			14 Prut-Siret	48 Lower Prut	53		14		105	14		90									
Municipalities	MD13	Medium	WWTP Comrat & Taraclia				14 Prut-Siret	49 Yalpugh	2		2		4	2		5									
Municipalities	MD08	Low	Water and sewage Completion Programme				14 Prut-Siret	48 Lower Prut							54,00	5	2,70	51,30							
Municipalities	MD24	Low	Pilot project on sewerage systems in rural area				14 Prut-Siret	48 Lower Prut								5									
Subtotal									**855**	**1.600**	**479**	**0**	**1.709**	**479**	**54,00**		**2,70**	**51,30**							
Industry	MD03	High	Giurgiulesti Oil Terminal				14 Prut-Siret	48 Lower Prut							38,00	20	7,60	30,40							
Industry	MD15	High	Vulcanesti pesticide dump site				14 Prut-Siret	48 Lower Prut								20									
Industry	MD16	High	Utilization of toxic industrial waste				14 Prut-Siret	48 Lower Prut								20									
Industry	MD17	High	Rehabilitation of waste water facilities in industrial enterprises				14 Prut-Siret	48 Lower Prut								20									
Industry	MD18	High	Modernization of waste water treatment facilities and improving waste management at wineries				14 Prut-Siret	48 Lower Prut								20									
Subtotal									**0**	**0**	**0**	**0**	**0**	**0**	**38,00**		**7,60**	**30,40**							
Agriculture	MD04	High	Water Resources Development Project				14 Prut-Siret	48 Lower Prut							12,00	5	0,60	11,40							
Agriculture	MD20	High	Animal waste management				14 Prut-Siret	48 Lower Prut								5									
Agriculture	MD19	Medium	Edinet pig farm				14 Prut-Siret	48 Lower Prut								20									
Agriculture	MD01	NST	First Agriculture Project				14 Prut-Siret	48 Lower Prut							18,49			18,49							
Agriculture	MD06	NST	Rural Finance Project				14 Prut-Siret								15,00			15,00							
Agriculture	MD21	NST	Optimization of land (anti-erosion point of view)				14 Prut-Siret																		
Subtotal									**0**	**0**	**0**	**0**	**0**	**0**	**45,49**		**0,60**	**44,89**							
Wetlands	MD23	High	Lower Prut				14 Prut-Siret	48 Lower Prut			1.395	140		1.535	16,74		2,79	13,95	1.818						10.906
Wetlands	MD25	High	Liman Lakes				15 Delta-Liman	51 Ukrainian Delta&Liman Lakes			585	59		644	7,02		1,17	5,85	1.818						10.901
Subtotal									**0**	**0**	**1.980**	**199**	**0**	**2.179**	**23,76**		**3,96**	**19,80**							
Total Country									**855**	**1.600**	**2.459**	**199**	**1.709**	**2.658**	**161,25**		**14,86**	**146,39**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per country according to the project data base

Country: Ukraine

Sector	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Sub-river Basin	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	UA05	High	Extension and reconstruction of Waste Water Treatment Facilities of Uzhgorod (3 turn)	0,920			9 Tisa	12 Uzh	646	807	107		1.292	107	25,00	30	7,50	17,50	70.093	5	13.545	3			233.645
Municipalities	UA13	High	Extension and reconstruction of the Kolomiya Waste Water Treatment Facilities up to 45,000 m3 capacity				14 Prut-Siret	46 Upper Prut	149	223	71	22	298	93	8,80	50	4,40	4,40	47.312	4	14.765	4			94.624
Municipalities	UA14	High	Additional engineering networks and facilities for the processing for the Kolomiya WWTP	0,220			14 Prut-Siret	46 Upper Prut								5									
Municipalities	UA16	High	Processing and raise of environmental safety of mud formations in “Vodokanal” enterprise (Chernivtsi)				14 Prut-Siret	46 Upper Prut	95		29	4	190	33	1,00	20	0,20	0,80	6.135	2	4.211	2			30.675
Municipalities	UA17	High	Sanation, design and demonstration reconstruction of water supply and canalization facil. in Chernivtsi area of old building up aimed at improv. of water supply and reduction of soil displacement risk				14 Prut-Siret	46 Upper Prut							0,35	20	0,07	0,28							
Municipalities	UA18	High	Construction of the polygon for storage of solid waste in Chernivtsi (2nd stage).				14 Prut-Siret	46 Upper Prut							1,65	20	0,33	1,32							
Municipalities	UA19	High	Expansion and reconstruction of Chernivtsi canalization system including increase of its daily capacity up to 200.000 m3	1,060			14 Prut-Siret	46 Upper Prut	467	966	53	16	966	69	1,60	20	0,32	1,28	4.638	1	1.325	1			23.188
Municipalities	UA11	Medium	Extension of the Waste Water Treament Faciclities in the Izmail Paper Factory (city WWTP)				15 Delta-Liman	51 Ukrainian Delta & Liman Lakes	41	109	133	24	109	157	3,60	50	1,80	1,80	11.465	3	16.514	5			22.930
Municipalities	UA25	Medium	WWTP Mukachevo				9 Tisa	12 Uzh	43		25	13	86	38		5									
Municipalities	UA07	Low	Priority measures on protection against flooding and improvement of sanitary and epidemic situation in Vilkovo				15 Delta-Liman	51 Ukrainian Delta & Liman Lakes							8,50	5	0,43	8,08							
Municipalities	UA08	Low	Kiliya protection against flooding (emergency measures)				15 Delta-Liman	51 Ukrainian Delta & Liman Lakes							1,90	5	0,10	1,81							
Municipalities	UA09	Low	Creation of the Waste Water Treatment Facilities in Reni, Reni Seaport				15 Delta-Liman	51 Ukrainian Delta & Liman Lakes							2,80	5	0,14	2,66							
Municipalities	UA10	Low	Construction of Vilkovo Waste Water Treatment Facilities				15 Delta-Liman	51 Ukrainian Delta & Liman Lakes							6,50	5	0,33	6,18							
Municipalities	UA12	Low	Vilkovo city-chanels erec reconstruction				15 Delta-Liman	51 Ukrainian Delta & Liman Lakes							2,40	5	0,12	2,28							
Municipalities	UA20	NST	Pilot implementation of the EU Directive on the municipal waste water treatment including the development of the tasks for the economic burden estimation																						
Subtotal									**1.441**	**2.105**	**418**	**79**	**2.941**	**497**	**64,10**		**15,73**	**48,38**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
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	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	UA04	Medium	Complex utilization of timber with introduction of environmentally friendly technologies in Velykobychkiv Wood Chemistry Enterprise				9 Tisa	9 Upper Tisa	23			8	46	8	5,00	5	0,25	4,75	33.333	2	103.261	1			666.667
Industry	UA03	Low	Complex utilization of timber with introduction of environmentally friendly technologies in Teresva Woodprocessing Enterprise.				9 Tisa	9 Upper Tisa	23			30	46	30	5,00	5	0,25	4,75	8.333	1	103.261	1			166.667
Industry	UA15	Low	Implementation of the extended project of sewer erection designated for Luzhany industrial area waste water discharge and implem. of w. water purification technology at Luzhany Pilot Distillery Plant				14 Prut-Siret	46 Upper Prut							1,35	20	0,27	1,08							
Industry	UA26	Low	Rakhiv Cardboard Factory, Reconstruction of existing and construction of new WWT facilities and accumulations pounds, improvement of technological processes				9 Tisa	9 Upper Tisa	39				78			20									
Subtotal									**85**	**0**	**0**	**38**	**170**	**38**	**11,35**		**0,77**	**10,58**							
Agriculture	UA23	High	Reconstruction of irrigation systems taking into account their impact on the environment				15 Delta-Liman	51 Ukrainian Delta & Liman Lakes								5									
Agriculture	UA24	High	Rehabilitation of deteriorated pastureland				15 Delta-Liman	51 Ukrainian Delta & Liman Lakes								20									
Agriculture	UA02	Low	Construction of embankment on Tysa River in Tyachiv				9 Tisa	9 Upper Tisa							0,87	20	0,17	0,70							
Agriculture	UA27	Low	Animal farms in Kylia region - Put Lenina and Pgranichnik				15 Delta-Liman	51 Ukrainian Delta & Liman Lakes								20									
Agriculture	UA21	NST	Establish a network of training consulting centers for land users																						
Agriculture	UA22	NST	Development of a methodology and legislative basis for restructuring cattle breeding farms																						
Agriculture	UA28	NST	Reduction of nutrients load from diffuse sources in Ukraine																						
Agriculture	UA29	NST	Training center for the sustainable land use (ecological farming)																						
Agriculture	UA30	NST	Introduction of practices for water re-use and waste recycling in technological processes as pilot projects																						
Subtotal									**0**	**0**	**0**	**0**	**0**	**0**	**0,87**		**0,17**	**0,70**							

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	ID-No	Priority	Title						BOD	COD	N	P	LROM	NLR											
				(m^3/s)	(m^3/s)				t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Wetlands	UA32	High	Liman Lakes				15 Delta-Liman	51 Ukrainian Delta & Liman Lakes			1.365	137		1.502	16,38		2,73	13,65	1.818						10.905
Wetlands	UA33	High	Ukrainian part of Danube Delta				15 Delta-Liman	51 Ukrainian Delta & Liman Lakes			1.000	100		1.100	12,00		2,00	10,00	1.818						10.909
Subtotal									**0**	**0**	**2.365**	**237**	**0**	**2.602**	**28,38**		**4,73**	**23,65**							
Other Measures	UA01	Low	Automatically controlled information measuring system for flood forecasting and Tysa River water resources management - 1st stage (ACIM - Tysa).				9 Tisa	9 Upper Tisa							1,45			10,00							
Other Measures	UA06	Low	Automatically controlled information measuring system for flood forecasting and Tysa River water resources management - 2nd stage (ACIM - Tysa).				9 Tisa	9 Upper Tisa							0,90			10,00							
Other Measures	UA31	NST	NGO information and cooperation center in the DRV																						
Subtotal									**0**	**0**	**0**	**0**	**0**	**0**	**2,35**		**0,00**	**20,00**							
Total Country									**1.526**	**2.105**	**2.783**	**353**	**3.111**	**3.136**	**107,05**		**21,40**	**103,30**							

Annex 6.

Summary Tables of pollution reduction and investment per country

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Summary of pollution reduction and investments per country

Sector	Country	Expected Load Reduction						Total Investment Costs	Incremental Costs	Baseline Costs
		BOD	COD	N	P	LROM	NLR			
		t/y						(mil USD)	(mil USD)	(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipality	Germany	75	1,293	5,255	74	1,273	5,329	233.46	176.37	57.09
Industry	Austria	11,240	16,528	4,675	421	24,028	5,096	700.15	544.59	155.56
Agriculture	Czech Republic	638	3,364	1,661	187	3,389	1,848	210.82	128.38	82.44
Wetlands	Slovakia	2,355	4,516	1,905	323	7,188	2,228	188.15	66.99	121.16
Other Measures	Hungary	59,080	120,200	5,690	832	120,200	6,522	460.30	87.36	372.94
	Slovenia	51,170	116,270	7,715	1,718	116,270	9,433	341.92	104.86	237.06
	Croatia	25,273	41,697	6,658	752	60,491	7,410	914.64	229.10	685.54
	Bosnia-Herzegovina	78,820	37,020	7,873	1,276	180,260	9,149	364.55	53.22	311.33
	Yugoslavia	91,283	127,624	7,083	8,052	206,534	15,135	905.47	196.12	709.34
	Bulgaria	34,495	74,772	5,223	1,846	75,606	7,069	317.99	109.37	208.62
	Romania	74,843	93,928	22,291	4,338	153,295	26,629	758.54	352.40	406.15
	Moldova	855	1,600	2,459	199	1,709	2,658	161.25	14.86	146.39
	Ukraine	1,526	2,105	2,783	353	3,111	3,136	107.05	21.40	103.30
Total Danube River Basin Countries		**431,653**	**640,917**	**81,272**	**20,371**	**953,354**	**101,642**	**5,664.28**	**2,085.03**	**3,596.90**

note: Structural and nonstructural projects have been included in this list

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Summary of pollution reduction and investments per sector and country

Sector	Country	Expected Load Reduction						Total Investment Costs	Incremental Costs	Baseline Costs
		BOD	COD	N	P	LROM	NLR			
		t/y						(mil USD)	(mil USD)	(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipality	Germany	75	513	4,409	13	513	4,422	100.57	90.52	10.06
	Austria	5,740	12,028	4,040	404	13,028	4,444	576.06	518.45	57.61
	Czech Republic	516	2,850	942	115	2,850	1,057	105.63	93.07	12.56
	Slovakia	498	2,866	1,792	312	3,384	2,104	104.02	44.60	59.42
	Hungary	58,400	116,800	1,107	410	116,800	1,517	90.03	52.73	37.30
	Slovenia	29,010	65,920	4,372	972	65,920	5,344	280.42	93.09	187.34
	Croatia	19,026	41,488	1,764	259	47,882	2,023	729.20	198.90	530.29
	Bosnia-Herzegovina	46,565	0	3,168	474	93,130	3,642	222.05	13.35	208.70
	Yugoslavia	80,679	95,500	2,598	3,388	164,742	5,986	680.88	160.60	520.28
	Bulgaria	28,639	62,682	2,879	1,594	63,411	4,473	198.73	59.62	139.11
	Romania	66,986	79,064	10,802	3,329	133,972	14,131	359.93	260.82	99.11
	Moldova	855	1,600	479	0	1,709	479	54.00	2.70	51.30
	Ukraine	1,441	2,105	418	79	2,941	497	64.10	15.73	48.38
	Subtotal	**338,430**	**483,416**	**38,770**	**11,348**	**710,282**	**50,118**	**3,565.62**	**1,604.17**	**1,961.45**
Industry	Germany	0	780	635	40	760	675	6.29	1.26	5.03
	Austria	5,500	4,500	470	0	11,000	470	81.19	16.24	64.95
	Czech Republic	109	497	40	4	513	44	3.41	1.83	1.59
	Slovakia	1,857	1,650	0	0	3,804	0	74.55	21.26	53.30
	Hungary	680	3,400	420	6	3,400	426	57.52	13.26	44.26
	Slovenia	16,720	38,020	2,521	561	38,020	3,082	54.50	10.38	44.13
	Croatia	1,147	209	0	0	2,409	0	5.52	1.57	3.95
	Bosnia-Herzegovina	15,120	37,020	0	0	52,860	0	47.60	15.40	32.20
	Yugoslavia	5,770	32,124	682	4,118	32,124	4,800	78.44	4.42	74.01
	Bulgaria	5,856	12,090	480	65	12,195	545	96.89	46.03	50.87
	Romania	5,006	10,852	1,685	168	13,572	1,853	254.67	64.17	190.50
	Moldova	0	0	0	0	0	0	38.00	7.60	30.40
	Ukraine	85	0	0	38	170	38	11.35	0.77	10.58
	Subtotal	**57,850**	**141,142**	**6,933**	**5,000**	**170,827**	**11,933**	**809.92**	**204.17**	**605.75**
Agriculture	Germany	0	0	0	0	0	0	0.00	0.00	0.00
	Austria	0	0	0	0	0	0	0.00	0.00	0.00
	Czech Republic	13	17	159	16	26	175	31.20	2.30	28.90
	Slovakia	0	0	0	0	0	0	0.00	0.00	0.00
	Hungary	0	0	0	0	0	0	0.00	0.00	0.00
	Slovenia	5,440	12,330	822	185	12,330	1,007	7.00	1.40	5.60
	Croatia	5,100	0	7	4	10,200	11	0.10	0.00	0.10
	Bosnia-Herzegovina	17,135	0	2,705	602	34,270	3,307	14.90	4.47	10.43
	Yugoslavia	4,834	0	603	226	9,668	829	19.83	3.60	16.23
	Bulgaria	0	0	0	0	0	0	0.00	0.00	0.00
	Romania	2,851	4,012	1,401	1	5,751	1,402	39.62	10.60	29.01
	Moldova	0	0	0	0	0	0	45.49	0.60	44.89
	Ukraine	0	0	0	0	0	0	0.87	0.17	0.70
	Subtotal	**35,373**	**16,359**	**5,697**	**1,034**	**72,245**	**6,731**	**159.00**	**23.14**	**135.86**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Summary of pollution reduction and investments per sector and country

Sector	Country	Expected Load Reduction						Total Investment Costs	Incremental Costs	Baseline Costs
		BOD	COD	N	P	LROM	NLR			
		t/y						(mil USD)	(mil USD)	(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Wetlands	Germany	0	0	211	21	0	232	126.60	84.60	42.00
	Austria	0	0	165	17	0	182	42.90	9.90	33.00
	Czech Republic	0	0	520	52	0	572	70.58	31.19	39.39
	Slovakia	0	0	113	11	0	124	9.00	1.13	7.88
	Hungary	0	0	4,163	416	0	4,579	312.75	21.38	291.38
	Slovenia	0	0	0	0	0	0	0	0	0
	Croatia	0	0	4,887	489	0	5,376	175.23	28.62	146.61
	Bosnia-Herzegovina	0	0	2,000	200	0	2,200	80.00	20.00	60.00
	Yugoslavia	0	0	3,200	320	0	3,520	123.71	27.50	96.21
	Bulgaria	0	0	1,864	187	0	2,051	22.37	3.73	18.64
	Romania	0	0	8,404	840	0	9,244	100.85	16.81	84.04
	Moldova	0	0	1,980	199	0	2,179	23.76	3.96	19.80
	Ukraine	0	0	2,365	237	0	2,602	28.38	4.73	23.65
	Subtotal	**0**	**0**	**29,872**	**2,989**	**0**	**32,861**	**1,116.14**	**253.54**	**862.59**
Other	Germany	0	0	0	0	0	0	0.00	0.00	0.00
Measures	Austria	0	0	0	0	0	0	0.00	0.00	0.00
	Czech Republic	0	0	0	0	0	0	0.00	0.00	0.00
	Slovakia	0	0	0	0	0	0	0.57	0.00	0.57
	Hungary	0	0	0	0	0	0	0.00	0.00	0.00
	Slovenia	0	0	0	0	0	0	0.00	0.00	0.00
	Croatia	0	0	0	0	0	0	4.58	0.00	4.58
	Bosnia-Herzegovina	0	0	0	0	0	0	0	0	0
	Yugoslavia	0	0	0	0	0	0	2.62	0.00	2.62
	Bulgaria	0	0	0	0	0	0	0	0	0
	Romania	0	0	0	0	0	0	3.49	0.00	3.49
	Moldova	0	0	0	0	0	0	0	0	0
	Ukraine	0	0	0	0	0	0	2.35	0.00	20.00
	Subtotal	**0**	**0**	**0**	**0**	**0**	**0**	**13.60**	**0.00**	**31.25**
Total Danube River Basin Countries		**431,653**	**640,917**	**81,272**	**20,371**	**953,354**	**101,642**	**5,664.28**	**2,085.03**	**3,596.90**

note: Structural and nonstructural projects have been included in this list

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Summary of pollution reduction and investments per country and sector

Country	Sector	Expected Load Reduction						Total Investment Costs	Incremental Costs	Baseline Costs
		BOD	COD	N	P	LROM	NLR			
		t/y						(mil USD)	(mil USD)	(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Germany	Municipality	75	513	4,409	13	513	4,422	100.57	90.52	10.06
	Industry	0	780	635	40	760	675	6.29	1.26	5.03
	Agriculture	0	0	0	0	0	0	0.00	0.00	0.00
	Wetlands	0	0	211	21	0	232	126.60	84.60	42.00
	Other Measures	0	0	0	0	0	0	0.00	0.00	0.00
Austria	Municipality	5,740	12,028	4,040	404	13,028	4,444	576.06	518.45	57.61
	Industry	5,500	4,500	470	0	11,000	470	81.19	16.24	64.95
	Agriculture	0	0	0	0	0	0	0.00	0.00	0.00
	Wetlands	0	0	165	17	0	182	42.90	9.90	33.00
	Other Measures	0	0	0	0	0	0	0.00	0.00	0.00
Czech Republic	Municipality	516	2,850	942	115	2,850	1,057	105.63	93.07	12.56
	Industry	109	497	40	4	513	44	3.41	1.83	1.59
	Agriculture	13	17	159	16	26	175	31.20	2.30	28.90
	Wetlands	0	0	520	52	0	572	70.58	31.19	39.39
	Other Measures	0	0	0	0	0	0	0.00	0.00	0.00
Slovakia	Municipality	498	2,866	1,792	312	3,384	2,104	104.02	44.60	59.42
	Industry	1,857	1,650	0	0	3,804	0	74.55	21.26	53.30
	Agriculture	0	0	0	0	0	0	0.00	0.00	0.00
	Wetlands	0	0	113	11	0	124	9.00	1.13	7.88
	Other Measures	0	0	0	0	0	0	0.57	0.00	0.57
Hungary	Municipality	58,400	116,800	1,107	410	116,800	1,517	90.03	52.73	37.30
	Industry	680	3,400	420	6	3,400	426	57.52	13.26	44.26
	Agriculture	0	0	0	0	0	0	0.00	0.00	0.00
	Wetlands	0	0	4,163	416	0	4,579	312.75	21.38	291.38
	Other Measures	0	0	0	0	0	0	0.00	0.00	0.00
Slovenia	Municipality	29,010	65,920	4,372	972	65,920	5,344	280.42	93.09	187.34
	Industry	16,720	38,020	2,521	561	38,020	3,082	54.50	10.38	44.13
	Agriculture	5,440	12,330	822	185	12,330	1,007	7.00	1.40	5.60
	Wetlands	0	0	0	0	0	0	0.00	0.00	0.00
	Other Measures	0	0	0	0	0	0	0.00	0.00	0.00
Croatia	Municipality	19,026	41,488	1,764	259	47,882	2,023	729.20	198.90	530.29
	Industry	1,147	209	0	0	2,409	0	5.52	1.57	3.95
	Agriculture	5,100	0	7	4	10,200	11	0.10	0.00	0.10
	Wetlands	0	0	4,887	489	0	5,376	175.23	28.62	146.61
	Other Measures	0	0	0	0	0	0	4.58	0.00	4.58
Bosnia	Municipality	46,565	0	3,168	474	93,130	3,642	222.05	13.35	208.70
	Industry	15,120	37,020	0	0	52,860	0	47.60	15.40	32.20
	Agriculture	17,135	0	2,705	602	34,270	3,307	14.90	4.47	10.43
	Wetlands	0	0	2,000	200	0	2,200	80.00	20.00	60.00
	Other Measures	0	0	0	0	0	0	0.00	0.00	0.00
Yugoslavia	Municipality	80,679	95,500	2,598	3,388	164,742	5,986	680.88	160.60	520.28
	Industry	5,770	32,124	682	4,118	32,124	4,800	78.44	4.42	74.01
	Agriculture	4,834	0	603	226	9,668	829	19.83	3.60	16.23
	Wetlands	0	0	3,200	320	0	3,520	123.71	27.50	96.21
	Other Measures	0	0	0	0	0	0	2.62	0.00	2.62
Bulgaria	Municipality	28,639	62,682	2,879	1,594	63,411	4,473	198.73	59.62	139.11
	Industry	5,856	12,090	480	65	12,195	545	96.89	46.03	50.87
	Agriculture	0	0	0	0	0	0	0.00	0.00	0.00
	Wetlands	0	0	1,864	187	0	2,051	22.37	3.73	18.64
	Other Measures	0	0	0	0	0	0	0.00	0.00	0.00
Romania	Municipality	66,986	79,064	10,802	3,329	133,972	14,131	359.93	260.82	99.11
	Industry	5,006	10,852	1,685	168	13,572	1,853	254.67	64.17	190.50
	Agriculture	2,851	4,012	1,401	1	5,751	1,402	39.62	10.60	29.01
	Wetlands	0	0	8,404	840	0	9,244	100.85	16.81	84.04
	Other Measures	0	0	0	0	0	0	3.49	0.00	3.49
Moldova	Municipality	855	1,600	479	0	1,709	479	54.00	2.70	51.30
	Industry	0	0	0	0	0	0	38.00	7.60	30.40
	Agriculture	0	0	0	0	0	0	45.49	0.60	44.89
	Wetlands	0	0	1,980	199	0	2,179	23.76	3.96	19.80
	Other Measures	0	0	0	0	0	0	0.00	0.00	0.00
Ukraine	Municipality	1,441	2,105	418	79	2,941	497	64.10	15.73	48.38
	Industry	85	0	0	38	170	38	11.35	0.77	10.58
	Agriculture	0	0	0	0	0	0	0.87	0.17	0.70
	Wetlands	0	0	2,365	237	0	2,602	28.38	4.73	23.65
	Other Measures	0	0	0	0	0	0	2.35	0.00	20.00
Total		**431,653**	**640,917**	**81,272**	**20,371**	**953,354**	**101,642**	**5,664.28**	**2,085.03**	**3,596.90**

Note: Structural and nonstructural projects have been included in this list.

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Summary of pollution reduction and investments per sector and country

Sector	Country	Expected Load Reduction						Total Investment Costs	Incremental Costs	Baseline Costs
		BOD	COD	N	P	LROM	NLR			
		t/y						(mil USD)	(mil USD)	(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipality	Germany	75	513	4,409	13	513	4,422	100.57	90.52	10.06
	Austria	5,740	12,028	4,040	404	13,028	4,444	576.06	518.45	57.61
	Czech Republic	516	2,850	942	115	2,850	1,057	105.63	93.07	12.56
	Slovakia	498	2,866	1,792	312	3,384	2,104	104.02	44.60	59.42
	Hungary	58,400	116,800	1,107	410	116,800	1,517	90.03	52.73	37.30
	Slovenia	29,010	65,920	4,372	972	65,920	5,344	280.42	93.09	187.34
	Croatia	19,026	41,488	1,764	259	47,882	2,023	729.20	198.90	530.29
	Bosnia-Herzegovina	46,565	0	3,168	474	93,130	3,642	222.05	13.35	208.70
	Yugoslavia	80,679	95,500	2,598	3,388	164,742	5,986	680.88	160.60	520.28
	Bulgaria	28,639	62,682	2,879	1,594	63,411	4,473	198.73	59.62	139.11
	Romania	66,986	79,064	10,802	3,329	133,972	14,131	359.93	260.82	99.11
	Moldova	855	1,600	479	0	1,709	479	54.00	2.70	51.30
	Ukraine	1,441	2,105	418	79	2,941	497	64.10	15.73	48.38
	Subtotal	**338,430**	**483,416**	**38,770**	**11,348**	**710,282**	**50,118**	**3,565.62**	**1,604.17**	**1,961.45**
Wetlands	Germany	0	0	211	21	0	232	126.60	84.60	42.00
	Austria	0	0	165	17	0	182	42.90	9.90	33.00
	Czech Republic	0	0	520	52	0	572	70.58	31.19	39.39
	Slovakia	0	0	113	11	0	124	9.00	1.13	7.88
	Hungary	0	0	4,163	416	0	4,579	312.75	21.38	291.38
	Slovenia	0	0	0	0	0	0	0	0	0
	Croatia	0	0	4,887	489	0	5,376	175.23	28.62	146.61
	Bosnia-Herzegovina	0	0	2,000	200	0	2,200	80.00	20.00	60.00
	Yugoslavia	0	0	3,200	320	0	3,520	123.71	27.50	96.21
	Bulgaria	0	0	1,864	187	0	2,051	22.37	3.73	18.64
	Romania	0	0	8,404	840	0	9,244	100.85	16.81	84.04
	Moldova	0	0	1,980	199	0	2,179	23.76	3.96	19.80
	Ukraine	0	0	2,365	237	0	2,602	28.38	4.73	23.65
	Subtotal	**0**	**0**	**29,872**	**2,989**	**0**	**32,861**	**1,116.14**	**253.54**	**862.59**
Total Municipality and Wetlands		**338,430**	**483,416**	**68,642**	**14,337**	**710,282**	**82,979**	**4,681.76**	**1,857.72**	**2,824.04**

note: Structural and nonstructural projects have been included in this list

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Summary of pollution reduction and investments per sector and country
revised version
(only projects with complete invormation on investments and pollultion reduction are considered)

Sector	Country	Expected Load Reduction						Total Investment Costs	Incremental Costs	Baseline Costs	IC/COD from Point Sources	IC/(N+P) from Point Sources	IC/(N+P) from Wetlands Restoration
		BOD	COD	N	P	LROM	NLR						
		t/y						(mil.USD)	(mil. USD)	(mil. USD)	(USD/t)		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Municipality	Germany	75	1,293	5,044	53	1,273	5,097	106.86	91.77	15.09	82,643	18,005	
Industry	Austria	11,240	16,528	4,510	404	24,028	4,914	657.25	534.69	122.56	39,766	108,810	
Agriculture	Czech Republic	638	3,364	1,141	135	3,389	1,276	140.24	97.19	16.45	41,691	76,175	
	Slovakia	2,355	4,516	1,792	312	7,188	2,104	115.20	48.44	66.76	25,508	23,027	
	Hungary	59,080	120,200	1,527	416	120,200	1,943	144.62	65.40	79.22	1,203	33,659	
	Slovenia	49,500	112,470	7,463	1,661	112,470	9,124	335.08	102.81	232.27	2,979	11,268	
	Croatia	19,073	41,697	1,764	259	48,091	2,023	486.10	148.40	337.69	11,658	73,359	
	Bosnia-Herzegovina	78,820	37,020	5,873	1,076	180,260	6,949	204.30	22.06	182.24	5,519	3,175	
	Yugoslavia	84,149	114,690	3,364	7,333	188,832	10,697	773.00	167.95	605.05	6,740	15,701	
	Bulgaria	21,579	45,323	1,835	1,023	46,157	2,858	286.44	103.19	183.25	6,320	36,106	
	Romania	74,843	93,928	13,887	3,498	153,295	17,385	491.83	324.44	167.38	5,236	18,662	
	Moldova	0	0	0	0	0	0	0.00	0.00	0.00			
	Ukraine	1,444	2,105	393	103	2,947	496	50.00	14.72	35.28	23,753	29,671	
	Subtotal	**402,796**	**593,134**	**48,593**	**16,273**	**888,130**	**64,866**	**3,790.90**	**1,721.07**	**2,043.23**			
Wetlands	Germany	0	0	211	21	0	232	126.60	84.60	42.00			545,690
	Austria	0	0	165	17	0	182	42.90	9.90	33.00			235,714
	Czech Republic	0	0	520	52	0	572	70.58	31.19	39.39			123,392
	Slovakia	0	0	113	11	0	124	9.03	1.15	7.88			72,823
	Hungary	0	0	4,163	416	0	4,579	312.78	21.40	291.38			68,307
	Slovenia	0	0	0	0	0	0	0	0	0			
	Croatia	0	0	4,887	489	0	5,376	175.23	28.62	146.61			32,595
	Bosnia-Herzegovina	0	0	2,000	200	0	2,200	80.00	20.00	60.00			36,364
	Yugoslavia	0	0	3,200	320	0	3,520	123.50	27.50	96.00			35,085
	Bulgaria	0	0	1,864	187	0	2,051	22.37	3.73	18.64			10,910
	Romania	0	0	8,404	840	0	9,244	100.85	16.81	84.04			10,910
	Moldova	0	0	1,980	199	0	2,179	23.76	3.96	19.80			10,904
	Ukraine	0	0	2,365	237	0	2,602	28.38	4.73	23.65			10,907
	Subtotal	**0**	**0**	**29,872**	**2,989**	**0**	**32,861**	**1,115.98**	**253.59**	**862.39**			
Total Danube River Basin Countries		**399,326**	**573,944**	**77,699**	**15,316**	**864,040**	**93,015**	**4,813.89**	**1,967.31**	**2,819.97**			

Annex 7.

Tables of proposed projects related to the 15 Sub-river Basins

Sub-river Basins Overview Tables

Column	**Explanation**
3	ID-No: Identification Number in the Database
4	Priority of projects given by countries - High, Medium, Low or Nonstructural Project
8	Dilution Factor = Discharge of WWTP / River Low Flow Rate
9	Significant Impact Area: according to the report "Thematic Maps of the Danube River Basin - Social and Economic Characteristics, with particular attention to Hot Spots, Significant Impact Areas and Hydraulic Structures"
14	Load Reduction of Organic Matter Indicator: LROM = highest value of either (2*BOD) or COD
15	Nutrient Load Reduction Indicator: NLR = N+P
17	Incremental Percentage = instead of missing data for Incremental Costs (18)
	a percentage is given by countries (*) or is estimated from Total Investment Costs for Nutrient removal
	Project category: 1. new sewer and new WWTP 5%
	2. extension of sewer and extension of existing WWTP 20%
	3. existing sewer (or extension) and new WWTP 30%
	4. extension of capacity of existing WWTP 50%
	5. extension of WWTP predominantly for nutrient reduction 90%
	For other projects the percentage is estimated landfills (industrial, municipal),
	change in technology in industr 20%
	remedial measures in agricultu 50%
18	Incremental Costs = Incremental Percentage*Total Investment Costs
19	Baseline Costs = Total Investment Costs - Incremental Costs
20	Specific Incremental Costs = Incremental Costs / NLR
22	Specific Baseline costs = Baseline Costs / LROM

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 1 Upper Danube

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Germany	D01	High	Abwasserzweckverband Oberes Laucherttal						2	16		2	16	2,29	90	2,06	0,23	128.531	6	114.250	5			142.813
Municipalities	Germany	D02	High	Mergelstetten - Brenz					40	140	110	5	140	115	9,72	90	8,74	0,97	76.030	5	6.939	2			84.478
Municipalities	Germany	D03	High	Leutkirch - Eschach, Iller					1	9	64		9	64	4,57	90	4,11	0,46	64.266	4	50.778	3			71.406
Municipalities	Germany	D04	High	Zweckverband Obere Iller, Sonthofen					33	326	145	5	326	150	7,43	90	6,69	0,74	44.580	3	2.279	1			49.533
Municipalities	Germany	D05	High	Munchen I - Isar					1	36	2.704	3	36	2.707	28,57	90	25,71	2,86	9.499	1	79.361	4			10.554
Municipalities	Germany	D06	High	Munchen II - Isar							1.150			1.150	20,00	90	18,00	2,00	15.652	2					17.391
Municipalities	Germany	D07	High	Zweckverband Starnberger See - Isar							152			152	22,86	90	20,57	2,29	135.355	7					150.395
	Subtotal								**75**	**513**	**4.341**	**13**	**513**	**4.354**	**95,43**		**85,89**	**9,54**							
Industry	Germany	D09	High	ESSO AG Ingolstadt - Donau						20	390			390	0,57	20	0,11	0,46	293						1.464
	Subtotal								**0**	**20**	**390**	**0**	**0**	**390**	**0,57**	20	**0,11**	**0,46**							
Wetlands	Germany	D11	High	Floodplains next to Ingolstadt							113	11		124	101,25		78,75	22,50	635.081	2					635.081
Wetlands	Germany	D12	High	Mouth of Isar							98	10		108	25,35		5,85	19,50	54.167	1					54.167
	Subtotal								**0**	**0**	**211**	**21**	**0**	**232**	**126,60**		**84,60**	**42,00**							
Total Sub- Basin Area									**75**	**533**	**4.942**	**34**	**513**	**4.976**	**222,60**		**170,60**	**52,00**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 2 Inn

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Germany	D08	High	Zweckverband Chiemsee - Inn							68			68	5,14	90	4,63	0,51	68.069						75.632
	Subtotal								**0**	**0**	**68**	**0**	**0**	**68**	**5,14**		**4,63**	**0,51**							
Industry	Germany	D10	High	WNC - Nitrochemie GmBH Aschau - Inn						760	245	40	760	285	5,71	20	1,14	4,57	4.010	1	6.015	2			20.049
Industry	Austria	A06	High	Biochemie GmbH Kundl							470			470	42,73	20	8,55	34,18	18.183	2					90.915
Industry	Austria	A05	High	PCA Fine Paper Hallein					5.500	4.500			11.000		38,46	20	7,69	30,77			2.797	1			
	Subtotal								**5.500**	**5.260**	**715**	**40**	**11.760**	**755**	**86,90**		**17,38**	**69,52**							
Total Sub-river Basin									**5.500**	**5.260**	**783**	**40**	**11.760**	**823**	**92,05**		**22,01**	**70,04**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 3 Austrian Danube

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Austria	A02	High	Linz - Asten - extension and upgrade of NP removal				3 Szigetköz		1.278	770	64	1.278	834	55,55	90	50,00	5,56	59.946	1	4.347	2			66.607
Municipalities	Austria	A01	High	Wien - HKA - extension and upgrade of NP removal				3 Szigetköz	5.500	10.000	2.000		11.000	2.000	470,09	90	423,08	47,01	211.541	2	4.274	1			235.045
	Subtotal								**5.500**	**11.278**	**2.770**	**64**	**12.278**	**2.834**	**525,64**		**473,08**	**52,56**							
Total Sub-river Basin									**5.500**	**11.278**	**2.770**	**64**	**12.278**	**2.834**	**525,64**		**473,08**	**52,56**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 4 Morava

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Czech Republic	CZ01	High	Extension of Municipal Waste Water Treatment Plant for the City of Brno (in Modrice)	1,430	2,870	0,498	1 Middle Morava	118	705	277	62	705	339	39,70	90	35,73	3,97	105.492	5	5.631	6	11,39	3	117.213
Municipalities	Czech Republic	CZ02	High	Extension and Intensification of Waste Water Treatment Plant in Zlin - Malenovice	0,360	0,220	1,636	1 Middle Morava	137	377	237	23	377	260	10,80	90	9,72	1,08	37.385	3	2.865	3	0,24	7	41.538
Municipalities	Czech Republic	CZ03	High	Reconstruction of the Technology in Waste Water Treatment Plant Uherske Hradiste	0,100	8,010	0,012	1 Middle Morava	4	108	74	12	108	85	5,00	50	2,50	2,50	29.274	1	23.148	7	20,03	1	58.548
Municipalities	Czech Republic	CZ04	High	Intensification and Extension of Waste Water Treatment Plant Hodonin	0,080	8,500	0,009	1 Middle Morava	15	75	60	10	75	70	2,32	90	2,09	0,23	29.829	2	3.093	4	1,97	5	33.143
Municipalities	Czech Republic	CZ09	Medium	M. Breclav - Reconstruction and intensification of WWTP (NP removal)	0,116	14,100	0,008	1 Middle Morava	23	218	35	1	218	36	10,06	90	9,05	1,01	251.500	8	4.615	5	14,18	2	279.444
Municipalities	Czech Republic	CZ10	Medium	Prerov - WWTP reconstruction - biological stage and NP removal	0,203	1,600	0,127	1 Middle Morava	138	1.015	94	1	1.015	95	8,66	90	7,79	0,87	82.215	4	853	1	1,39	6	91.350
Municipalities	Czech Republic	CZ18	Low	WWTP Kromeriz reconstruction - biological stage and N+P removal	0,115	7,450	0,015	1 Middle Morava	81	352	70	2	352	72	9,20	90	8,28	0,92	115.000	6	2.614	2	6,85	4	127.778
Municipalities	Czech Republic	CZ19	Low	WWTP Prostejov reconstruction - biological stage and N+P removal	0,211	0,160	1,319	1 Middle Morava	0	0	75	3	0	78	13,12	90	11,81	1,31	151.385	7					168.205
Municipalities	Czech Republic	CZ20	Low	WWTP Znojmor reconstruction - biological stage and N+P removal	0,156	3,150	0,050	2 Lower Morava	0	0	20	2	0	22	6,77	90	6,09	0,68	276.955	9					307.727
	Subtotal								**516**	**2.850**	**942**	**115**	**2.850**	**1.057**	**105,63**		**93,07**	**12,56**							
Industry	Czech Republic	CZ05	High	Intensification of Waste Water Treatment Plant Kozeluzny Otrokovice	0,170	7,890	0,022	1 Middle Morava	78	442	30	4	442	34	2,41	50	1,21	1,21	35.441	2	2.726	2	9,51	1	70.882
Industry	Czech Republic	CZ11	Medium	Tanex Vladislav - WWTP reconstruction and N removal	0,004	0,800	0,005	2 Lower Morava	3	15	10	0	15	10	0,30	90	0,27	0,03	27.000	1	2.000	1	0,02	2	30.000
Industry	Czech Republic	CZ21	Low	IWWTP Snaha Brtnice reconstruction	0,002	0,050	0,040		28	40	0	0	56	0	0,70	50	0,35	0,35			6.250	3	0,02	3	
	Subtotal								**109**	**497**	**40**	**4**	**513**	**44**	**3,41**		**1,83**	**1,59**							
Agriculture	Czech Republic	CZ07	High	Remedial Measures and Reduction of Slurry Production in the Pig Farm "Gigant Dubnany"	0,005	0,080	0,063	1 Middle Morava	13	17	50	5	26	55	4,60	50	2,30	2,30	41.818		88.462		0,18		83.636
Agriculture	Czech Republic	CZ08	High	Milotice - Remedial measures in Pig Farm	0,006	0,080	0,075	1 Middle Morava			60	7		67		50									
Agriculture	Czech Republic	CZ12	Medium	Remedial measures in Pig Farm Kunovice	0,002	0,230	0,009	1 Middle Morava			19	2		21		50									
Agriculture	Czech Republic	CZ13	Medium	Remedial measures in Pig Farm Velke Nemcice	0,002	3,110	0,001	1 Middle Morava			15	1		16		50									
Agriculture	Czech Republic	CZ22	Low	Remedial measures in Pig Farm Strachotice	0,002	3,180	0,001	1 Middle Morava			15	1		16		50									
	Subtotal								**13**	**17**	**159**	**16**	**26**	**175**	**4,60**		**2,30**	**2,30**							
Wetlands	Austria	A07	High	Drösinger Wald				2 Lower Morava			165	17		182	42,90		9,90	33,00	54.396						235.714
Wetlands	Czech Republic	CZ14	High	Floodplains next to Hodonin				1 Middle Morava			520	52		572	70,58		31,19	39,39	54.528						123.392
Wetlands	Slovakia	SK34	Low	Floodplain Meadow Restoration in the Lower Morava River				2 Lower Morava																	
	Subtotal								**0**	**0**	**685**	**69**	**0**	**754**	**113,48**		**41,09**	**72,39**							
Total Sub-river Basin									**638**	**3.364**	**1.826**	**204**	**3.389**	**2.030**	**227,12**		**138,28**	**88,84**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 5 Váh-Hron

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Slovakia	SK02	High	Nitra - construction and expansion of wastewater treatment plant	0,370	3,500	0,106	4 Danube Bend			370	77		447	15,77	50	7,89	7,89	17.657	2			0,83		35.313
Municipalities	Slovakia	SK03	Medium	Expansion of wastewater treatment plan Banska Bystrica				4 Danube Bend			346	72		417	16,96	50	8,48	8,48	20.311	3					40.623
Municipalities	Slovakia	SK06	Medium	Trencin-sewer system and wastwater treatment plant				4 Danube Bend	268	378	199	50	536	249	7,63	5	0,38	7,25	1.531	1	13.520				30.622
Municipalities	Slovakia	SK08	Low	Topolcany-wastewater treatment plant upgrading				4 Danube Bend							0,98	90	0,88	0,10							
Municipalities	Slovakia	SK10	Low	Liptovsky Mikulas - reconstruction of wastewater treatment plant 2nd stage				4 Danube Bend							2,29	90	2,06	0,23							
	Subtotal								**268**	**378**	**915**	**199**	**536**	**1.113**	**43,62**		**19,68**	**23,94**							
Industry	Slovakia	SK11	High	Management of wastewater in NCHZ Nováky, a.s.	0,270	0,550	0,491	4 Danube Bend							0,34	20	0,07	0,27					0,13		
Industry	Slovakia	SK12	High	Removal of chlorinated hydrocarbons in the production of propylenoxid - Novaky Chemical Plant				4 Danube Bend							0,86	20	0,17	0,69							
Industry	Slovakia	SK14	Medium	Reconstruction of wastewater treatment plant - Povazske Chemical Plant				4 Danube Bend							0,63	90	0,56	0,06							
Industry	Slovakia	SK16	Medium	Reconstruction of caprolactam holding tanks - Povazske chemical plant				4 Danube Bend							1,64	20	0,33	1,31							
Industry	Slovakia	SK17	Medium	Reconstruction of methylmethacrylate holding tanks - Povazske chemical plant				4 Danube Bend							0,75	20	0,15	0,60							
Industry	Slovakia	SK15	Low	Reconstruction of ammonium storehouse Varin				4 Danube Bend							1,82	20	0,36	1,46							
Industry	Slovakia	SK23	Low	Construction of wastewater treatment plant with reconstruction and expansion of sewer network, Bucina Zvolen				4 Danube Bend							2,69	30	0,81	1,88							
Industry	Slovakia	SK24	Low	Wastewater treatment plant reconstruction, Biotika Slovenska Lupca				4 Danube Bend							1,43	50	0,71	0,71							
Industry	Slovakia	SK25	Low	Centralise the collection and treatment of wastewater polluted by chrome, Kozeluzne Bosany				4 Danube Bend							2,31	20	0,46	1,84							
Industry	Slovakia	SK26	Low	Biological wastewater treatment / Wastewater treatment in Harmanecke Papierne, a.s. Harmanec				4 Danube Bend	105	300			300		2,29	30	0,69	1,60			5.332				
Industry	Slovakia	SK29	Low	Final landfill Chalmová - VI. construction				4 Danube Bend							9,58	20	1,92	7,66							
	Subtotal								**105**	**300**	**0**	**0**	**300**	**0**	**24,32**		**6,23**	**18,09**							
Total Sub-river Basin									**373**	**678**	**915**	**199**	**836**	**1.113**	**67,94**		**25,91**	**42,03**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 6 Pannonian Central Danube

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Hungary	H01	High	Expansion of wastewater treatment plant at North Budapest				5 Gemenc-Kopacki Rit	28.000	56.000	308	183	56.000	491	32,25	50	16,13	16,13	32.841	3	288	2			65.682
Municipalities	Hungary	H02	High	Expansion of wastewater treatment plant at South Pest				5 Gemenc-Kopacki Rit	18.700	37.400	203	122	37.400	325	27,89	90	25,10	2,79	77.234	5	75	1			85.815
Municipalities	Hungary	H03	High	Györ town wastewater treatment plan development and extension of the II. Treatment phase and sludge management	0,430			4 Danube Bend	1.100	2.200	273	43	2.200	316	12,67	50	6,34	6,34	20.047	1	2.880	4			40.095
Municipalities	Hungary	H04	High	Construction of the wastewater treatment plant at Dunaujvaros				5 Gemenc-Kopacki Rit	4.620	9.240	53	32	9.240	85	10,64	30	3,19	7,45	37.553	2	806	3			125.176
Municipalities	Yugoslavia	YU03	High	City of Novi sad WWTP	0,990	1.410,0	0,001	8 Danube At Novi Sad	5.657	12.000	148	268	12.000	416	53,00	30	15,90	37,10	38.221	4	3.092	5	0,03		127.404
Municipalities	Croatia	HR74	Low	WWTP Vukovar				5 Gemenc-Kopacki Rit								5									
	Subtotal								**58.077**	**116.840**	**985**	**648**	**116.840**	**1.633**	**136,45**		**66,65**	**69,80**							
Industry	Hungary	H07	High	Water and wastewater development program at the Danube refinery of the MOL Company	0,580			5 Gemenc-Kopacki Rit	300	1.500			1.500		48,74	20	9,75	38,99			25.995	3			
Industry	Hungary	H08	High	General reconstruction of the wastewater treatment system of the Nitrokémia Company				5 Gemenc-Kopacki Rit	380	1.900	420	6	1.900	426	5,85	50	2,93	2,93	6.866		1.539	2			13.732
Industry	Slovakia	SK37	Medium	Istrochem Bratislava				4 Danube Bend								20									
Industry	Slovakia	SK22	Low	The reduction of discharged wastewater pollution to the Danube River, AssiDomän Packaging Sturovo, a.s.				3 Szigetköz	1.650	1.350			3.300		9,08	50	4,54	4,54			1.375	1			
Industry	Yugoslavia	YU09	Low	Eco Filling Station, Novi Sad				8 Danube At Novi Sad							3,12	20	0,62	2,50							
	Subtotal								**2.330**	**4.750**	**420**	**6**	**6.700**	**426**	**66,79**		**17,84**	**48,95**	**6.866**						
Wetlands	Yugoslavia	YU44	High	Area between Gemenc and Kopacki Rit				5 Gemenc-Kopacki Rit			900	90		990	31,50		4,50	27,00	4.545						31.818
	Subtotal								**0**	**0**	**900**	**90**	**0**	**990**	**31,50**		**4,50**	**27,00**							
Total Sub-river Basin									**60.407**	**121.590**	**2.305**	**744**	**123.540**	**3.049**	**234,74**		**88,99**	**145,75**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 7 Drava-Mura

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage		Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR												
					(m³/s)	(m³/s)			t/y						(mil USD)	%		(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		18	19	20	21	22	23	24	25	26
Municipalities	Austria	A03	High	Graz - extension and upgrade of NP removal				7 Lower Mura - Drava	240	750	1.180	340	750	1.520	42,73	90		38,46	4,27	25.301	7	5.697,33	10			28.112
Municipalities	Austria	A04	High	Klagenfurt - upgrade of N removal				6 Middle Drava			90			90	7,69	90		6,92	0,77	76.900	8					85.444
Municipalities	Slovenia	SLO09	High	Wastewater treatment plant municipal Lendava	0,026	0,160	0,163	7 Lower Mura - Drava	460	1.050	69	15	1.050	84	5,00	30	*	1,50	3,50	17.857,14	6	3.333,33	8	0,57	3	59.524
Municipalities	Slovenia	SLO12	High	Construction of the Central Waste Water Treatment Plant Maribor and the Consession for the Treatment of Waste Water in Maribor	0,317	98,000	0,003	7 Lower Mura - Drava	6.270	14.250	945	210	14.250	1.155	57,60	30	*	17,28	40,32	14.961,04	5	2.829,47	7	0,13	5	49.870
Municipalities	Slovenia	SLO14	High	Wastewater treatment plant municipality Murska Sobota	0,078	60,000	0,001	7 Lower Mura - Drava	1.250	2.850	189	42	2.850	231	9,90	30		2,97	6,93	12.857,14	3	2.431,58	4	0,01	6	42.857
Municipalities	Slovenia	SLO15	High	Construction of the second phase of Central Waste Treatment Plant of Šaleška dolina (Šalek valley)	0,087	0,900	0,097	23 Upper Sava	1.050	2.380	158	35	2.380	193	29,14	30	*	8,74	20,40	45.295,34	10	8.570,59	11	1,97	1	150.984
Municipalities	Slovenia	SLO11	Medium	Central Waste Water Treatment Plant Ljutomer	0,035	0,120	0,292	7 Lower Mura - Drava	310	710	49	11	710	60	2,84	30	*	0,85	1,99	14.215,00	4	2.802,96	6	0,58	2	47.383
Municipalities	Slovenia	SLO22	Medium	Ptuj	0,182	98,000	0,002	6 Middle Drava	2.300	5.230	346	77	5.230	423	11,00	30	*	3,30	7,70	7.801,42	3	1.472,28	1	0,01	6	26.005
Municipalities	Croatia	HR25	High	The general solution of the sewerage system of city of Osijek	0,290			5 Gemenc-Kopacki Rit	953	2.671	160	18	2.671	178	5,63	5		0,28	5,35	1.581	1	2.002,43	3			31.629
Municipalities	Croatia	HR28	Medium	The sewerage system and the waste water treatment plant of city of Belišce				5 Gemenc-Kopacki Rit	1.364	2.538	27	1	2.728	28	4,80	5		0,24	4,56	8.571	2	1.671,55	2			171.429
Municipalities	Croatia	HR33	Medium	The sewerage system of town of Cepin				7 Lower Mura - Drava							11,73	5		0,59	11,15							
Municipalities	Croatia	HR34	Medium	The retention basin of the waste water treatment plant of Virovitica				7 Lower Mura - Drava							1,77	50		0,89	0,89							
Municipalities	Croatia	HR38	Medium	The waste water treatment plant of city of Novi Marof				7 Lower Mura - Drava							2,34	30		0,70	1,63							
Municipalities	Croatia	HR40	Medium	The waste water treatment plant of city of Koprivnica				7 Lower Mura - Drava	604	806			1.208		10,84	50		5,42	5,42			4.487	9			
Municipalities	Croatia	HR58	Medium	The building of the dump site “Pustošije” Cakovec				7 Lower Mura - Drava								20										
Municipalities	Croatia	HR59	Medium	The municipal dump site of city of Slatina				7 Lower Mura - Drava							0,21	20		0,04	0,16							
Municipalities	Croatia	HR61	Medium	Regional landfill for Eastern Slavonija				27 Middle Sava-Una&Vrbas							27,00	20		5,40	21,60							
Municipalities	Croatia	HR62	Medium	Centre for pre-processing and storage of dangerous waste for Osijek-Baranja county				5 Gemenc-Kopacki Rit							1,77	20		0,35	1,42							
Municipalities	Croatia	HR64	Medium	Improvement of sanitary Conditions of landfill in Nemetin – Sarvaš				7 Lower Mura - Drava								20										

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 7 Drava-Mura

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m³/s)	(m³/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Croatia	HR24	Low	The waste water treatment plant of city of Našice				5 Gemenc-Kopacki Rit							1,10	30	0,33	0,77							
Municipalities	Croatia	HR26	Low	The waste water treatment of city of Đurdenovac				7 Lower Mura - Drava							2,96	5	0,15	2,81							
Municipalities	Croatia	HR27	Low	The sewerage system of city of Đurdenovac				7 Lower Mura - Drava							4,86	5	0,24	4,62							
Municipalities	Croatia	HR29	Low	The waste water treatment of city of Donji Miholjac				5 Gemenc-Kopacki Rit							19,00	30	5,70	13,30							
Municipalities	Croatia	HR30	Low	The waste water treatment plant of city of Orahovica				7 Lower Mura - Drava							1,10	30	0,33	0,77							
Municipalities	Croatia	HR31	Low	The sewerage system of town of Bizovac				7 Lower Mura - Drava							1,23	5	0,06	1,17							
Municipalities	Croatia	HR32	Low	The waste water treatment plant of town of Bizovac				7 Lower Mura - Drava							4,13	5	0,21	3,92							
Municipalities	Croatia	HR35	Low	The sewerage system and the waste water treatment plant of town of Ilok				7 Lower Mura - Drava							31,13	5	1,56	29,57							
Municipalities	Croatia	HR36	Low	The sewerage system and the waste water treatment plant of city of Slatina				7 Lower Mura - Drava							3,68	30	1,10	2,57							
Municipalities	Croatia	HR37	Low	The waste water treatment plant of city of Cakovec and nearby towns				7 Lower Mura - Drava							7,32	30	2,19	5,12							
Municipalities	Croatia	HR39	Low	The waste water treatment plant of city of Ivanec				7 Lower Mura - Drava							0,95	30	0,29	0,67							
Municipalities	Croatia	HR41	Low	The sewerage system and the waste water treatment plant of city of Prelog				7 Lower Mura - Drava							7,78	30	2,33	5,45							
Municipalities	Croatia	HR60	Low	The rehabilitation of the municipal dump site of city of Orahovica				7 Lower Mura - Drava							0,75	20	0,15	0,60							
Municipalities	Croatia	HR63	Low	Temporary landfill “Loncarica Velika”				7 Lower Mura - Drava							2,70	20	0,54	2,16							
Municipalities	Croatia	HR65	High	The reconstruction of the waste water treatment plant of city of Varazdin	0,260	8,000	0,033	6 Middle Drava	1.162	1.779	132	1	2.324	133	12,00	50	6,00	6,00	45.112,78	9	2.581,76	5	0,20	4	90.226
	Subtotal								**15.963**	**35.014**	**3.345**	**750**	**36.151**	**4.095**	**332,67**		**115,11**	**217,55**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 7 Drava-Mura

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m³/s)	(m³/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	Slovenia	SLO05	High	Wastewater treatment plant of the Paper Factory Sladkogorska (or Paloma)	0,111	59,000	0,002	7 Lower Mura - Drava	1.050	2.380	158	35	2.380	193	3,00	30	0,90	2,10	4.663,2124		882,3529		0,0040		15.544
Industry	Slovenia	SLO20	High	Wastewater Treatment Plant Pomurka Murska Sobota	0,013	60,000	0,0002	7 Lower Mura - Drava	310	710	47	11	710	58	0,00	30 *	0,00	0,00							
Industry	Croatia	HR49	High	The waste water treatment plant of food industry "Kvasac-Podravka" d.d. of Koprivnica				7 Lower Mura - Drava							0,23	50	0,11	0,11							
Industry	Croatia	HR50	High	The waste water treatment plant of industrial area Danica of Koprivnica				7 Lower Mura - Drava							4,00	30	1,20	2,80							
Industry	Croatia	HR68	High	Belisce (paper)	0,060			5 Gemenc-Kopacki Rit	1.100				2.200			5									
Industry	Croatia	HR69	High	IPK Osijek sugar factory	0,040			5 Gemenc-Kopacki Rit								5									
Industry	Slovenia	SLO29	Low	Diary Industry for Maribor				6 Middle Drava	730	1.660	110	25	1.660	135		5									
	Subtotal								**3.190**	**4.750**	**315**	**71**	**6.950**	**386**	**7,23**		**2,21**	**5,01**							
Agriculture	Slovenia	SLO01	High	Construction of the Liquid Manure Treatment Plant Podgrad as a turn-key project	0,003	59,000	0,0001	7 Lower Mura - Drava	840	1.900	126	28	1.900	154	1,40	20	0,28	1,12	1.811,6883	1	587,3684	1	0,0001	2	9.058
Agriculture	Slovenia	SLO18	High	Reconstruction of the Wastewater Treatment Plant for Pig Farmings Nemščak and Jezera of Izakovci.	0,008	60,000	0,0001	7 Lower Mura - Drava	2.300	5.200	350	80	5.200	430	5,60	20	1,12	4,48	2.604,6512	2	861,5385	2	0,0006	1	13.023
Agriculture	Croatia	HR71	Medium	Farma Senkovac (pig farm)				5 Gemenc-Kopacki Rit	1.500		7	3	3.000	10		20									
Agriculture	Croatia	HR75	Low	Renewal of animal stock at PIK "Belje"				5 Gemenc-Kopacki Rit								50									
	Subtotal								**4.640**	**7.100**	**483**	**111**	**10.100**	**594**	**7,00**		**1,40**	**5,60**							
Wetlands	Hungary	H10	High	Area between Gemenec and Kopacki Rit - Rehabilitation and management of the water related ecosystems in the Danube-Drava Region				5 Gemenc-Kopacki Rit			4.050	405		4.455	303,75		20,25	283,50	4.545						68.182
Wetlands	Croatia	HR67	High	Area between Gemenc and Kopacki Rit - Preservation and rehabilitation of the Drava river basin wetlands in Baranja region				6 Middle Drava			4.050	405		4.455	141,75		20,25	121,50	4.545						31.818
	Subtotal								**0**	**0**	**8.100**	**810**	**0**	**8.910**	**445,50**		**40,50**	**405,00**							
Total Sub-river Basin									**23.793**	**46.864**	**12.243**	**1.742**	**53.201**	**13.985**	**792,39**		**159,23**	**633,16**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 8 Sava

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage		Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR												
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%		(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		18	19	20	21	22	23	24	25	26
Municipalities	Slovenia	SLO06	High	Central Waste Water Treatment Plant Celje - outline solution with new input data	0,122	3,500	0,0349	23 Upper Sava	1.880	4.270	283	63	4.270	346	11,80	30	*	3,54	8,26	10.231	7	1.934	5			34.104
Municipalities	Slovenia	SLO08	High	Central Waste Water Treatment Plant of town Krško - outline scheme	0,035	84,000	0,0004	27 Middle Sava-Una&Vrbas	310	710	47	11	710	58	2,50	30		0,75	1,75	12.931	8	2.465	8			43.103
Municipalities	Slovenia	SLO10	High	Wastewater treatment plan municipality Ljubljana	0,868	7,700	0,113	23 Upper Sava	10.460	23.750	1.575	350	23.750	1.925	124,20	30	*	37,26	86,94	19.356	12	3.661	12			64.519
Municipalities	Slovenia	SLO19	High	Wastewater Treatment Plant Municipality Rogaška Slatina	0,000	0,000		24 Sutla							3,64	30	*	1,09	2,55							
Municipalities	Croatia	HR02	High	The sewerage and waste water treatment of city of Zupanja				28 Lower Sava-Bosna	40				80		11,00	30		3,30	7,70			96.250	24			
Municipalities	Croatia	HR03	High	The sewerage and waste water treatment of city of Kutina and surrounding settlements				26 Middle Sava-Kupa							12,00	30		3,60	8,40							
Municipalities	Croatia	HR05	High	The sewerage and waste water treatment of city of Vinkovci.				28 Lower Sava-Bosna	190				380		12,00	30		3,60	8,40			22.105	21			
Municipalities	Croatia	HR12	High	The sewerage and waste water treatment of the National Park Plitvice lakes				25 Kupa							16,00	5		0,80	15,20							
Municipalities	Croatia	HR14	High	The sewerage and waste water treatment of cities of Karlovac and Duga Resa	0,220			25 Kupa, 26 Middle Sava-Kupa	2.026	1.177	9	16	4.052	25	50,00	30		15,00	35,00	600.000	21	8.638	18			2.000.000
Municipalities	Croatia	HR19	High	The central waste water treatment plant of city of Zagreb	3,450			26 Middle Sava-Kupa	10.438	29.743	1.320	220	29.743	1.540	256,00	30		76,80	179,20	49.870	15	6.025	16			166.234
Municipalities	Bosnia-Herzegovina	BH01	High	Construction of regional sewerage system Tuzla-Lukavac with central waste water treatment plant for cities and industry.		0,010		28 Lower Sava-Bosna	15.840		1.080	160	31.680	1.240	58,00	5		2,90	55,10	2.339	1	1.739	3			46.774
Municipalities	Bosnia-Herzegovina	BH02	High	Rehabilitation and reconstruction sewerage and industry waste water treatment plant of city Sarajevo				28 Lower Sava-Bosna	14.850		1.015	150	29.700	1.165	15,00	20		3,00	12,00	2.575	3	404	2			12.876
Municipalities	Bosnia-Herzegovina	BH03	High	Construction of regional sewerage system Banja Luka with central waste water treatment plant city and industry				27 Middle Sava-Una&Vrbas	13.500		910	140	27.000	1.050	50,00	5		2,50	47,50	2.381	2	1.759	4			47.619
Municipalities	Yugoslavia	YU07	High	City of Sabac WWTP	0,270	2,850	0,095	31 Sava at Beograde	1.912		43	102	3.824	145	18,00	5		0,90	17,10	6.207	5	4.472	14			124.138
Municipalities	Yugoslavia	YU10	High	Mojkovac Town WWTP	0,020	3,950	0,005	29 Tara Canyon	118		3	5	236	8	3,00	30		0,90	2,10	112.500	18	8.898	19			375.000
Municipalities	Yugoslavia	YU53	High	Kolasin Town WWTP	0,030	6,820	0,004	29 Tara Canyon	175		5	7	350	12	3,00	30		0,90	2,10	75.000	17	6.000	15			250.000
Municipalities	Yugoslavia	YU55	High	WWTP Valjevo	0,280	0,700	0,400	31 Sava at Beograde	1.695		44	110	3.390	154	10,00	5		0,50	9,50	3.247	4	2.802	9			64.935
Municipalities	Slovenia	SLO13	Medium	Central Waste Water Treatment Plant Metlika	0,035	9,000	0,004	23 Upper Sava	120	260	17	4	260	21	1,60	50		0,80	0,80	38.095	14	3.077	10			76.190

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 8 Sava

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Slovenia	SLO16	Medium	Central Waste Water Treatment Plant Vrhnika	0,035	2,000	0,018	23 Upper Sava							3,20	30	0,96	2,24							
Municipalities	Slovenia	SLO17	Medium	Upgrading of the central waste water treatment plant Domzale - Kamnik - nitrification/denitrification	0,340	3,500	0,097	23 Upper Sava	4.180	9.500	630	140	9.500	770	13,70	90	12,33	1,37	16.013	9	144	1			17.792
Municipalities	Slovenia	SLO25	Medium	Brezice	0,017	84,000	0,0002	23 Upper Sava	210	480	32	7	480	39	2,20	30 *	0,66	1,54	16.923	10	3.208	11			56.410
Municipalities	Croatia	HR01	Medium	The sewerage and waste water treatment of city of Slavonski Brod and wider area				27 Middle Sava-Una&Vrbas	201	600	52		600	52	50,00	30	15,00	35,00	288.462	19	58.333	23			961.538
Municipalities	Croatia	HR04	Medium	The waste water treatment plant of city of Bjelovar.				26 Middle Sava-Kupa	744	1.255			1.488		6,66	50	3,33	3,33			2.238	7			
Municipalities	Croatia	HR07	Medium	The sewerage and waste water treatment of cities of Grubišno Polje and Mali Zdenci along with PPI "Zdenka" Veliki Zdenci				26 Middle Sava-Kupa	604		16	1	1.208	17	6,21	20	1,24	4,97	73.088	16	4.114	13			365.441
Municipalities	Croatia	HR13	Medium	The sewerage and waste water treatment of city of Sisak				26 Middle Sava-Kupa	700	919	48	2	1.400	50	60,00	30	18,00	42,00	360.000	20	30.000	22			1.200.000
Municipalities	Croatia	HR15	Medium	The sewerage and waste water treatment of city of Petrinja and neighbourhood towns				26 Middle Sava-Kupa							31,00	30	9,30	21,70							
Municipalities	Croatia	HR18	Medium	The waste water treatment plant of city of Sesvete—east				26 Middle Sava-Kupa								5									
Municipalities	Croatia	HR20	Medium	The waste water treatment plant of city of Sesvete-north-east				26 Middle Sava-Kupa								5									
Municipalities	Croatia	HR21	Medium	The waste water treatment plant of city of Zaprešic				26 Middle Sava-Kupa								5									
Municipalities	Croatia	HR23	Medium	The waste water treatment plant of city of Krašic				26 Middle Sava-Kupa							0,55	30	0,17	0,39							
Municipalities	Croatia	HR51	Medium	The rehabilitation of the municipal dump site of city of Sisak				26 Middle Sava-Kupa							6,15	20	1,23	4,92							
Municipalities	Croatia	HR52	Medium	The municipal dump site "Doline" of city of Bjelovar				26 Middle Sava-Kupa							2,24	20	0,45	1,79							
Municipalities	Croatia	HR53	Medium	The municipal dump site "Grginac" of city of Bjelovar				26 Middle Sava-Kupa							0,94	20	0,19	0,75							
Municipalities	Croatia	HR54	Medium	The rehabilitation of the municipal dump site of city of Daruvar				26 Middle Sava-Kupa							1,20	20	0,24	0,96							
Municipalities	Croatia	HR55	Medium	The rehabilitation of the municipal dump site of city of Nova Gradiška				27 Middle Sava-Una&Vrbas							0,10	20	0,02	0,08							
Municipalities	Croatia	HR57	Medium	The dump site of Pozeška kotlina region				27 Middle Sava-Una&Vrbas							1,56	20	0,31	1,25							
Municipalities	Bosnia-Herzegovina	BH04	Medium	Construction regional sewerage system Gornji Vakuf- Bugojno- Donji Vakuf with central waste water treatment plant for cities and industry.				27 Middle Sava-Una&Vrbas	1.385		95	14	2.770	109	18,50	5	0,93	17,58	8.486	6	6.345	17			169.725

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 8 Sava

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Bosnia-Herzegovina	BH05	Medium	Construction of regional sewerage system Sarajevo-Visoko with central waste water treatment plant near Visoko for cities and industry.				28 Lower Sava-Bosna	990		68	10	1.980	78	28,50	5	1,43	27,08	18.269	11	13.674	20			365.385
Municipalities	Slovenia	SLO07	Low	Wastewater treatment plant municipal Crnomelj	0,017	1,000	0,017	23 Upper Sava	210	480	32	7	480	39	2,10	50	1,05	1,05	26.923	13	2.188	6			53.846
Municipalities	Croatia	HR06	Low	The waste water treatment plant of city of Velika				26 Middle Sava-Kupa							1,00	30	0,30	0,70							
Municipalities	Croatia	HR08	Low	The sewerage and waste water treatment of city of Daruvar				26 Middle Sava-Kupa							0,94	20	0,19	0,75							
Municipalities	Croatia	HR09	Low	The sewerage and waste water treatment of city of Garešnica				26 Middle Sava-Kupa							2,35	5	0,12	2,23							
Municipalities	Croatia	HR10	Low	The sewerage and waste water treatment of cities of Pakrac and Lipik				26 Middle Sava-Kupa							1,65	20	0,33	1,32							
Municipalities	Croatia	HR11	Low	The sewerage and waste water treatment of city of Ogulin				25 Kupa							3,35	30	1,01	2,35							
Municipalities	Croatia	HR16	Low	The central waste water treatment plant of area of cities of Zabok-Orosavlje- Gornja and Donja Stubica				26 Middle Sava-Kupa							27,30	30	8,19	19,11							
Municipalities	Croatia	HR17	Low	The waste water treatment plant of city of Samobor				26 Middle Sava-Kupa								50									
Municipalities	Croatia	HR22	Low	The waste water treatment plant of city of Velika Gorica				26 Middle Sava-Kupa							2,20	50	1,10	1,10							
Municipalities	Croatia	HR56	Low	The municipal dump site of city of Oriovac				26 Middle Sava-Kupa							0,04	20	0,01	0,04							
Municipalities	Bosnia-Herzegovina	BH06	Low	Construction of regional sewerage system Travnik-Vitez with central waste water treatment plant near Vitez for cities and industry.				28 Lower Sava-Bosna							10,00	5	0,50	9,50							
Municipalities	Bosnia-Herzegovina	BH07	Low	Construction of collecting system Pliva-Jajce with central waste water treatment				27 Middle Sava-Una&Vrbas							6,05	5	0,30	5,75							
Municipalities	Bosnia-Herzegovina	BH08	Low	Construction sewerage system Zenica with central waste water treatment plant for city and industry				28 Lower Sava-Bosna							24,00	5	1,20	22,80							
Municipalities	Bosnia-Herzegovina	BH09	Low	Construction sewerage system Bijelijina with central waste water treatment plant for city and industry.				30 Lower Sava-Drina							12,00	5	0,60	11,40							
	Subtotal								**82.778**	**73.144**	**7.324**	**1.519**	**179.331**	**8.843**	**983,42**		**238,81**	**744,62**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 8 Sava

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage		Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR												
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%		(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		18	19	20	21	22	23	24	25	26
Industry	Slovenia	SLO02	High	WWTP Brewery Laško	0,019	3,500	0,005	23 Upper Sava	1.050	2.380	158	35	2.380	193	13,20	5	*	0,66	12,54	3.420	3	5.269	9			68.394
Industry	Slovenia	SLO04	High	Wastewater treatment plant of the Paper Factory ICEC Krško	0,284	84,000	0,003	23 Upper Sava	9.400	21.380	1.418	315	21.380	1.733	17,40	30		5,22	12,18	3.012	2	570	4			10.040
Industry	Slovenia	SLO21	High	Wastewater Treatment Plant Leather Processing industry of Vrhnika				23 Upper Sava	2.090	4.750	315	70	4.750	385	17,00	20		3,40	13,60	8.831	4	2.863	7			44.156
Industry	Croatia	HR47	High	The waste water treatment plant of "Agroproteinka" d.d.				26 Middle Sava-Kupa								30										
Industry	Croatia	HR70	High	WWTP Zapresic				26 Middle Sava-Kupa								5										
Industry	Bosnia-Herzegovina	BH10	High	Reconstruction waste water pre-treatment plant in Chlorine Alkaline Complex in Tuzla				28 Lower Sava-Bosna							2,20	20		0,44	1,76							
Industry	Bosnia-Herzegovina	BH11	High	Reconstruction of waste water pre-treatment plant in Coke Chemical Combine Lukavac				28 Lower Sava-Bosna	860	5.250			5.250		2,80	20		0,56	2,24			427	3			
Industry	Bosnia-Herzegovina	BH12	High	Reconstruction and improve waste water treatment plant from "Incel" Banja Luka				27 Middle Sava-Una&Vrbas	3.960	19.400			19.400		3,50	50		1,75	1,75			90	1			
Industry	Bosnia-Herzegovina	BH13	High	Rehabilitation and reconstruction waste water treatment plant in "Natron" Maglaj				28 Lower Sava-Bosna	7.920				15.840		3,00	50		1,50	1,50			95	2			
Industry	Bosnia-Herzegovina	BH14	High	Construction waste water treatment plant for "Celpak" Prijedor				27 Middle Sava-Una&Vrbas	2.380	12.370			12.370		14,00	30		4,20	9,80			792	5			
Industry	Yugoslavia	YU28	High	HI "Zarka" - Sabac				31 Sava at Beograde	200	580	200	280	580	480		5										
Industry	Croatia	HR45	Medium	The waste water treatment of meat industry PIK "Vrbovec"				26 Middle Sava-Kupa								50										
Industry	Croatia	HR46	Medium	The waste water treatment of meat industry "Gavrilovic" d.o.o. Petrinja				26 Middle Sava-Kupa							0,34	20		0,07	0,27							
Industry	Croatia	HR48	Medium	The building of the system for the collection and treatment of highly polluted waste water of "Petrokemija" d.d. Kutina	0,170			26 Middle Sava-Kupa	47	209			209		0,95	20		0,19	0,76			3.648	8			
Industry	Bosnia-Herzegovina	BH15	Medium	Reconstruction of industry wwtp for DD "Zeljezara" Zenica				28 Lower Sava-Bosna							1,60	50		0,80	0,80							
Industry	Bosnia-Herzegovina	BH16	Medium	Construction of industrial waste water treatment in the Sodium Factory Lukavac				28 Lower Sava-Bosna							6,00	30		1,80	4,20							
Industry	Slovenia	SLO03	Low	Wastewater treatment plant of the Brewery Union, Ljubljana	0,013	7,700	0,002	23 Upper Sava	1.460	3.330	220	49	3.330	269	3,90	5	*	0,20	3,71	725	1	1.113	6			14.498
Industry	Slovenia	SLO28	Low	Diary Industry for Ljubljana	0,004	98,000	0,00004	23 Upper Sava	630	1.430	95	21	1.430	116		5										
Industry	Bosnia-Herzegovina	BH17	Low	Construction of industrial WWTP for "Destilacija drveta" Teslic				30 Lower Sava-Drina							5,30	30		1,59	3,71							
Industry	Bosnia-Herzegovina	BH18	Low	Construction of Industrial waste water treatment plant for DD "Maglic" Foca				30 Lower Sava-Drina							9,20	30		2,76	6,44							
	Subtotal								**29.997**	**71.079**	**2.406**	**770**	**86.919**	**3.176**	**100,40**			**25,13**	**75,26**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 8 Sava

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Agriculture	Slovenia	SLO24	High	Farm Ihan	0,003	3,500	0,001	23 Upper Sava	2.300	5.230	346	77	5.230	423		20									0
Agriculture	Croatia	HR72	High	Farma Luzani				27 Middle Sava-Una&Vrbas	3.600			1	7.200	1		20									
Agriculture	Bosnia-Herzegovina	BH19	High	Construction of waste water treatment plant for dairy and pigs breeding farm in the Nova Topola.				27 Middle Sava-Una&Vrbas	7.200		1.130	250	14.400	1.380	6,50	30	1,95	4,55	1.413	2	316	2			4.710
Agriculture	Yugoslavia	YU30	High	D. Makovic, Obrenovac	0,003			31 Sava at Beograde	470		58	22	940	80	5,00	20									
Agriculture	Yugoslavia	YU35	High	Surcin (Pig farm)	0,004			31 Sava at Beograde	820		102	38	1.640	140		20									
Agriculture	Bosnia-Herzegovina	BH20	Medium	Construction of waste water treatment plant for pigs breeding farm in the Brcko				30 Lower Sava-Drina	9.900		1.570	350	19.800	1.920	2,30	30	0,69	1,61	359	1	81	1			1.198
Agriculture	Bosnia-Herzegovina	BH21	Medium	Construction of waste water treatment plant for dairy farm “Spreca” Kalesija				28 Lower Sava-Bosna	35		5	2	70	7	2,20	30	0,66	1,54	94.286	3	22.000	3			314.286
Agriculture	Croatia	HR42	Low	The sewerage system and waste water treatment of the farm “Dubravica” d.d.				26 Middle Sava-Kupa								30									
Agriculture	Bosnia-Herzegovina	BH22	Low	Construction of waste water treatment plant for dairy farm “Butmir” Sarajevo				28 Lower Sava-Bosna							1,90	30	0,57	1,33							
Agriculture	Bosnia-Herzegovina	BH23	Low	Construction of waste water treatment plant for dairy and pigs breeding farm Bijeljina.				30 Lower Sava-Drina							2,00	30	0,60	1,40							
	Subtotal								**24.325**	**5.230**	**3.211**	**740**	**49.280**	**3.951**	**19,90**		**4,47**	**10,43**							
Wetlands	Croatia	HR76	High	Mokro Polje				27 Middle Sava-Una&Vrbas			837	84		921	33,48		8,37	25,11	9.091						36.355
Wetlands	Bosnia-Herzegovina	BH24	High	Area of Mouth of Drina				30 Lower Sava-Drina			2.000	200		2.200	80,00		20,00	60,00	9.091						36.364
Wetlands	Yugoslavia	YU57	High	Area of Mouth of Drina				30 Lower Sava-Drina			500	50		550	20,00		5,00	15,00	9.091						36.364
	Subtotal								**0**	**0**	**3.337**	**334**	**0**	**3.671**	**133,48**		**33,37**	**100,11**							
Total Sub-river Basin									**137.100**	**149.453**	**16.278**	**3.363**	**315.530**	**19.641**	**1.237,20**		**301,78**	**930,42**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 9 Tisa

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m³/s)	(m³/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Slovakia	SK01	High	Kosice - expansion of wastewater treatment plant 2nd stage of construction	1,250	4,380	0,285	14 Sajo-Hornad		2.388	447	107	2.388	554	25,71	50	12,86	12,86	23.220	8	5.384	9			46.440
Municipalities	Hungary	H06	High	Construction of the wastewater treatment plant of Szeged, Mechanical treatment I/b Phase	0,400			18 Lower Mures-Szeged	5.980	11.960	270	30	11.960	300	6,58	30	1,97	4,61	6.580	3	385	3			21.933
Municipalities	Yugoslavia	YU15	High	Subotica - upgrading WWTP	0,550			19 Palic-Ludos Lakes	3.600		550	165	7.200	715	33,00	50	16,50	16,50	23.077	7	2.292	4			46.154
Municipalities	Yugoslavia	YU51	High	City of Senta WWTP	0,120	1,200	0,100	19 Palic-Ludos Lakes	1.261		36	50	2.522	86	14,00	30	4,20	9,80	48.837	10	3.886	6			162.791
Municipalities	Romania	RO11	High	Waste water treatment plant of Zalau city	0,550	0,000		10 Somes	476	846	112	34	952	145	7,00	50	3,50	3,50	24.105	9	3.676	5			48.209
Municipalities	Romania	RO14	High	Development of wastewater treatment plant of Deva city	0,710	0,000		17 Middle Mures	816	1.156	63	31	1.633	95	5,60	90	5,04	0,56	53.277	11	343	2			59.197
Municipalities	Romania	RO51	High	Expansion of WWTP of Timisoara city	3,150	0,000		22 Middle Banat-Bega&Birzava	3.284	2.561	444	101	6.568	545	1,50	90	1,35	0,15	2.477	1	23	1			2.752
Municipalities	Ukraine	UA05	High	Extension and reconstruction of Waste Water Treatment Facilities of Uzhgorod (3 turn)	0,920			12 Uzh	646	807	107		1.292	107	25,00	30	7,50	17,50	70.093	13	13.545	10			233.645
Municipalities	Slovakia	SK04	Medium	Upgrading of wastewater treatment plant Michalovce				13 Bodrog-Tisza	56		219		112	219	3,26	50	1,63	1,63	7.453	5	14.540	11			14.906
Municipalities	Slovakia	SK05	Medium	Svidnik-sewer network and wastewater treatment plant				13 Bodrog-Tisza	120	100	64	6	240	70	11,71	5	0,59	11,13	8.379	6	46.368	12			167.582
Municipalities	Slovakia	SK07	Medium	Expansion of wastewater treatment plant Humenné				13 Bodrog-Tisza	54		148		108	148	17,08	50	8,54	8,54	57.586	12	79.074	13			115.172
Municipalities	Yugoslavia	YU06	Medium	City of Zrenjanin WWTP	0,500	1,760	0,284	32 Western & Southern Morava	3.932		160	214	7.864	374	38,00	5	1,90	36,10	5.080	2	4.591	7			101.604
Municipalities	Yugoslavia	YU11	Medium	Vrbas/Kula/Crvenka	0,300	3,000	0,100	21 Vrbas-DTD Canal	3.390		90	143	6.780	233	34,00	5	1,70	32,30	7.296	4	4.764	8			145.923
Municipalities	Ukraine	UA25	Medium	WWTP Mukachevo				12 Uzh	43		25	13	86	38		5									
Municipalities	Slovakia	SK09	Low	Roznava-expansion of wastewater treatment plant				14 Sajo-Hornad							2,62	50	1,31	1,31							
	Subtotal								**23.658**	**19.818**	**2.734**	**894**	**49.705**	**3.628**	**225,06**		**68,58**	**156,48**							
Industry	Slovakia	SK13	High	Reconstruction of wastewater treatment plant in Bukocel, a.s.	0,330	1,000	0,330	13 Bodrog-Tisza	102				204		5,71	50	2,86	2,86							
Industry	Hungary	H09	High	Salty technological water concentration and christalisation unit development for salt reuse - salty water reduction program				14 Sajo-Hornad							2,93	20	0,59	2,34							
Industry	Yugoslavia	YU25	High	"Lepenka" - N. Knzevac				20 Upper Banat	1.100	3.184	22	8	3.184	30		5									
Industry	Romania	RO44	High	Ecologising the wet process in the platform TÎRGU MURES MANPEL S.A	0,000	0,000		16 Upper Mures							1,10	50	0,55	0,55							
Industry	Romania	RO45	High	Removal of chromium, zinc and phenols from the wastewater – SINTEZA Oradea	0,000	0,000		15 Körös							0,33	50	0,17	0,17							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 9 Tisa

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	Romania	RO46	High	Modernising WWTP CLUJANA S.A – Cluj-Napoca	0,000	0,000		10 Somes							3,00	50	1,50	1,50							
Industry	Romania	RO47	High	WWTP system at VIDRA S.A.- ORASTIE	0,000	0,000		17 Middle Mures							1,20	30	0,36	0,84							
Industry	Romania	RO54	High	Modernization of wastewater treatment at SC SOMES SA DEJ	0,000	0,000		10 Somes	993	3.522	91		3.522	91	0,60	50	0,30	0,30	3.297	2	85	2			6.593
Industry	Romania	RO55	High	Completion and modernisation of WWTP at Phoenix Baia Mare	0,000	0,000		10 Somes		83			83		1,25	30	0,38	0,88			10.542	3			
Industry	Romania	RO56	High	Expansion of discharging facilities and final disposal of waste at SC UPSOM SA OCNA Mures	0,000	0,000		16 Upper Mures							0,12	20	0,02	0,10							
Industry	Romania	RO57	High	Modernisation of WWTP at SC INDAGRA SA Arad	0,000	0,000		18 Lower Mures-Szeged	1.112	2.448	280		2.448	280	1,00	50	0,50	0,50	1.786	1	204	1			3.571
Industry	Slovakia	SK18	Medium	Project 2000, Chemical plant Strazske				13 Bodrog-Tisza							2,00	20	0,40	1,60							
Industry	Slovakia	SK19	Medium	Barrelling the chemicals for production - Chemical plant Strazske				13 Bodrog-Tisza							0,46	20	0,09	0,37							
Industry	Slovakia	SK20	Medium	Reconstruction of activated sludge tanks of wastewater treatment plant - Chemical plant Strazske				13 Bodrog-Tisza							0,43	50	0,22	0,22							
Industry	Slovakia	SK21	Medium	Reconstruction of sewer system - Chemical plant Strazske				13 Bodrog-Tisza							2,86		0,00	2,86							
Industry	Ukraine	UA04	Medium	Complex utilization of timber with introduction of environmentally friendly technologies in Velykobychkiv Wood Chemistry Enterprise				9 Upper Tisa	23			8	46	8	5,00	5	0,25	4,75	33.333	4	103.261	4			666.667
Industry	Slovakia	SK27	Low	Sludge disposal upgrading in Wastewater Treatment Plant, VSZ Kosice				14 Sajo-Hornad							3,29	50	1,65	1,65							
Industry	Slovakia	SK28	Low	Reduction of contamination of groundwater and revitalisation of landfill in Krompachy				13 Bodrog-Tisza								20									
Industry	Slovakia	SK30	Low	Reconstruction of wet waste tip, VSZ Kosice				14 Sajo-Hornad							0,61	20	0,12	0,49							
Industry	Slovakia	SK31	Low	Reconstruction of dry waste tip and waste liquidation, VSZ Kosice				14 Sajo-Hornad							14,37	20	2,87	11,50							
Industry	Slovakia	SK32	Low	Reconstruction of industrial landfill, Bukocel Hencovce				14 Sajo-Hornad							1,43	20	0,29	1,14							
Industry	Slovakia	SK33	Low	Disposal of wastes from the PCB production, Chemko Strazske				13 Bodrog-Tisza							10,00	20	2,00	8,00							
Industry	Ukraine	UA03	Low	Complex utilization of timber with introduction of environmentally friendly technologies in Teresva Woodprocessing Enterprise.				9 Upper Tisa	23			30	46	30	5,00	5	0,25	4,75	8.333	3	103.261	4			166.667

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 9 Tisa

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	Ukraine	UA26	Low	Rakhiv Cardboard Factory, Reconstruction of existing and construction of new WWT facilities and accumulations pounds, improvement of technological processes				9 Upper Tisa	39				78			20									
	Subtotal								**3.392**	**9.237**	**393**	**46**	**9.611**	**439**	**62,69**		**15,35**	**47,34**							
Agriculture	Yugoslavia	YU36	High	PDP Galad - Kikinda	0,002			20 Upper Banat								20									
Agriculture	Yugoslavia	YU31	High	Neoplanta, Cenej	0,005			20 Upper Banat	1.160		146	55	2.320	201	8,00	20	1,60	6,40	7.960		2.759				39.801
Agriculture	Yugoslavia	YU29	High	FARMACOOP - DD Carmex, Vrbas	0,004			21 Vrbas-DTD Canal	820		102	38	1.640	140	5,00	20	1,00	4,00	7.143		2.439				35.714
Agriculture	Romania	RO61	Medium	WWTP at CONSUIN BEREGSAU Timis	0,000	0,000		22 Middle Banat-Bega&Birzava	1.909	2.586	573		3.818	573	0,60	30	0,18	0,42	314		110				1.047
Agriculture	Romania	RO33	Medium	Consolidation and rehabilitation of sliding lands in Zalau city	0,000	0,000		10 Somes							3,20	5	0,16	3,04							
Agriculture	Ukraine	UA02	Low	Construction of embankment on Tysa River in Tyachiv				9 Upper Tisa							0,87	20	0,17	0,70							
	Subtotal								**3.889**	**2.586**	**821**	**93**	**7.778**	**914**	**17,67**		**3,11**	**14,56**							
Wetlands	Slovakia	SK38	High	Mouth of Bodrog - Revitalization fo wetland of the Bodrog river basin				13 Bodrog-Tisza			113	11		124	9,00		1,13	7,88	9.091						72.599
Wetlands	Hungary	H11	High	Mouth of Bodrog				13 Bodrog-Tisza			113	11		124	9,00		1,13	7,88	9.091						72.599
Wetlands	Yugoslavia	YU58	High	Lower Tisza				20 Upper Banat			1.800	180		1.980	72,00		18,00	54,00	9.091						36.364
	Subtotal								**0**	**0**	**2.026**	**202**	**0**	**2.228**	**90,00**		**20,25**	**69,75**							
Total Sub-river Basin									**30.939**	**31.641**	**5.974**	**1.235**	**67.094**	**7.209**	**395,43**		**107,30**	**288,12**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 10 Banat - Eastern Serbia

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Yugoslavia	YU01	High	WWTP "Veliko Selo" - Belgrade (central)	4,630	1.800,0	0,003	31 Sava at Beograde	31.536	65.000	876	1.183	65.000	2.059	215,00	30	64,50	150,50	31.326	3	2.315	2			104.420
Municipalities	Yugoslavia	YU02	High	WWTP "Ostruznica" - Belgrade	0,160	285,000	0,001	31 Sava at Beograde	1.084		30	41	2.168	71	13,00	30	3,90	9,10	54.930	4	4.197	4			183.099
Municipalities	Yugoslavia	YU17	High	Zajecar WWTP	0,180	1,300	0,138	34 Lower Timok	1.315		31	50	2.630	81	14,00	5	0,70	13,30	8.642	2	5.057	5			172.840
Municipalities	Yugoslavia	YU18	High	Bor WWTP	0,170	0,580	0,293	34 Lower Timok	1.258		22	39	2.516	61	14,00	30	4,20	9,80	68.852	5	3.895	3			229.508
Municipalities	Romania	RO12	High	Development of waste water treatment plant of Resita city	0,520	0,000		17 Middle Mures	1.502	1.729	241	527	3.004	768	3,50	90	3,15	0,35	4.102	1	117	1			4.557
Subtotal									**36.695**	**66.729**	**1.200**	**1.840**	**75.318**	**3.040**	**259,50**		**76,45**	**183,05**							
Industry	Yugoslavia	YU20	High	RTB BOR				34 Lower Timok	580	2.170		30	2.170	30	35,00	5	1,75	33,25	58.333		15.323				1.166.667
Industry	Yugoslavia	YU22	High	IHP Prahovo (fertilizers)				34 Lower Timok	440	2.020	460	3.800	2.020	4.260	25,00	5	1,25	23,75	293		11.757				5.869
Industry	Yugoslavia	YU23	Low	Ash Dump Belgrade				31 Sava at Beograde								20									
Industry	Yugoslavia	YU42	Low	The Recultivation of Ash Dump Sites				22 Middle Banat-Bega&Birzava							0,25	20	0,05	0,20							
Subtotal									**1.020**	**4.190**	**460**	**3.830**	**4.190**	**4.290**	**60,25**		**3,05**	**57,20**							
Agriculture	Yugoslavia	YU37	High	Petrovac na Mlavi - Pig Farm DP "Petrovac"	0,003			33 Danube at Iron Gate	514		64	24	1.028	88		20									
Agriculture	Romania	RO32	Medium	Dams rehabilitation alongside Danube River from the „Iron Gates" – km 875 to Isaccea – km 103	0,000	0,000		33 Danube at Iron Gate							2,85	5	0,14	2,71							
	Subtotal								**514**	**0**	**64**	**24**	**1.028**	**88**	**2,85**		**0,14**	**2,71**							
Total Sub-river Basin									**38.229**	**70.919**	**1.724**	**5.694**	**80.536**	**7.418**	**322,60**		**79,64**	**242,96**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 11 Velika Morava

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Yugoslavia	YU04	High	City of Nis WWTP	0,900	3,400	0,265	32 Western & Southern Morava	5.302	11.000	124	260	11.000	384	45,00	30	13,50	31,50	35.156	6	2.864	1			117.188
Municipalities	Yugoslavia	YU05	High	City of Pristina WWTP	0,520	0,680	0,765	32 Western & Southern Morava	3.563	7.500	86	133	7.500	219	40,00	30	12,00	28,00	54.795		3.733	3			182.648
Municipalities	Yugoslavia	YU08	High	City of Leskovac WWTP	0,400	3,400	0,118	32 Western & Southern Morava	2.874		44	119	5.748	163	25,00	30	7,50	17,50	46.012	10	3.045	2			153.374
Municipalities	Yugoslavia	YU12	High	Krusevac WWTP	0,320	15,000	0,021	32 Western & Southern Morava	2.779		50	71	5.558	121	24,00	5	1,20	22,80	9.917	4	4.102	5			198.347
Municipalities	Yugoslavia	YU13	High	Cacak WWTP	0,350	5,350	0,065	32 Western & Southern Morava	2.466		62	125	4.932	187	24,00	5	1,20	22,80	6.417	1	4.623	7			128.342
Municipalities	Yugoslavia	YU14	High	Novi Pazar WWTP	0,240	1,450	0,166	32 Western & Southern Morava	1.620		38	90	3.240	128		5									
Municipalities	Yugoslavia	YU16	High	Uzice WWTP	0,200	1,300	0,154	32 Western & Southern Morava	1.399		33	56	2.798	89	14,00	5	0,70	13,30	7.865	3	4.753	8			157.303
Municipalities	Yugoslavia	YU19	High	Pirot WWTP	0,190	1,380	0,138	34 Lower Timok	1.225		36	50	2.450	86	14,00	30	4,20	9,80	48.837	9	4.000	4			162.791
Municipalities	Yugoslavia	YU52	High	Blace Town WWTP	0,040	0,050	0,800	32 Western & Southern Morava	310		38	13	620	51	8,00	30	2,40	5,60	47.059	8	9.032	10			156.863
Municipalities	Yugoslavia	YU54	High	WWTP Vranje	0,300	0,570	0,526	32 Western & Southern Morava	1.853		43	83	3.706	126	18,00	5	0,90	17,10	7.143	2	4.614	6			142.857
Municipalities	Yugoslavia	YU56	High	WWTP Rozaje	0,050	1,150	0,043	32 Western & Southern Morava	355		6	11	710	17	6,00	5	0,30	5,70	17.647	5	8.028	9			352.941
	Subtotal								**23.746**	**18.500**	**560**	**1.011**	**48.262**	**1.571**	**218,00**		**43,90**	**174,10**							
Industry	Yugoslavia	YU21	High	FOPA paper mill, Vladicin Han				32 Western & Southern Morava		15.000			15.000		15,00	5	0,75	14,25			950				
Industry	Yugoslavia	YU24	High	TE "Obilic" A and B - Obilic				32 Western & Southern Morava	3.450	9.170			9.170			5									
Industry	Yugoslavia	YU26	High	Trepca - Topionica				32 Western & Southern Morava								5									
Industry	Yugoslavia	YU27	High	Trepca - Flotacija				32 Western & Southern Morava								5									
	Subtotal								**3.450**	**24.170**	**0**	**0**	**24.170**	**0**	**15,00**		**0,75**	**14,25**							
Agriculture	Yugoslavia	YU33	High	DP1. Decembar - pig farm - Zitoradja	0,003			32 Western & Southern Morava	470		58	22	940	80		20									
Agriculture	Yugoslavia	YU34	High	DP Pik Varvarinsko Polje - Varvarin	0,001			32 Western & Southern Morava	580		73	27	1.160	100		20									
	Subtotal								**1.050**	**0**	**131**	**49**	**2.100**	**180**	**0,00**		**0,00**	**0,00**							
Total Sub-river Basin									**28.246**	**42.670**	**691**	**1.060**	**74.532**	**1.751**	**233,00**		**44,65**	**188,35**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 12 Mizia-Dobrudzha

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage		Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR												
					(m³/s)	(m³/s)			t/y						(mil USD)	%		(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		18	19	20	21	22	23	24	25	26
Municipalities	Bulgaria	BG01	High	Municipally Waste Water Treatment Plant - Lovetch	0,340			38 Ossam at Lovetch	1.382	2.927	69	44	2.927	113	17,83	30	*	5,35	12,48	47.336	9	4.264	8			157.788
Municipalities	Bulgaria	BG02	High	Municipally Waste Water Treatment Plant - Vratza	0,430			35 Ogosta at Vratza	784	1.826	258	43	1.826	301	7,60	30	*	2,28	5,32	7.575	1	2.913	3			25.249
Municipalities	Bulgaria	BG03	High	Municipally Waste Water Treatment Plant - Sofia	7,430			36 Iskar at Sofija	5.823	12.051	273	551	12.051	824	105,82	30	*	31,75	74,07	38.527	8	6.147	9			128.422
Municipalities	Bulgaria	BG04	High	Municipally Waste Water Treatment Plant - Sevlievo	0,170	0,160	1,063	39 Rossitza at Sevlievo	1.014	2.062	136	43	2.062	179	8,91	30	*	2,67	6,24	14.933	3	3.025	5			49.777
Municipalities	Bulgaria	BG07	High	Municipally Waste Water Treatment Plant - Troyan	0,330			37 Ossam at Troyan	1.634	3.996	121	56	3.996	177	16,98	30	*	5,09	11,89	28.780	7	2.974	4			95.932
Municipalities	Bulgaria	BG10	High	Municipal Waste Water treatment Plant Gorna Oryahovitza & Lyaskovetz	0,590			40 Middle Yantra	6.559	14.370	464	247	14.370	711		30	*									
Municipalities	Bulgaria	BG18	High	Construction of solid waste landfill in Pleven or the river Vit												30	*									
Municipalities	Bulgaria	BG05	Medium	Municipally Waste Water Treatment Plant - Montana				35 Ogosta at Vratza	2.473	5.577	243	88	5.577	331	18,00	30	*	5,40	12,60	16.314	4	2.259	1			54.381
Municipalities	Bulgaria	BG06	Medium	Municipally Waste Water Treatment Plant - Popovo				41 Lom Rivers	971	2.191	81	31	2.191	112	8,73	30	*	2,62	6,11	23.384	6	2.789	2			77.946
Municipalities	Bulgaria	BG23	Medium	Kostinbrod and Bojuristhe - several small towns				36 Iskar at Sofija								30	*									
Municipalities	Bulgaria	BG08	Low	Municipally Waste Water Treatment Plant - Silistra					516	303	22	92	1.032	114	4,60	30	*	1,38	3,22	12.105	2	3.120	6			40.351
Municipalities	Bulgaria	BG09	Low	Municipally Waste Water Treatment Plant - Levski				50 Lower Danube-Siret&Prut	1.126	2.300	152	10	2.300	162	10,26	30	*	3,08	7,18	19.000	5	3.123	7			63.333
Municipalities	Bulgaria	BG24	Low	WWTP Russe				41 Lom Rivers	3.883	8.987	603	219	8.987	822		30	*									
Municipalities	Bulgaria	BG25	Low	WWTP Svishtov					700	1.512	68	20	1.512	88		30	*									
Municipalities	Bulgaria	BG26	Low	WWTP Vidin					1.099	2.314	243	82	2.314	325		30	*									
Municipalities	Bulgaria	BG27	Low	WWTP Lom					675	2.266	146	68	2.266	214		30	*									
	Subtotal								**28.639**	**62.682**	**2.879**	**1.594**	**63.411**	**4.473**	**198,73**			**59,62**	**139,11**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 12 Mizia-Dobrudzha

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	Bulgaria	BG11	High	Industrial Waste Water Treatment Plant - Sugar and Alcohol Factory Gorna Oriahovitza	0,300			40 Middle Yantra	5.440	11.360	350	60	11.360	410	3,23	30	0,97	2,26	2.363	1	199	1			7.878
Industry	Bulgaria	BG12	High	Industrial Waste Water reatment Plant - Fertilizer plant "CHIMKO" Vratza	0,280			35 Ogosta at Vratza	118	239	121	3	239	124	7,15	30	2,15	5,01	17.298	2	20.941	3			57.661
Industry	Bulgaria	BG13	High	Industrial Waste Water Treatment Plant - Pharmaceutical plant "ANTIBIOTIC" Razgrad	0,270			41 Lom Rivers	200	331	9	2	400	11	4,48	90	4,03	0,45	366.545	3	1.120	2			407.273
Industry	Bulgaria	BG14	Medium	Industrial Waste Water TreatmentvPlant - Metallurgical Plant "KREMNIKOVTSI"				36 Iskar at Sofija	98	160			196		72,85	50	36,43	36,43			185.842	4			
Industry	Bulgaria	BG15	Low	Industrial Waste Water Treatment Plant - mining complex "Elatzite"				36 Iskar at Sofija							8,18	30	2,45	5,73							
	Subtotal								**5.856**	**12.090**	**480**	**65**	**12.195**	**545**	**95,89**		**46,03**	**49,87**							
Agriculture	Bulgaria	BG20	High	Development of a hydrometric system for the Karaissen irrigation system												5									
	Subtotal								**0**	**0**	**0**	**0**	**0**	**0**	**0,00**		**0,00**	**0,00**							
Wetlands	Bulgaria	BG21	High	Balta Potelu							439	44		483	5,27		0,88	4,39	1.818						10.911
Wetlands	Bulgaria	BG22	High	Area of Bulgarian Danube Islands							750	75		825	9,00		1,50	7,50	1.818						10.909
Wetlands	Bulgaria	BG28	High	Balta Greaca / Tutrakan				42 Arges at Bucuresti			675	68		743	8,10		1,35	6,75	1.818						10.909
	Subtotal								**0**	**0**	**1.864**	**187**	**0**	**2.051**	**22,37**		**3,73**	**18,64**							
Total Sub-river Basin									**34.495**	**74.772**	**5.223**	**1.846**	**75.606**	**7.069**	**316,99**		**109,37**	**207,62**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 13 Muntenia

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Romania	RO03	High	Wastewater treatment plant Craiova	1,370			50 Lower Danube-Siret&Prut	5.997	5.862	597	245	11.994	842	32,00	5	1,60	30,40	1.900	1	2.535	5			38.005
Municipalities	Romania	RO08	High	Expansion of Waste Water Treatment Plant from Mangalia city	0,000			50 Lower Danube-Siret&Prut							5,40	50	2,70	2,70							
Municipalities	Romania	RO09	High	Waste water treatment plant of Braila Nord city	0,880			50 Lower Danube-Siret&Prut	4.526	3.750	822	0	9.052	822	21,90	30	6,57	15,33	7.993	2	1.694	3			26.642
Municipalities	Romania	RO10	High	Waste water treatment plant of Galati city	1,210			50 Lower Danube-Siret&Prut	6.028	5.540	812	275	12.056	1.087	29,50	30	8,85	20,65	8.142	3	1.713	4			27.139
Municipalities	Romania	RO13	High	Development of wastewater treatment plant of Campulung Muscel City	0,270			42 Arges at Bucuresti	237	282	37	18	473	55	1,50	90	1,35	0,15	24.545	5	317	2			27.273
Municipalities	Romania	RO53	High	WWTP of the city of Bucharest	6,000			42 Arges at Bucuresti	42.730	56.566	7.509	1.744	85.460	9.253	250,00	90	225,00	25,00	24.316	4	293	1			27.018
	Subtotal								**59.518**	**72.000**	**9.777**	**2.282**	**119.035**	**12.059**	**340,30**		**246,07**	**94,23**							
Industry	Romania	RO34	Medium	Ecological reconstruction of polluted zone around SC ROMFOSFOCHIM SA Valea Calugareasca				43 Lalomita near Ploiesti							2,80	20	0,56	2,24							
Industry	Romania	RO37	High	Wastewater treatment plant at SC CELOHART DONARIS - Braila				50 Lower Danube-Siret&Prut	621				1.242		2,70	30	0,81	1,89			1.522	1			
Industry	Romania	RO38	High	Wastewater treatment plant of SC COLOROM CODLEA SA					113				226		25,30	30	7,59	17,71			78.363	4			
Industry	Romania	RO40	High	Works for pollution reduction at UPS GOVORA S.A				50 Lower Danube-Siret&Prut							13,60	20	2,72	10,88							
Industry	Romania	RO41	High	Modernising the secondary treatment of WWTP – S.C. SIDERCA - CALARASI				42 Arges at Bucuresti		18			18		2,50	50	1,25	1,25			69.444	2			
Industry	Romania	RO42	High	Modernising WWTP for oil products and slug recovery at PETROBRAZI – PLOIESTI				43 Lalomita near Ploiesti							2,80	50	1,40	1,40							
Industry	Romania	RO43	High	WWTP at ARPECHIM S.A PITESTI				42 Arges at Bucuresti	50				100		13,90	50	6,95	6,95			69.500	3			
Industry	Romania	RO50	High	Pollution with petroleum products abatement in PLOIESTI Zone (pilot project)				43 Lalomita near Ploiesti							3,00	5	0,15	2,85							
Industry	Romania	RO58	High	Modernisation of water treatment installation at SC OLTCHIM SA				50 Lower Danube-Siret&Prut							0,66	20	0,13	0,53							
	Subtotal								**784**	**18**	**0**	**0**	**1.586**	**0**	**67,26**		**21,56**	**45,70**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 13 Muntenia

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Agriculture	Romania	RO19	High	Agricultural turning to good account of zootechnical waste at ROMSUIN TEST PERIS				43 Lalomita near Ploiesti	336	456	245		672	245	1,30	30	0,39	0,91	1.588	2	1.351	2			5.294
Agriculture	Romania	RO62	High	Expansion of WWTP at SC ULMENI				42 Arges at Bucuresti	221	488	330	1	488	331	0,98	50	0,49	0,49	1.481	1	1.004	1			2.962
	Subtotal								**557**	**944**	**575**	**1**	**1.160**	**576**	**2,28**		**0,88**	**1,40**							
Wetlands	Romania	RO64	High	Balta Potelu							1.024	102		1.126	12,29		2,05	10,24	1.818						10.915
Wetlands	Romania	RO65	High	Area of Bulgarian Danube Island							750	75		825	9,00		1,50	7,50	1.818						10.909
Wetlands	Romania	RO66	High	Balta Greaca / Tutrakan				42 Arges at Bucuresti			2.700	270		2.970	32,40		5,40	27,00	1.818						10.909
Wetlands	Romania	RO67	High	Kalarasch							750	75		825	9,00		1,50	7,50	1.818						10.909
	Subtotal								**0**	**0**	**5.224**	**522**	**0**	**5.746**	**62,69**		**10,45**	**52,24**							
Total Sub-river Basin									**60.859**	**72.962**	**15.576**	**2.805**	**121.781**	**18.381**	**472,53**		**278,96**	**193,57**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 14 Prut-Siret

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Romania	RO52	High	Wastewater Treatment Plant of Iasi city	1,700	0,000		47 Middle Prut	1.390	772	165	354	2.780	519	1,90	90	1,71	0,19	3.295	1	68	1			3.661
Municipalities	Moldova	MD12	High	Installation of Nutrient Removal Facilities at the Waste Water Treatment Plant Ungheni	0,130			47 Middle Prut	800	1.600	464		1.600	464		90									
Municipalities	Moldova	MD14	High	Installation of second and advanced stages of treatment at the Waste Water Treatment Plant in Cantemir	0,030			48 Lower Prut	53		14		105	14		90									
Municipalities	Ukraine	UA13	High	Extension and reconstruction of the Kolomiya Waste Water Treatment Facilities up to 45,000 m3 capacity				46 Upper Prut	149	223	71	22	298	93	8,80	50	4,40	4,40	47.312	4	14.765	4			94.624
Municipalities	Ukraine	UA14	High	Additional engineering networks and facilities for the processing for the Kolomiya WWTP	0,220			46 Upper Prut								5									
Municipalities	Ukraine	UA16	High	Processing and raise of environmental safety of mud formations in "Vodokanal" enterprise (Chernivtsi)				46 Upper Prut	95		29	4	190	33	1,00	20	0,20	0,80	6.135	3	4.211	3			30.675
Municipalities	Ukraine	UA17	High	Sanation, design and demonstration reconstruction of water supply and canalization facil. in Chernivtsi area of old building up aimed at improv. of water supply and reduction of soil displacement risk				46 Upper Prut							0,35	20	0,07	0,28							
Municipalities	Ukraine	UA18	High	Construction of the polygon for storage of solid waste in Chernivtsi (2nd stage).				46 Upper Prut							1,65	20	0,33	1,32							
Municipalities	Ukraine	UA19	High	Expansion and reconstruction of Chernivtsi canalization system including increase of its daily capacity up to 200.000 m3	1,060			46 Upper Prut	467	966	53	16	966	69	1,60	20	0,32	1,28	4.638	2	1.325	2			23.188
Municipalities	Moldova	MD13	Medium	WWTP Comrat & Taraclia				49 Yalpugh	2		2		4	2		5									
Municipalities	Moldova	MD08	Low	Water and sewage Completion Programme				48 Lower Prut							54,00	5	2,70	51,30							
Municipalities	Moldova	MD24	Low	Pilot project on sewerage systems in rural area				48 Lower Prut								5									
	Subtotal								**2.956**	**3.561**	**797**	**396**	**5.943**	**1.193**	**69,30**		**9,73**	**59,57**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 14 Prut-Siret

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Industry	Romania	RO36	High	Modernisation of installations from SC LETEA SA.- Bacau	0,000	0,000		45 Middle Siret-Bistrita&Trotus		1.699	551	155	1.699	706	1,50	50	0,75	0,75	1.062	1	441	1			2.125
Industry	Romania	RO39	High	Wastewater treatment plant expansion at SC ANTIBIOTICE SA - Iasi	0,000	0,000		47 Middle Prut	343	547	8	3	686	11	1,80	50	0,90	0,90	82.569	3	1.312	2			165.138
Industry	Romania	RO59	High	Modernisation and completion of the WWTP at FIBREX Savinesti	0,000	0,000		45 Middle Siret-Bistrita&Trotus							1,16	50	0,58	0,58							
Industry	Romania	RO60	High	Modernizing of the industrial WWT at SIDEX Galati	0,000	0,000		50 Lower Danube - Siret&Prut	1.774	2.535	755	11	3.548	765	73,20	50	36,60	36,60	47.831	2	10.316	3			95.661
Industry	Moldova	MD03	High	Giurgiulesti Oil Terminal				48 Lower Prut							38,00	20	7,60	30,40							
Industry	Moldova	MD15	High	Vulcanesti pesticide dump site				48 Lower Prut								20									
Industry	Moldova	MD16	High	Utilization of toxic industrial waste				48 Lower Prut								20									
Industry	Moldova	MD17	High	Rehabilitation of waste water facilities in industrial enterprises				48 Lower Prut								20									
Industry	Moldova	MD18	High	Modernization of waste water treatment facilities and improving waste management at wineries				48 Lower Prut								20									
Industry	Ukraine	UA15	Low	Implementation of the extended project of sewer erection designated for Luzhany industrial area waste water discharge and implem. of w. water purification technology at Luzhany Pilot Distillery Plant				46 Upper Prut							1,35	20	0,27	1,08							
	Subtotal								**2.117**	**4.781**	**1.314**	**168**	**5.933**	**1.482**	**117,01**		**46,70**	**70,31**							
Agriculture	Romania	RO20	High	Capacity increase of WWTP of COMTM TOMESTI	0,000	0,000		47 Middle Prut	35	73	27		73	27	10,00	90	9,00	1,00	338.346	2	13.699	2			375.940
Agriculture	Romania	RO63	High	WWTP at SC SUINPROD Independanta - jud. Galati	0,000	0,000		50 Lower Danube-Siret&Prut	350	409	226		700	226	0,80	30	0,24	0,56	1.062	1	800	1			3.540
Agriculture	Moldova	MD04	High	Water Resources Development Project				48 Lower Prut							12,00	5	0,60	11,40							
Agriculture	Moldova	MD19	Medium	Edinet pig farm				48 Lower Prut								20									
Agriculture	Moldova	MD20	High	Animal waste management				48 Lower Prut								5									
	Subtotal								**385**	**482**	**253**	**0**	**773**	**253**	**22,80**		**9,84**	**12,96**							
Wetlands	Romania	RO68	High	Lower Prut				48 Lower Prut			930	93		1.023	11,16		1,86	9,30	1.818						10.909
Wetlands	Moldova	MD23	High	Lower Prut				48 Lower Prut			1.395	140		1.535	16,74		2,79	13,95	1.818						10.906
	Subtotal								**0**	**0**	**2.325**	**233**	**0**	**2.558**	**27,90**		**4,65**	**23,25**							
Total Sub-river Basin									**5.458**	**8.824**	**4.689**	**797**	**12.649**	**5.486**	**237,01**		**70,92**	**166,09**							

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Sub-river Basin

Sub-river Basin: 15 Delta-Liman

Sector	Country	Project			Discharge of WWTP	River Low Flow Rate	Dilution Factor (DF)	Significant Impact Areas	Expected Load Reduction						Total Investment Costs	Incremental Percentage	Incremental Costs	Baseline Costs	Specific Incremental Costs		Specific Baseline Costs		Baseline Costs *DF		Total Investment Costs / NLR
		ID-No	Priority	Title					BOD	COD	N	P	LROM	NLR											
					(m^3/s)	(m^3/s)			t/y						(mil USD)	%	(mil USD)	(mil USD)	(USD/t)	Rank	(USD/t)	Rank		Rank	(USD/t)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Municipalities	Ukraine	UA11	Medium	Extension of the Waste Water Treament Faciclities in the Izmail Paper Factory (city WWTP)				51 Ukrainian Delta&Liman Lakes	41	109	133	24	109	157	3,60	50	1,80	1,80	11.465		16.514				22.930
Municipalities	Ukraine	UA07	Low	Priority measures on protection against flooding and improvement of sanitary and epidemic situation in Vilkovo				51 Ukrainian Delta&Liman Lakes							8,50	5	0,43	8,08							
Municipalities	Ukraine	UA08	Low	Kiliya protection against flooding (emergency measures)				51 Ukrainian Delta&Liman Lakes							1,90	5	0,10	1,81							
Municipalities	Ukraine	UA09	Low	Creation of the Waste Water Treatment Facilities in Reni, Reni Seaport				51 Ukrainian Delta&Liman Lakes							2,80	5	0,14	2,66							
Municipalities	Ukraine	UA10	Low	Construction of Vilkovo Waste Water Treatment Facilities				51 Ukrainian Delta&Liman Lakes							6,50	5	0,33	6,18							
Municipalities	Ukraine	UA12	Low	Vilkovo city-chanels erec reconstruction				51 Ukrainian Delta&Liman Lakes							2,40	5	0,12	2,28							
	Subtotal								**41**	**109**	**133**	**24**	**109**	**157**	**25,70**		**2,91**	**22,80**							
Agriculture	Ukraine	UA23	High	Reconstruction of irrigation systems taking into account their impact on the environment				51 Ukrainian Delta&Liman Lakes								5									
Agriculture	Ukraine	UA24	High	Rehabilitation of deteriorated pastureland				51 Ukrainian Delta&Liman Lakes								20									
Agriculture	Ukraine	UA27	Low	Animal farms in Kylia region - Put Lenina and Pgranichnik				51 Ukrainian Delta&Liman Lakes								20									
	Subtotal								**0**	**0**	**0**	**0**	**0**	**0**	**0,00**		**0,00**	**0,00**							
Wetlands	Romania	RO69	High	Polder Pardina				51 Ukrainian Delta&Liman Lakes			2.250	225		2.475	27,00		4,50	22,50	1.818						10.909
Wetlands	Moldova	MD25	High	Liman Lakes				51 Ukrainian Delta&Liman Lakes			585	59		644	7,02		1,17	5,85	1.818						10.901
Wetlands	Ukraine	UA32	High	Liman Lakes				51 Ukrainian Delta&Liman Lakes			1.365	137		1.502	16,38		2,73	13,65	1.818						10.905
Wetlands	Ukraine	UA33	High	Ukrainian part of Danube Delta				51 Ukrainian Delta&Liman Lakes			1.000	100		1.100	12,00		2,00	10,00	1.818						10.909
	Subtotal								**0**	**0**	**5.200**	**521**	**0**	**5.721**	**62,40**		**10,40**	**52,00**							
Total Sub-river Basin									**41**	**109**	**5.333**	**545**	**109**	**5.878**	**88,10**		**13,31**	**74,80**							

Annex 8.

Summary tables and graphs of pollution reduction and investment per Sub-river Basins

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Summary of pollution reduction and investments per Sub-river Basin

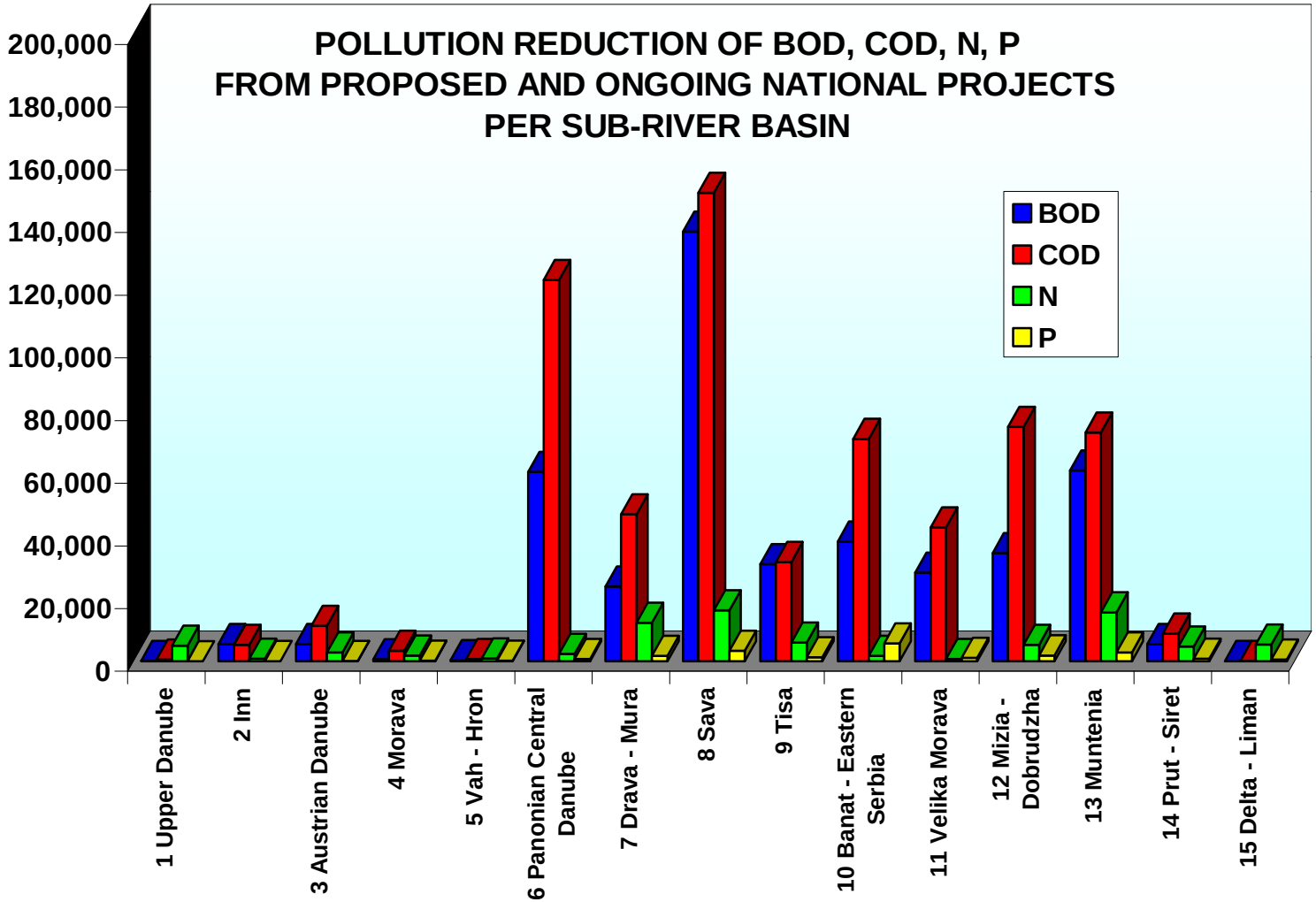
Sector	Sub-river Basin	Expected Load Reduction						Total Investment Costs	Incremental Costs	Baseline Costs
		BOD	COD	N	P	LROM	NLR			
		t/y						(mil.USD)	(mil. USD)	(mil. USD)
1	2	10	11	12	13	14	15	16	17	18
Municipality	1 Upper Danube	75	533	4,942	34	513	4,976	223	171	52
Industry	2 Inn	5,500	5,260	783	40	11,760	823	92	22	70
Agriculture	3 Austrian Danube	5,500	11,278	2,770	64	12,278	2,834	526	473	53
Wetlands	4 Morava	638	3,364	1,826	204	3,389	2,030	227	138	89
	5 Vah - Hron	373	678	915	199	836	1,113	68	26	42
	6 Panonian Central Danube	60,407	121,590	2,305	744	123,540	3,049	235	89	146
	7 Drava - Mura	23,793	46,864	12,243	1,742	53,201	13,985	792	159	633
	8 Sava	137,100	149,453	16,278	3,363	315,530	19,641	1,237	302	930
	9 Tisa	30,939	31,641	5,974	1,235	67,094	7,209	395	107	288
	10 Banat - Eastern Serbia	38,229	70,919	1,724	5,694	80,536	7,418	323	80	243
	11 Velika Morava	28,246	42,670	691	1,060	74,532	1,751	233	45	188
	12 Mizia - Dobrudzha	34,495	74,772	5,223	1,846	75,606	7,069	317	109	208
	13 Muntenia	60,859	72,962	15,576	2,805	121,781	18,381	473	279	194
	14 Prut - Siret	5,458	8,824	4,689	797	12,649	5,486	237	71	166
	15 Delta - Liman	41	109	5,333	545	109	5,878	88	13	75
Total Danube River Basin Area		**431,653**	**640,917**	**81,272**	**20,371**	**953,354**	**101,642**	**5,465.32**	**2,084.03**	**3,376.29**

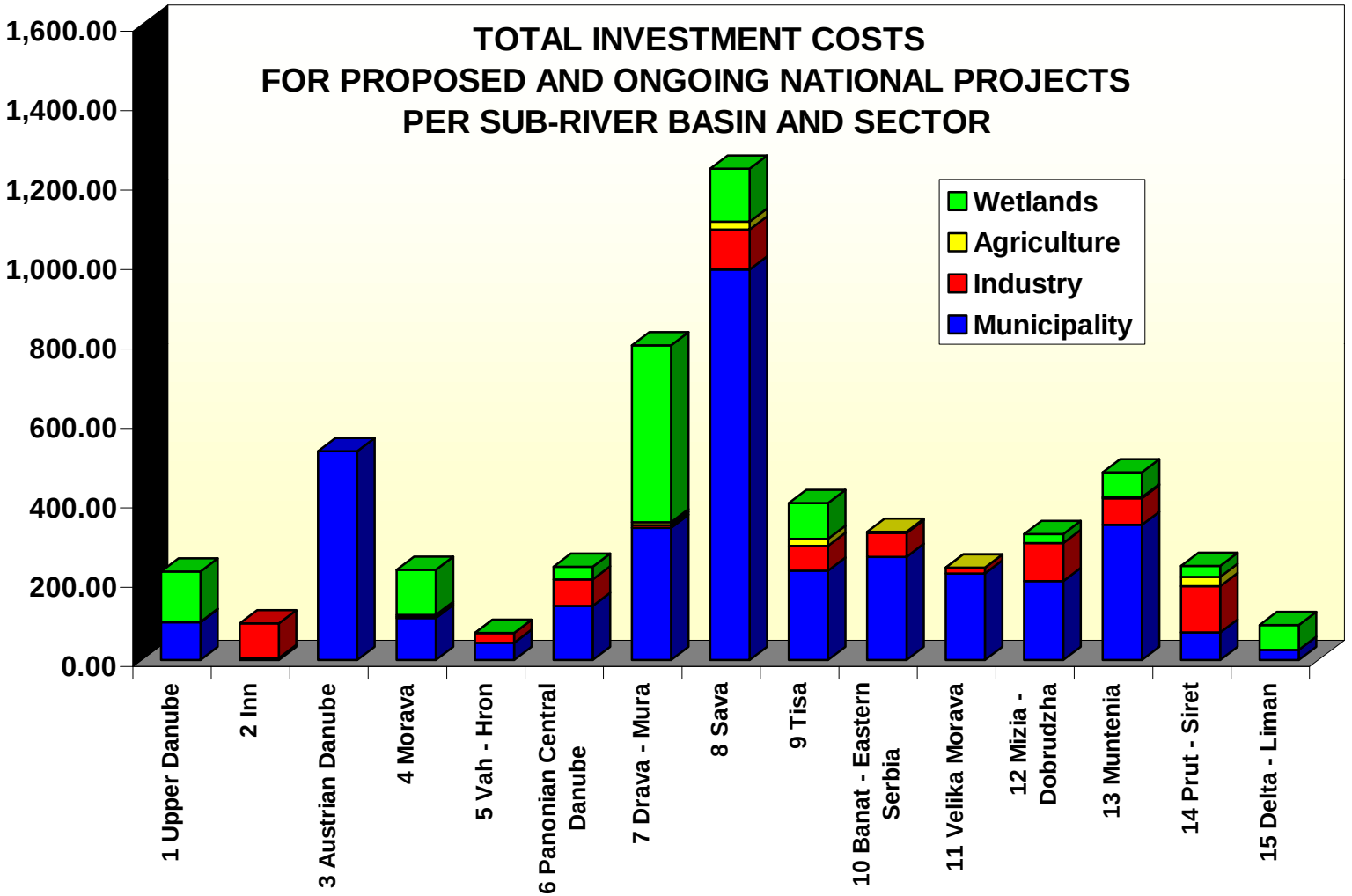
DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Summary of pollution reduction and investments per Sub-river Basin and sector

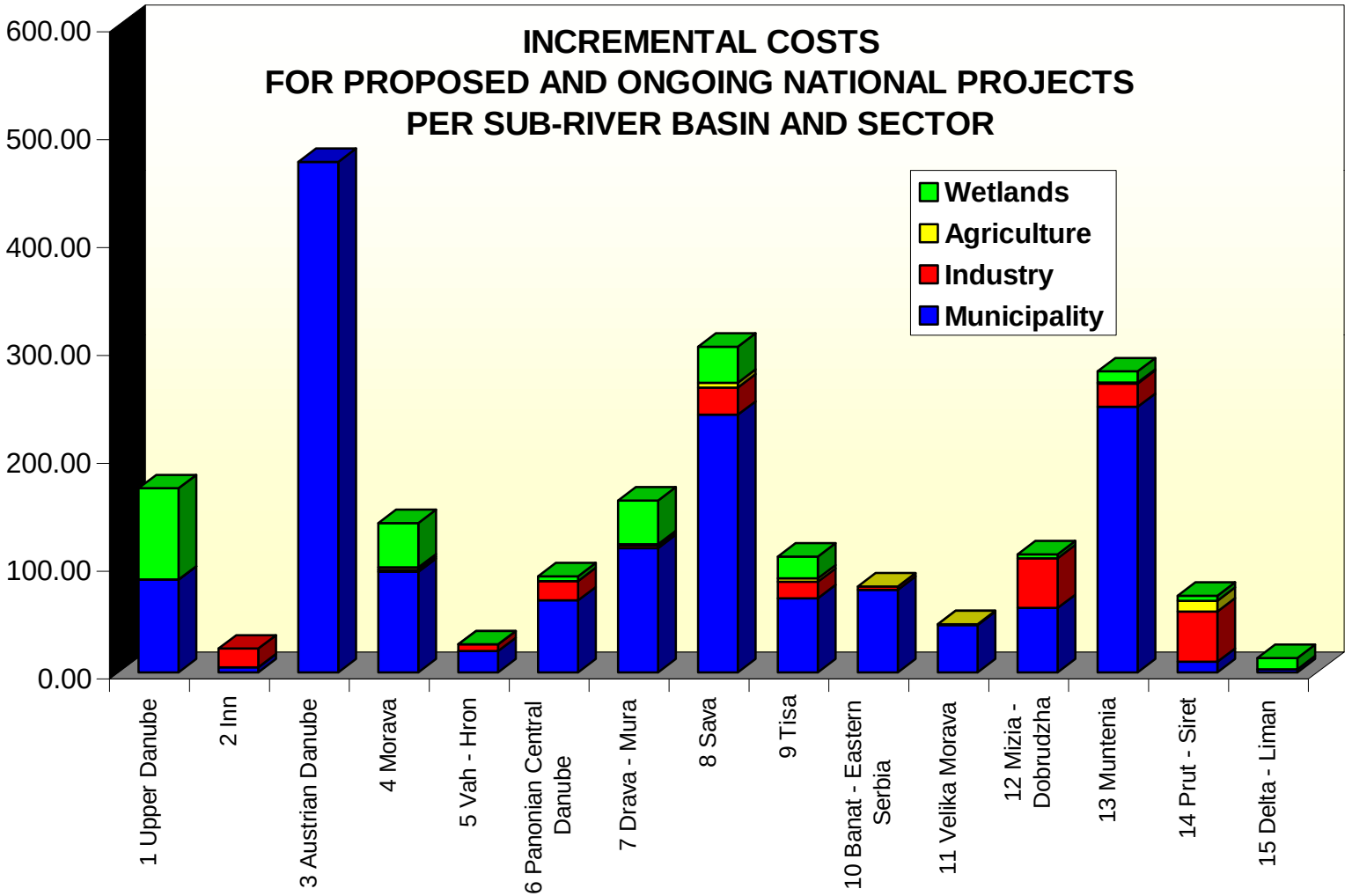
Sector	Sub-river Basin	Expected Load Reduction						Total Investment Costs	Incremental Costs	Baseline Costs
		BOD	COD	N	P	LROM	NLR			
		t/y						(mil.USD)	(mil. USD)	(mil. USD)
1	2	10	11	12	13	14	15	16	17	18
Municipality	1 Upper Danube	75	513	4,341	13	513	4,354	95.43	85.89	9.54
	2 Inn	0	0	68	0	0	68	5.14	4.63	0.51
	3 Austrian Danube	5,500	11,278	2,770	64	12,278	2,834	525.64	473.08	52.56
	4 Morava	516	2,850	942	115	2,850	1,057	105.63	93.07	12.56
	5 Vah - Hron	268	378	915	199	536	1,113	43.62	19.68	23.94
	6 Panonian Central Danube	58,077	116,840	985	648	116,840	1,633	136.45	66.65	69.80
	7 Drava - Mura	15,963	35,014	3,345	750	36,151	4,095	332.67	115.11	217.55
	8 Sava	82,778	73,144	7,324	1,519	179,331	8,843	983.42	238.81	744.62
	9 Tisa	23,658	19,818	2,734	894	49,705	3,628	225.06	68.58	156.48
	10 Banat - Eastern Serbia	36,695	66,729	1,200	1,840	75,318	3,040	259.50	76.45	183.05
	11 Velika Morava	23,746	18,500	560	1,011	48,262	1,571	218.00	43.90	174.10
	12 Mizia - Dobrudzha	28,639	62,682	2,879	1,594	63,411	4,473	198.73	59.62	139.11
	13 Muntenia	59,518	72,000	9,777	2,282	119,035	12,059	340.30	246.07	94.23
	14 Prut - Siret	2,956	3,561	797	396	5,943	1,193	69.30	9.73	59.57
	15 Delta - Liman	41	109	133	24	109	157	25.70	2.91	22.80
	Subtotal	**338,430**	**483,416**	**38,770**	**11,348**	**710,282**	**50,118**	**3,564.59**	**1,604.17**	**1,960.42**
Industry	1 Upper Danube	0	20	390	0	0	390	0.57	0.11	0.46
	2 Inn	5,500	5,260	715	40	11,760	755	86.90	17.38	69.52
	3 Austrian Danube									
	4 Morava	109	497	40	4	513	44	3.41	1.83	1.59
	5 Vah - Hron	105	300	0	0	300	0	24.32	6.23	18.09
	6 Panonian Central Danube	2,330	4,750	420	6	6,700	426	66.79	17.84	48.95
	7 Drava - Mura	3,190	4,750	315	71	6,950	386	7.23	2.21	5.01
	8 Sava	29,997	71,079	2,406	770	86,919	3,176	100.40	25.13	75.26
	9 Tisa	3,392	9,237	393	46	9,611	439	62.69	15.35	47.34
	10 Banat - Eastern Serbia	1,020	4,190	460	3,830	4,190	4,290	60.25	3.05	57.20
	11 Velika Morava	3,450	24,170	0	0	24,170	0	15.00	0.75	14.25
	12 Mizia - Dobrudzha	5,856	12,090	480	65	12,195	545	95.89	46.03	49.87
	13 Muntenia	784	18	0	0	1,586	0	67.26	21.56	45.70
	14 Prut - Siret	2,117	4,781	1,314	168	5,933	1,482	117.01	46.70	70.31
	15 Delta - Liman									
	Subtotal	**57,850**	**141,142**	**6,933**	**5,000**	**170,827**	**11,933**	**707.71**	**204.17**	**503.54**

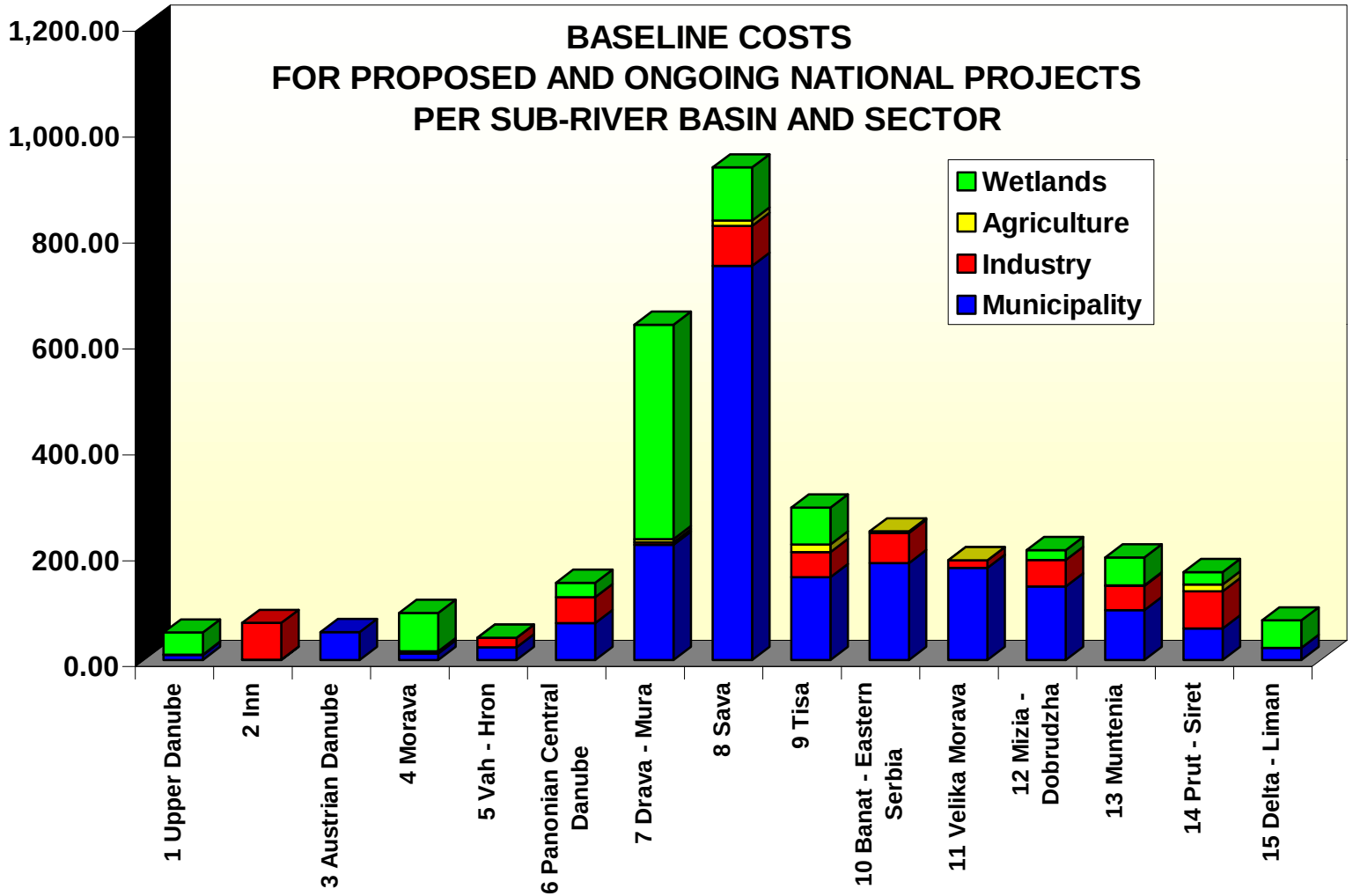
Summary of pollution reduc and investments per Sub-river Basin and sector

Sector	Sub-river Basin	Expected Load Reduction						Total Investment Costs	Incremental Costs	Baseline Costs
		BOD	COD	N	P	LROM	NLR			
		t/y						(mil.USD)	(mil. USD)	(mil. USD)
1	2	10	11	12	13	14	15	16	17	18
Agriculture	1 Upper Danube									
	2 Inn									
	3 Austrian Danube									
	4 Morava	13	17	159	16	26	175	4.60	2.30	2.30
	5 Vah - Hron									
	6 Panonian Central Danube									
	7 Drava - Mura	4,640	7,100	483	111	10,100	594	7.00	1.40	5.60
	8 Sava	24,325	5,230	3,211	740	49,280	3,951	19.90	4.47	10.43
	9 Tisa	3,889	2,586	821	93	7,778	914	17.67	3.11	14.56
	10 Banat - Eastern Serbia	514	0	64	24	1,028	88	2.85	0.14	2.71
	11 Velika Morava	1,050	0	131	49	2,100	180	0.00	0.00	0.00
	12 Mizia - Dobrudzha									
	13 Muntenia	557	944	575	1	1,160	576	2.28	0.88	1.40
	14 Prut - Siret	385	482	253	0	773	253	22.80	9.84	12.96
	15 Delta - Liman	0	0	0	0	0	0	0.00	0.00	0.00
	Subtotal	**35,373**	**16,359**	**5,697**	**1,034**	**72,245**	**6,731**	**77.09**	**22.14**	**49.95**
Wetlands	1 Upper Danube	0	0	211	21	0	232	126.60	84.60	42.00
	2 Inn									
	3 Austrian Danube									
	4 Morava	0	0	685	69	0	754	113.48	41.09	72.39
	5 Vah - Hron	0	0	0	0	0	0	0	0	0
	6 Panonian Central Danube	0	0	900	90	0	990	31.50	4.50	27.00
	7 Drava - Mura	0	0	8,100	810	0	8,910	445.50	40.50	405.00
	8 Sava	0	0	3,337	334	0	3,671	133.48	33.37	100.11
	9 Tisa	0	0	2,026	202	0	2,228	90.00	20.25	69.75
	10 Banat - Eastern Serbia									
	11 Velika Morava									
	12 Mizia - Dobrudzha	0	0	1,864	187	0	2,051	22.37	3.73	18.64
	13 Muntenia	0	0	5,224	522	0	5,746	62.69	10.45	52.24
	14 Prut - Siret	0	0	2,325	233	0	2,558	27.90	4.65	23.25
	15 Delta - Liman	0	0	5,200	521	0	5,721	62.40	10.40	52.00
	Subtotal	**0**	**0**	**29,872**	**2,989**	**0**	**32,861**	**1,115.93**	**253.54**	**862.38**
Total Danube River Basin Area		**431,653**	**640,917**	**81,272**	**20,371**	**953,354**	**101,642**	**5,465.32**	**2,084.03**	**3,376.29**


POLLUTION REDUCTION OF BOD, COD, N, P
FROM PROPOSED AND ONGOING NATIONAL PROJECTS
PER SUB-RIVER BASIN
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
BOD
COD
N
P
1 Upper Danube
2 Inn
3 Austrian Danube
4 Morava
5 Vah - Hron
6 Panonian Central Danube
7 Drava - Mura
8 Sava
9 Tisa
10 Banat - Eastern Serbia
11 Velika Morava
12 Mizia - Dobrudzha
13 Muntenia
14 Prut - Siret
15 Delta - Liman


TOTAL INVESTMENT COSTS
FOR PROPOSED AND ONGOING NATIONAL PROJECTS
PER SUB-RIVER BASIN AND SECTOR
1,600.00
1,400.00
1,200.00
1,000.00
800.00
600.00
400.00
200.00
0.00
Wetlands
Agriculture
Industry
Municipality
1 Upper Danube
2 Inn
3 Austrian Danube
4 Morava
5 Vah - Hron
6 Panonian Central Danube
7 Drava - Mura
8 Sava
9 Tisa
10 Banat - Eastern Serbia
11 Velika Morava
12 Mizia - Dobrudzha
13 Muntenia
14 Prut - Siret
15 Delta - Liman


INCREMENTAL COSTS
FOR PROPOSED AND ONGOING NATIONAL PROJECTS
PER SUB-RIVER BASIN AND SECTOR
600.00
500.00
400.00
300.00
200.00
100.00
0.00
Wetlands
Agriculture
Industry
Municipality
1 Upper Danube
2 Inn
3 Austrian Danube
4 Morava
5 Vah - Hron
6 Panonian Central Danube
7 Drava - Mura
8 Sava
9 Tisa
10 Banat - Eastern Serbia
11 Velika Morava
12 Mizia - Dobrudzha
13 Muntenia
14 Prut - Siret
15 Delta - Liman


BASELINE COSTS
FOR PROPOSED AND ONGOING NATIONAL PROJECTS
PER SUB-RIVER BASIN AND SECTOR
1,200.00
1,000.00
800.00
600.00
400.00
200.00
0.00
Wetlands
Agriculture
Industry
Municipality
1 Upper Danube
2 Inn
3 Austrian Danube
4 Morava
5 Vah - Hron
6 Panonian Central Danube
7 Drava - Mura
8 Sava
9 Tisa
10 Banat - Eastern Serbia
11 Velika Morava
12 Mizia - Dobrudzha
13 Muntenia
14 Prut - Siret
15 Delta - Liman

Annex 9.

Tables of proposed projects in relation to the 51 Significant Impact Areas and

Table of potential nutrient reduction through restoration of wetlands and floodplains

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 1 Middle Morava (CZ)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Czech Republic	CZ01	High	Extension of Municipal Waste Water Treatment Plant for the City of Brno (in Modrice)	4 Morava	118	705	277	62	39,70
Municipalities	Czech Republic	CZ02	High	Extension and Intensification of Waste Water Treatment Plant in Zlin - Malenovice	4 Morava	137	377	237	23	10,80
Municipalities	Czech Republic	CZ03	High	Reconstruction of the Technology in Waste Water Treatment Plant Uherske Hradiste	4 Morava	4	108	74	12	5,00
Municipalities	Czech Republic	CZ04	High	Intensification and Extension of Waste Water Treatment Plant Hodonin	4 Morava	15	75	60	10	2,32
Municipalities	Czech Republic	CZ09	Medium	M. Breclav - Reconstruction and intensification of WWTP (NP removal)	4 Morava	23	218	35	1	10,06
Municipalities	Czech Republic	CZ10	Medium	Prerov - WWTP reconstruction - biological stage and NP removal	4 Morava	138	1.015	94	1	8,66
Municipalities	Czech Republic	CZ18	Low	WWTP Kromeriz reconstruction - biological stage and N+P removal	4 Morava	81	352	70	2	9,20
Municipalities	Czech Republic	CZ19	Low	WWTP Prostejov reconstruction - biological stage and N+P removal	4 Morava			75	3	13,12
Industry	Czech Republic	CZ05	High	Intensification of Waste Water Treatment Plant Kozeluzny Otrokovice	4 Morava		442	30	4	2,41
Agriculture	Czech Republic	CZ07	High	Remedial Measures and Reduction of Slurry Production in the Pig Farm "Gigant Dubnany"	4 Morava	13	17	50	5	4,60
Agriculture	Czech Republic	CZ08	High	Milotice - Remedial measures in Pig Farm	4 Morava			60	7	
Agriculture	Czech Republic	CZ12	Medium	Remedial measures in Pig Farm Kunovice	4 Morava			19	2	
Agriculture	Czech Republic	CZ13	Medium	Remedial measures in Pig Farm Velke Nemcice	4 Morava			15	1	
Agriculture	Czech Republic	CZ22	Low	Remedial measures in Pig Farm Strachotice	4 Morava			15	1	
Wetlands	Czech Republic	CZ14	High	Floodplains next to Hodonin	4 Morava			520	52	70,58
Subtotal						**529**	**3.309**	**1.631**	**185**	**176,45**

Significant Impact Area: 2 Lower Morava (A, CZ, SK)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Czech Republic	CZ20	Low	WWTP Znojmor reconstruction - biological stage and N+P removal	4 Morava			20	2	6,77
Industry	Czech Republic	CZ11	Medium	Tanex Vladislav - WWTP reconstruction and N removal	4 Morava	3	15	10		
Wetlands	Austria	A07	High	Drösinger Wald	4 Morava			165	17	42,90
Wetlands	Slovakia	SK34	Low	Floodplain Meadow Restoration in the lower Morava River	4 Morava					
Subtotal						**3**	**15**	**195**	**19**	**49,67**

Significant Impact Area: 3 Szigetkoz (A, SK)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Austria	A01	High	Wien - HKA - extension and upgrade of NP removal	3 Austrian Danube	5.500	10.000	2.000		470,09
Municipalities	Austria	A02	High	Linz - Asten - extension and upgrade of NP removal	3 Austrian Danube		1.278	770	64	55,55
Industry	Slovakia	SK22	Low	The reduction of discharged wastewater pollution to the Danube River, AssiDomän Packaging Sturovo, a.s.	6 Pannonian Central Danube	1.650	1.350			9,08
Subtotal						**7.150**	**12.628**	**2.770**	**64**	**534,72**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 4 Danube Bend (SK,H)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Slovakia	SK02	High	Nitra - construction and expansion of WWTP	5 Váh-Hron			370	77	15,77
Municipalities	Hungary	H03	High	Györ town WWTP development and extension of the II. Treatment phase and sludge management	6 Pannonian Central Danube	1.100	2.200	273	43	12,67
Municipalities	Slovakia	SK03	Medium	Expansion of WWTP Banska Bystrica	5 Váh-Hron			346	72	16,96
Municipalities	Slovakia	SK06	Medium	Trencin-sewer system and WWTP	5 Váh-Hron	268	378	199	50	7,63
Municipalities	Slovakia	SK08	Low	Topolcany-WWTP upgrading	5 Váh-Hron					0,98
Municipalities	Slovakia	SK10	Low	Liptovsky Mikulas - reconstruction of wastewater treatment plant 2nd stage	5 Váh-Hron					2,29
Industry	Slovakia	SK11	High	Management of wastewater in NCHZ Nováky, a.s.	5 Váh-Hron					0,34
Industry	Slovakia	SK12	High	Removal of chlorinated hydrocarbons in the production of propylenoxid - Novaky Chemical Plant	5 Váh-Hron					0,86
Industry	Slovakia	SK14	Medium	Reconstruction of WWTP - Povazske Chemical Plant	5 Váh-Hron					0,63
Industry	Slovakia	SK16	Medium	Reconstruction of caprolactam holding tanks - Povazske chemical plant	5 Váh-Hron					1,64
Industry	Slovakia	SK17	Medium	Reconstruction of methylmethacrylate holding tanks - Povazske chemical plant	5 Váh-Hron					0,75
Industry	Slovakia	SK37	Medium	Istrochem Bratislava	6 Pannonian Central Danube					
Industry	Slovakia	SK15	Low	Reconstruction of ammonium storehouse Varin	5 Váh-Hron					1,82
Industry	Slovakia	SK23	Low	Construction of WWTP with reconstruction and expansion of sewer network, Bucina Zvolen	5 Váh-Hron					2,69
Industry	Slovakia	SK24	Low	Wastewater treatment plant reconstruction, Biotika Slovenska Lupca	5 Váh-Hron					1,43
Industry	Slovakia	SK25	Low	Centralise the collection and treatment of wastewater polluted by chrome, Kozeluzne Bosany	5 Váh-Hron					2,31
Industry	Slovakia	SK26	Low	Biological wastewater treatment / Wastewater treatment in Harmanecke Papierne, a.s. Harmanec	5 Váh-Hron	105	300			2,29
Industry	Slovakia	SK29	Low	Final landfill Chalmová - VI. construction	5 Váh-Hron					9,58
Subtotal						**1.473**	**2.878**	**1.188**	**242**	**80,61**

Significant Impact Area: 5 Gemenc-Kopacki Rit (H, HR, YU)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Hungary	H01	High	Expansion of wastewater treatment plant at North Budapest	6 Pannonian Central Danube	28.000	56.000	308	183	32,25
Municipalities	Hungary	H02	High	Expansion of wastewater treatment plant at South Pest	6 Pannonian Central Danube	18.700	37.400	203	122	27,89
Municipalities	Hungary	H04	High	Construction of the wastewater treatment plant at Dunaujvaros	6 Pannonian Central Danube	4.620	9.240	53	32	10,64
Municipalities	Croatia	HR25	High	The general solution of the sewerage system of city of Osijek	7 Drava-Mura	953	2.671	160	18	5,63
Municipalities	Croatia	HR28	Medium	The sewerage system and theWWTP of city of Belišce	7 Drava-Mura	1.364	2.538	27	1	4,80
Municipalities	Croatia	HR62	Medium	Centre for pre-processing and storage of dangerous waste for Osijek-Baranja county	7 Drava-Mura					1,77
Municipalities	Croatia	HR24	Low	The waste water treatment plant of city of Našice	7 Drava-Mura					1,10
Municipalities	Croatia	HR29	Low	The waste water treatment of city of Donji Miholjac	7 Drava-Mura					19,00
Municipalities	Croatia	HR74	Low	WWTP Vukovar	6 Pannonian Central Danube					
Industry	Hungary	H07	High	Water and wastewater development program at the Danube refinery of the MOL Company	6 Pannonian Central Danube	300	1.500			48,74
Industry	Hungary	H08	High	General reconstruction of the wastewater treatment system of the Nitrokémia Company	6 Pannonian Central Danube	380	1.900	420	6	5,85
Industry	Croatia	HR68	High	Belisce (paper)	7 Drava-Mura	1.100				
Industry	Croatia	HR69	High	IPK Osijek sugar factory	7 Drava-Mura					
Agriculture	Croatia	HR71	Medium	Farma Senkovac (pig farm)	7 Drava-Mura	1.500		7	3	
Agriculture	Croatia	HR75	Low	Renewal of animal stock at PIK "Belje"	7 Drava-Mura					
Wetlands	Hungary	H10	High	Area between Gemenec and Kopacki Rit - Rehabilitation and management of the water related ecosystems in the Danube-Drava Region	7 Drava-Mura			4.050	405	303,75
Wetlands	Yugoslavia	YU44	High	Area between Gemenc and Kopacki Rit	6 Pannonian Central Danube			900	90	31,50
Subtotal						**56.917**	**111.249**	**6.128**	**860**	**492,92**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 6 Middle Drava (A, SLO, HR)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Austria	A04	High	Klagenfurt - upgrade of N removal	7 Drava-Mura			90		7,69
Municipalities	Croatia	HR65	High	The reconstruction of the WWTP of city of Varazdin	7 Drava-Mura	1.162	1.779	132	1	12,00
Municipalities	Slovenia	SLO22	Medium	Ptuj	7 Drava-Mura	2.300	5.230	346	77	11,00
Industry	Slovenia	SLO29	Low	Diary Industry for Maribor	7 Drava-Mura	730	1.660	110	25	0,00
Wetlands	Croatia	HR67	High	Area between Gemenc and Kopacki Rit - Preservation and rehabilitation of the Drava river basin wetlands in Baranja region	7 Drava-Mura			4.050	405	141,75
Subtotal						**4.192**	**8.669**	**4.728**	**508**	**172,44**

Significant Impact Area: 7 Lower Mura - Drava (A, SLO, HR)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Austria	A03	High	Graz - extension and upgrade of NP removal	7 Drava-Mura	240	750	1.180	340	42,73
Municipalities	Slovenia	SLO09	High	WWTP municipal Lendava	7 Drava-Mura	460	1.050	69	15	5,00
Municipalities	Slovenia	SLO12	High	Construction of the Central WWTP Maribor and the Consession for the Treatment of Waste Water in Maribor	7 Drava-Mura	6.270	14.250	945	210	57,60
Municipalities	Slovenia	SLO14	High	WWWTP municipality Murska Sobota	7 Drava-Mura	1.250	2.850	189	42	9,90
Municipalities	Croatia	HR33	Medium	The sewerage system of town of Cepin	7 Drava-Mura					11,73
Municipalities	Croatia	HR34	Medium	The retention basin of the waste water treatment plant of Virovitica	7 Drava-Mura					1,77
Municipalities	Croatia	HR38	Medium	The WWTP of city of Novi Marof	7 Drava-Mura					2,34
Municipalities	Croatia	HR40	Medium	The WWTP of city of Koprivnica	7 Drava-Mura	604	806			10,84
Municipalities	Croatia	HR58	Medium	The building of the dump site “Pustošije” Cakovec	7 Drava-Mura					
Municipalities	Croatia	HR59	Medium	The municipal dump site of city of Slatina	7 Drava-Mura					0,21
Municipalities	Croatia	HR64	Medium	Improvement of sanitary Conditions of landfill in Nemetin – Sarvaš	7 Drava-Mura					
Municipalities	Slovenia	SLO11	Medium	Central WWTP Plant Ljutomer	7 Drava-Mura	310	710	49	11	2,84
Municipalities	Croatia	HR26	Low	The WWTP of city of Đurdenovac	7 Drava-Mura					2,96
Municipalities	Croatia	HR27	Low	The sewerage system of city of Đurdenovac	7 Drava-Mura					4,86
Municipalities	Croatia	HR30	Low	The WWTP of city of Orahovica	7 Drava-Mura					1,10
Municipalities	Croatia	HR31	Low	The sewerage system of town of Bizovac	7 Drava-Mura					1,23
Municipalities	Croatia	HR32	Low	The WWTP of town of Bizovac	7 Drava-Mura					4,13
Municipalities	Croatia	HR35	Low	The sewerage system and the WWTP of town of Ilok	7 Drava-Mura					31,13
Municipalities	Croatia	HR36	Low	The sewerage system and the WWTP of city of Slatina	7 Drava-Mura					3,68
Municipalities	Croatia	HR37	Low	The WWTPof city of Cakovec and nearby towns	7 Drava-Mura					7,32
Municipalities	Croatia	HR39	Low	The WWTP of city of Ivanec	7 Drava-Mura					0,95
Municipalities	Croatia	HR41	Low	The sewerage system and the waste water treatment plant of city of Prelog	7 Drava-Mura					7,78
Municipalities	Croatia	HR60	Low	The rehabilitation of the municipal dump site of city of Orahovica	7 Drava-Mura					0,75
Municipalities	Croatia	HR63	Low	Temporary landfill “Loncarica Velika”	7 Drava-Mura					2,70
Industry	Slovenia	SLO05	High	Wastewater treatment plant of the Paper Factory Sladkogorska (or Paloma)	7 Drava-Mura	1.050	2.380	158	35	3,00
Industry	Slovenia	SLO20	High	WWTP Pomurka Murska Sobota	7 Drava-Mura	310	710	47	11	0,00
Industry	Croatia	HR49	High	The waste water treatment plant of food industry “Kvasac-Podravka” d.d. of Koprivnica	7 Drava-Mura					0,23
Industry	Croatia	HR50	High	The WWTP of industrial area Danica of Koprivnica	7 Drava-Mura					4,00
Agriculture	Slovenia	SLO01	High	Construction of the Liquid Manure Treatment Plant Podgrad as a turn-key project	7 Drava-Mura	840	1.900	126	28	1,40
Agriculture	Slovenia	SLO18	High	Reconstruction of the Wastewater Treatment Plant for Pig Farmings Nemščak and Jezera of Izakovci.	7 Drava-Mura	2.300	5.200	350	80	5,60
Subtotal						**13.634**	**30.606**	**3.113**	**772**	**227,76**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 8 Danube At Novi Sad (YU)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Yugoslavia	YU03	High	City of Novi sad WWTP	6 Pannonian Central Danube	5.657	12.000	148	268	53,00
Industry	Yugoslavia	YU09	Low	Eco Filling Station, Novi Sad	6 Pannonian Central Danube					3,12
Subtotal						**5.657**	**12.000**	**148**	**268**	**56,12**

Significant Impact Area: 9 Upper Tisa (UA)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Industry	Ukraine	UA04	Medium	Complex utilization of timber with introduction of environmentally friendly technologies in Velykobychkiv Wood Chemistry Enterprise	9 Tisa	23			8	5,00
Industry	Ukraine	UA03	Low	Complex utilization of timber with introduction of environmentally friendly technologies in Teresva Woodprocessing Enterprise.	9 Tisa	23			30	5,00
Industry	Ukraine	UA26	Low	Rakhiv Cardboard Factory, Reconstruction of existing and construction of new WWT facilities and accumulations pounds, improvement of technological processes	9 Tisa	39				
Agriculture	Ukraine	UA02	Low	Construction of embankment on Tysa River in Tyachiv	9 Tisa					0,87
Subtotal						**85**	**0**	**0**	**38**	**10,87**

Significant Impact Area: 10 Somes (RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Romania	RO11	High	Waste water treatment plant of Zalau city	9 Tisa	476	846	112	34	7,00
Industry	Romania	RO46	High	Modernising WWTP CLUJANA S.A – Cluj-Napoca	9 Tisa					3,00
Industry	Romania	RO54	High	Modernization of wastewater treatment at SC SOMES SA DEJ	9 Tisa	993	3.522	91		0,60
Industry	Romania	RO55	High	Completion and modernisation of WWTP at Phoenix Baia Mare	9 Tisa		83			1,25
Agriculture	Romania	RO33	Medium	Consolidation and rehabilitation of sliding lands in Zalau city	9 Tisa					3,20
Subtotal						**1.469**	**4.451**	**203**	**34**	**15,05**

Significant Impact Area: 11 Latoritsa (SK, H)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
				no project identified						
Subtotal						**0**	**0**	**0**	**0**	**0,00**

Significant Impact Area: 12 Uzh (UA)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Ukraine	UA05	High	Extension and reconstruction of Waste Water Treatment Facilities of Uzhgorod (3 turn)	9 Tisa	646	807	107		25,00
Municipalities	Ukraine	UA25	Medium	WWTP Mukachevo	9 Tisa	43		25	13	
Subtotal						**689**	**807**	**132**	**13**	**25,00**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 13 Bodrog-Tisza (SK)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Slovakia	SK04	Medium	Upgrading of WWTP Michalovce	9 Tisa	56		219		3,26
Municipalities	Slovakia	SK05	Medium	Svidnik-sewer network and wastewater treatment plant	9 Tisa	120	100	64	6	11,71
Municipalities	Slovakia	SK07	Medium	Expansion of WWTPHumenné	9 Tisa	54		148		17,08
Industry	Slovakia	SK13	High	Reconstruction of wastewater treatment plant in Bukocel, a.s.	9 Tisa	102				5,71
Industry	Slovakia	SK18	Medium	Project 2000, Chemical plant Strazske	9 Tisa					2,00
Industry	Slovakia	SK19	Medium	Barrelling the chemicals for production - Chemical plant Strazske	9 Tisa					0,46
Industry	Slovakia	SK20	Medium	Reconstruction of activated sludge tanks of WWTP - Chemical plant Strazske	9 Tisa					0,43
Industry	Slovakia	SK21	Medium	Reconstruction of sewer system - Chemical plant Strazske	9 Tisa					2,86
Industry	Slovakia	SK28	Low	Reduction of contamination of groundwater and revitalisation of landfill in Krompachy	9 Tisa					
Industry	Slovakia	SK33	Low	Disposal of wastes from the PCB production, Chemko Strazske	9 Tisa					10,00
Wetlands	Slovakia	SK38	High	Mouth of Bodrog	9 Tisa			113	11	9,00
Wetlands	Hungary	H11	High	Mouth of Bodrog	9 Tisa			113	11	9,00
Subtotal						**332**	**100**	**656**	**28**	**71,51**

Significant Impact Area: 14 Sajo-Hornad (SK, H)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Slovakia	SK01	High	Kosice - expansion of wastewater treatment plant 2nd stage of construction	9 Tisa		2.388	447	107	25,71
Municipalities	Slovakia	SK09	Low	Roznava-expansion of wastewater treatment plant	9 Tisa					2,62
Industry	Hungary	H09	High	Salty technological water concentration and christalisation unit development for salt reuse - salty water reduction program	9 Tisa					2,93
Industry	Slovakia	SK27	Low	Sludge disposal upgrading in Wastewater Treatment Plant, VSZ Kosice	9 Tisa					3,29
Industry	Slovakia	SK30	Low	Reconstruction of wet waste tip, VSZ Kosice	9 Tisa					0,61
Industry	Slovakia	SK31	Low	Reconstruction of dry waste tip and waste liquidation, VSZ Kosice	9 Tisa					14,37
Industry	Slovakia	SK32	Low	Reconstruction of industrial landfill, Bukocel Hencovce	9 Tisa					1,43
Subtotal						**0**	**2.388**	**447**	**107**	**50,96**

Significant Impact Area: 15 Körös (RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Industry	Romania	RO45	High	Removal of chromium, zinc and phenols from the wastewater – SINTEZA Oradea	9 Tisa					0,33
Subtotal						**0**	**0**	**0**	**0**	**0,33**

Significant Impact Area: 16 Upper Mures (RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Industry	Romania	RO44	High	Ecologising the wet process in the platform TÎRGU MURES MANPEL S.A	9 Tisa					1,10
Industry	Romania	RO56	High	Expansion of discharging facilities and final disposal of waste at SC UPSOM SA OCNA Mures	9 Tisa					0,12
Subtotal						**0**	**0**	**0**	**0**	**1,22**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 17 Middle Mures (RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Romania	RO12	High	Development of waste water treatment plant of Resita city	10 Banat	1.502	1.729	241	527	3,50
Municipalities	Romania	RO14	High	Development of wastewater treatment plant of Deva city	9 Tisa	816	1.156	63	31	5,60
Industry	Romania	RO47	High	WWTP system at VIDRA S.A.- ORASTIE	9 Tisa					1,20
Subtotal						**2.318**	**2.885**	**304**	**558**	**10,30**

Significant Impact Area: 18 Lower Mures-Szeged (H, RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Hungary	H06	High	Construction of the wastewater treatment plant of Szeged, Mechanical treatment I/b Phase	9 Tisa	5.980	11.960	270	30	6,58
Industry	Romania	RO57	High	Modernisation of WWTP at SC INDAGRA SA Arad	9 Tisa	1.112	2.448	280		1,00
Subtotal						**7.099**	**14.416**	**559**	**40**	**18,58**

Significant Impact Area: 19 Palic-Ludos Lakes (YU)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Yugoslavia	YU15	High	Subotica - upgrading WWTP	9 Tisa	3.600		550	165	33,00
Municipalities	Yugoslavia	YU51	High	City of Senta WWTP	9 Tisa	1.261		36	50	14,00
Subtotal						**4.861**	**0**	**586**	**215**	**47,00**

Significant Impact Area: 20 Upper Banat (YU)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Industry	Yugoslavia	YU25	High	"Lepenka" - N. Knzevac	9 Tisa	1.100	3.184	22	8	
Agriculture	Yugoslavia	YU31	High	Neoplanta, Cenej	9 Tisa	1.160		146	55	8,00
Agriculture	Yugoslavia	YU36	High	PDP Galad - Kikinda	9 Tisa					
Wetlands	Yugoslavia	YU58	High	Lower Tisza	9 Tisa			1.800	180	72,00
Subtotal						**2.260**	**3.184**	**1.968**	**243**	**80,00**

Significant Impact Area: 21 Vrbas-DTD Canal (YU)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Yugoslavia	YU11	Medium	Vrbas/Kula/Crvenka	9 Tisa	3.390		90	143	34,00
Agriculture	Yugoslavia	YU29	High	FARMACOOP - DD Carmex, Vrbas	9 Tisa	820		102	38	5,00
Subtotal						**4.210**	**0**	**192**	**181**	**39,00**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 22 Middle Banat-Bega&Birzava (YU, RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Romania	RO51	High	Expansion of WWTP of Timisoara city	9 Tisa	3.284	2.561	444	101	1,50
Industry	Yugoslavia	YU42	Low	The Recultivation of Ash Dump Sites	10 Banat-Eastern Serbia					0,25
Agriculture	Romania	RO61	Medium	WWTP at CONSUIN BEREGSAU Timis	9 Tisa	1.909	2.586	573		0,60
Subtotal						**5.193**	**5.147**	**1.017**	**101**	**2,35**

Significant Impact Area: 23 Upper Sava (SLO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Slovenia	SLO06	High	Central Waste Water Treatment Plant Celje - outline solution with new input data	8 Sava	1.880	4.270	283	63	11,80
Municipalities	Slovenia	SLO10	High	Wastewater treatment plan municipality Ljubljana	8 Sava	10.460	23.750	1.575	350	124,20
Municipalities	Slovenia	SLO15	High	Construction of the second phase of Central WWTP of Šaleška dolina (Šalek valley)	7 Drava-Mura	1.050	2.380	158	35	29,14
Municipalities	Slovenia	SLO13	Medium	Central WWTP Plant Metlika	8 Sava	120	260	17	4	1,60
Municipalities	Slovenia	SLO16	Medium	Central WWTP Plant Vrhnika	8 Sava					3,20
Municipalities	Slovenia	SLO17	Medium	Upgrading of the central WWTPDomzale - Kamnik - nitrification/denitrification	8 Sava	4.180	9.500	630	140	13,70
Municipalities	Slovenia	SLO25	Medium	Brezice	8 Sava	210	480	32	7	2,20
Municipalities	Slovenia	SLO07	Low	WWTP municipal Crnomelj	8 Sava	210	480	32	7	2,10
Industry	Slovenia	SLO03	Low	WWTP of the Brewery Union, Ljubljana	8 Sava	1.460	3.330	220	49	3,90
Industry	Slovenia	SLO28	Low	Diary Industry for Ljubljana	8 Sava	630	1.430	95	21	0,00
Industry	Slovenia	SLO02	High	Wastewater treatment plant Brewery Laško	8 Sava	1.050	2.380	158	35	13,20
Industry	Slovenia	SLO04	High	Wastewater treatment plant of the Paper Factory ICEC Krško	8 Sava	9.400	21.380	1.418	315	17,40
Industry	Slovenia	SLO21	High	Wastewater Treatment Plant Leather Processing industry of Vrhnika	8 Sava	2.090	4.750	315	70	17,00
Agriculture	Slovenia	SLO24	High	Farm Ihan	8 Sava	2.300	5.230	346	77	0,00
Subtotal						**35.040**	**79.620**	**5.279**	**1.173**	**239,44**

Significant Impact Area: 24 Sutla (SLO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Slovenia	SLO19	High	Wastewater Treatment Plant Municipality Rogaška Slatina	8 Sava					3,64
Subtotal						**0**	**0**	**0**	**0**	**3,64**

Significant Impact Area: 25 Kupa (HR)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Croatia	HR12	High	The sewerage and waste water treatment of the National Park Plitvice lakes	8 Sava					16,00
Municipalities	Croatia	HR11	Low	The sewerage and waste water treatment of city of Ogulin	8 Sava					3,35
Subtotal						**0**	**0**	**0**	**0**	**19,35**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 26 Middle Sava-Kupa (HR)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Croatia	HR14	High	The sewerage and waste water treatment of cities of Karlovac and Duga Resa	8 Sava	2.026	1.177	9	16	50,00
Municipalities	Croatia	HR04	Medium	The waste water treatment plant of city of Bjelovar.	8 Sava	744	1.255			6,66
Municipalities	Croatia	HR07	Medium	The sewerage and waste water treatment of cities of Grubišno Polje and Mali Zdenci along with PPI "Zdenka" Veliki Zdenci	8 Sava	604		16	1	6,21
Municipalities	Croatia	HR13	Medium	The sewerage and waste water treatment of city of Sisak	8 Sava	700	919	48	2	60,00
Municipalities	Croatia	HR15	Medium	The sewerage and waste water treatment of city of Petrinja and neighbourhood towns	8 Sava					31,00
Municipalities	Croatia	HR18	Medium	The waste water treatment plant of city of Sesvete—east	8 Sava					
Municipalities	Croatia	HR20	Medium	The waste water treatment plant of city of Sesvete-north-east	8 Sava					
Municipalities	Croatia	HR21	Medium	The waste water treatment plant of city of Zaprešic	8 Sava					
Municipalities	Croatia	HR23	Medium	The waste water treatment plant of city of Krašic	8 Sava					0,55
Municipalities	Croatia	HR51	Medium	The rehabilitation of the municipal dump site of city of Sisak	8 Sava					6,15
Municipalities	Croatia	HR52	Medium	The municipal dump site "Doline" of city of Bjelovar	8 Sava					2,24
Municipalities	Croatia	HR53	Medium	The municipal dump site "Grginac" of city of Bjelovar	8 Sava					0,94
Municipalities	Croatia	HR54	Medium	The rehabilitation of the municipal dump site of city of Daruvar	8 Sava					1,20
Municipalities	Croatia	HR06	Low	The waste water treatment plant of city of Velika	8 Sava					1,00
Municipalities	Croatia	HR08	Low	The sewerage and waste water treatment of city of Daruvar	8 Sava					0,94
Municipalities	Croatia	HR09	Low	The sewerage and waste water treatment of city of Garešnica	8 Sava					2,35
Municipalities	Croatia	HR10	Low	The sewerage and waste water treatment of cities of Pakrac and Lipik	8 Sava					1,65
Municipalities	Croatia	HR16	Low	The central waste water treatment plant of area of cities of Zabok-Orosavlje- Gornja and Donja Stubica	8 Sava					27,30
Municipalities	Croatia	HR17	Low	The waste water treatment plant of city of Samobor	8 Sava					
Municipalities	Croatia	HR22	Low	The waste water treatment plant of city of Velika Gorica	8 Sava					2,20
Municipalities	Croatia	HR56	Low	The municipal dump site of city of Oriovac	8 Sava					0,04
Municipalities	Croatia	HR03	High	The sewerage and waste water treatment of city of Kutina and surrounding settlements	8 Sava					12,00
Municipalities	Croatia	HR19	High	The central waste water treatment plant of city of Zagreb	8 Sava	10.438	29.743	1.320	220	256,00
Industry	Croatia	HR47	High	The waste water treatment plant of "Agroproteinka" d.d.	8 Sava					
Industry	Croatia	HR70	High	WWTP Zapresic	8 Sava					
Industry	Croatia	HR45	Medium	The waste water treatment of meat industry PIK "Vrbovec"	8 Sava					
Industry	Croatia	HR46	Medium	The waste water treatment of meat industry "Gavrilovic" d.o.o. Petrinja	8 Sava					0,34
Industry	Croatia	HR48	Medium	The building of the system for the collection and treatment of highly polluted waste water of "Petrokemija" d.d. Kutina	8 Sava	47	209			0,95
Agriculture	Croatia	HR42	Low	The sewerage system and waste water treatment of the farm "Dubravica" d.d.	8 Sava					
Subtotal						**14.559**	**33.303**	**1.393**	**239**	**469,73**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 27 Middle Sava-Una&Vrbas (SLO, HR, BH)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Slovenia	SLO08	High	Central Waste Water Treatment Plant of town Krško - outline scheme	8 Sava	310	710	47	11	2,50
Municipalities	Bosnia-Herzegovina	BH03	High	Construction of regional sewerage system Banja Luka with central waste water treatment plant city and industry	8 Sava	13.500		910	140	50,00
Municipalities	Croatia	HR01	Medium	The sewerage and waste water treatment of city of Slavonski Brod and wider area	8 Sava	201	600	52		50,00
Municipalities	Croatia	HR55	Medium	The rehabilitation of the municipal dump site of city of Nova Gradiška	8 Sava					0,10
Municipalities	Croatia	HR57	Medium	The dump site of Požeška kotlina region	8 Sava					1,56
Municipalities	Croatia	HR61	Medium	Regional landfill for Eastern Slavonija	7 Drava-Mura					27,00
Municipalities	Bosnia-Herzegovina	BH04	Medium	Construction regional sewerage system Gornji Vakuf- Bugojno-Donji Vakuf with central waste water treatment plant for cities and industry.	8 Sava	1.385		95	14	18,50
Municipalities	Bosnia-Herzegovina	BH07	Low	Construction of collecting system Pliva-Jajce with central waste water treatment	8 Sava					6,05
Industry	Bosnia-Herzegovina	BH12	High	Reconstruction and improve waste water treatment plant from "Incel" Banja Luka	8 Sava	3.960	19.400			3,50
Industry	Bosnia-Herzegovina	BH14	High	Construction waste water treatment plant for "Celpak" Prijedor	8 Sava	2.380	12.370			14,00
Agriculture	Croatia	HR72	High	Farma Luzani	8 Sava	3.600			1	
Agriculture	Bosnia-Herzegovina	BH19	High	Construction of waste water treatment plant for dairy and pigs breeding farm in the Nova Topola.	8 Sava	7.200		1.130	250	6,50
Wetlands	Croatia	HR76	High	Mokro Polje	8 Sava			837	84	33,48
Subtotal						**32.536**	**33.080**	**3.071**	**500**	**213,18**

Significant Impact Area: 28 Lower Sava-Bosna (HR, BH)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil.USD)
1	2	3	4	5	6	7	8	9	10	18
Municipalities	Croatia	HR02	High	The sewerage and waste water treatment of city of Zupanja	8 Sava	40				11,00
Municipalities	Croatia	HR05	High	The sewerage and waste water treatment of city of Vinkovci.	8 Sava	190				12,00
Municipalities	Bosnia-Herzegovina	BH01	High	Construction of regional sewerage system Tuzla-Lukavac with central waste water treatment plant for cities and industry.	8 Sava	15.840		1.080	160	58,00
Municipalities	Bosnia-Herzegovina	BH02	High	Rehabilitation and reconstruction sewerage and industry waste water treatment plant of city Sarajevo	8 Sava	14.850		1.015	150	15,00
Municipalities	Bosnia-Herzegovina	BH05	Medium	Construction of regional sewerage system Sarajevo-Visoko with central waste water treatment plant near Visoko for cities and industry.	8 Sava	990		68	10	28,50
Municipalities	Bosnia-Herzegovina	BH06	Low	Construction of regional sewerage system Travnik-Vitez with central waste water treatment plant near Vitez for cities and industry.	8 Sava					10,00
Municipalities	Bosnia-Herzegovina	BH08	Low	Construction sewerage system Zenica with central waste water treatment plant for city and industry	8 Sava					24,00
Industry	Bosnia-Herzegovina	BH10	High	Reconstruction waste water pre-treatment plant in Chlorine Alkaline Complex in Tuzla	8 Sava					2,20
Industry	Bosnia-Herzegovina	BH11	High	Reconstruction of waste water pre-treatment plant in Coke Chemical Combine Lukavac	8 Sava	860	5.250			2,80
Industry	Bosnia-Herzegovina	BH13	High	Rehabilitation and reconstruction waste water treatment plant in "Natron" Maglaj	8 Sava	7.920				3,00
Industry	Bosnia-Herzegovina	BH15	Medium	Reconstruction of industry waste water treatment plant for DD "Zeljezara" Zenica	8 Sava					1,60
Industry	Bosnia-Herzegovina	BH16	Medium	Construction of industrial waste water treatment in the Sodium Factory Lukavac	8 Sava					6,00
Agriculture	Bosnia-Herzegovina	BH21	Medium	Construction of waste water treatment plant for dairy farm "Spreca" Kalesija	8 Sava	35		5	2	2,20
Agriculture	Bosnia-Herzegovina	BH22	Low	Construction of waste water treatment plant for dairy farm "Butmir" Sarajevo	8 Sava					1,90
Total						**40.725**	**5.250**	**2.168**	**322**	**178,20**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 29 Tara Canyon (YU)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Yugoslavia	YU10	High	Mojkovac Town WWTP	8 Sava	118		3	5	3,00
Municipalities	Yugoslavia	YU53	High	Kolasin Town WWTP	8 Sava	175		5	7	3,00
Subtotal						**293**	**0**	**8**	**12**	**6,00**

Significant Impact Area: 30 Lower Sava-Drina (BH, YU)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Bosnia-Herzegovina	BH09	Low	Construction sewerage system Bijelijina with central waste water treatment plant for city and industry.	8 Sava					12,00
Industry	Bosnia-Herzegovina	BH17	Low	Construction of industrial waste water treatment plant for "Destilacija drveta" Teslic	8 Sava					5,30
Industry	Bosnia-Herzegovina	BH18	Low	Construction of Industrial waste water treatment plant for DD "Maglic" Foca	8 Sava					9,20
Agriculture	Bosnia-Herzegovina	BH20	Medium	Construction of waste water treatment plant for pigs breeding farm in the Brcko	8 Sava	9.900		1.570	350	2,30
Agriculture	Bosnia-Herzegovina	BH23	Low	Construction of waste water treatment plant for dairy and pigs breeding farm Bijeljina.	8 Sava					2,00
Wetlands	Bosnia-Herzegovina	BH24	High	Area of Mouth of Drina	8 Sava			2.000	200	80,00
Wetlands	Yugoslavia	YU57	High	Area of Mouth of Drina	8 Sava			500	50	20,00
Subtotal						**9.900**	**0**	**4.070**	**600**	**130,80**

Significant Impact Area: 31 Sava at Beograde (YU)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Yugoslavia	YU01	High	WWTP "Veliko Selo" - Belgrade (central)	10 Banat-Eastern Serbia	31.536	65.000	876	1.183	215,00
Municipalities	Yugoslavia	YU02	High	WWTP "Ostruznica" - Belgrade	10 Banat-Eastern Serbia	1.084		30	41	13,00
Municipalities	Yugoslavia	YU07	High	City of Sabac WWTP	8 Sava	1.912		43	102	18,00
Municipalities	Yugoslavia	YU55	High	WWTP Valjevo	8 Sava	1.695		44	110	10,00
Industry	Yugoslavia	YU28	High	HI "Zarka" - Sabac	8 Sava	200	580	200	280	
Industry	Yugoslavia	YU23	Low	Ash Dump Belgrade	10 Banat-Eastern Serbia					
Agriculture	Yugoslavia	YU30	High	D. Makovic, Obrenovac	8 Sava	470		58	22	5,00
Agriculture	Yugoslavia	YU35	High	Surcin (Pig farm)	8 Sava	820		102	38	
Subtotal						**37.717**	**65.580**	**1.353**	**1.776**	**261,00**

Significant Impact Area: 32 Western&Southern Morava (YU)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Yugoslavia	YU04	High	City of Nis WWTP	11 Velika Morava	5.302	11.000	124	260	45,00
Municipalities	Yugoslavia	YU05	High	City of Pristina WWTP	11 Velika Morava	3.563	7.500	86	133	40,00
Municipalities	Yugoslavia	YU08	High	City of Leskovac WWTP	11 Velika Morava	2.874		44	119	25,00
Municipalities	Yugoslavia	YU12	High	Krusevac WWTP	11 Velika Morava	2.779		50	71	24,00
Municipalities	Yugoslavia	YU13	High	Cacak WWTP	11 Velika Morava	2.466		62	125	24,00
Municipalities	Yugoslavia	YU14	High	Novi Pazar WWTP	11 Velika Morava	1.620		38	90	0,00
Municipalities	Yugoslavia	YU16	High	Uzice WWTP	11 Velika Morava	1.399		33	56	14,00
Municipalities	Yugoslavia	YU52	High	Blace Town WWTP	11 Velika Morava	310		38	13	8,00
Municipalities	Yugoslavia	YU54	High	WWTP Vranje	11 Velika Morava	1.853		43	83	18,00
Municipalities	Yugoslavia	YU56	High	WWTP Rozaje	11 Velika Morava	355		6	11	6,00
Municipalities	Yugoslavia	YU06	Medium	City of Zrenjanin WWTP	9 Tisa	3.932		160	214	38,00
Industry	Yugoslavia	YU21	High	FOPA paper mill, Vladicin Han	11 Velika Morava		15.000			15,00
Industry	Yugoslavia	YU24	High	TE "Obilic" A and B - Obilic	11 Velika Morava	3.450	9.170			
Industry	Yugoslavia	YU26	High	Trepca - Topionica	11 Velika Morava					
Industry	Yugoslavia	YU27	High	Trepca - Flotacija	11 Velika Morava					
Agriculture	Yugoslavia	YU33	High	DP1. Decembar - pig farm - Zitoradja	11 Velika Morava	470		56	22	
Agriculture	Yugoslavia	YU34	High	DP Pik Varvarinsko Polje - Varvarin	11 Velika Morava	580		73	27	
Subtotal						**30.953**	**42.670**	**813**	**1.224**	**257,00**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 33 Danube at Iron Gate (YU, RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Agriculture	Yugoslavia	YU37	High	Petrovac na Mlavi - Pig Farm DP "Petrovac"	10 Banat-Eastern Serbia	514		64	24	
Agriculture	Romania	RO32	Medium	Dams rehabilitation alongside Danube River from the „Iron Gates“ – km 875 to Isaccea – km 103	10 Banat-Eastern Serbia					2,85
Subtotal						**514**	**0**	**64**	**24**	**2,85**

Significant Impact Area: 34 Lower Timok (YU)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Yugoslavia	YU17	High	Zajecar WWTP	10 Banat-Eastern Serbia	1.315		31	50	14,00
Municipalities	Yugoslavia	YU18	High	Bor WWTP	10 Banat-Eastern Serbia	1.258		22	39	14,00
Municipalities	Yugoslavia	YU19	High	Pirot WWTP	11 Velika Morava	1.225		36	50	14,00
Industry	Yugoslavia	YU20	High	RTB BOR	10 Banat-Eastern Serbia	580	2.110		30	35,00
Industry	Yugoslavia	YU22	High	IHP Prahovo (fertilizers)	10 Banat-Eastern Serbia	440	2.020	460	3.800	25,00
Subtotal						**4.818**	**4.130**	**549**	**3.969**	**102,00**

Significant Impact Area: 35 Ogosta at Vratza (BG)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Bulgaria	BG05	Medium	Municipally Waste Water Treatment Plant - Montana	12 Mizia-Dobrudzha	2.473	5.577	243	88	18,00
Municipalities	Bulgaria	BG02	High	Municipally Waste Water Treatment Plant - Vratza	12 Mizia-Dobrudzha	784	1.826	258	43	7,60
Industry	Bulgaria	BG12	High	Industrial Waste Water reatment Plant - Fertilizer plant "CHIMKO" Vratza	12 Mizia-Dobrudzha	118	239	121	3	7,15
Subtotal						**3.375**	**7.642**	**622**	**134**	**32,75**

Significant Impact Area: 36 Iskar at Sofija (BG)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Bulgaria	BG03	High	Municipally Waste Water Treatment Plant - Sofia	12 Mizia-Dobrudzha	5.823	12.051	273	551	105,82
Municipalities	Bulgaria	BG23	Medium	Kostinbrod and Bojuristhe - several small towns	12 Mizia-Dobrudzha					
Industry	Bulgaria	BG14	Medium	Industrial Waste Water TreatmentvPlant - Metallurgical Plant "KREMNIKOVTSI"	12 Mizia-Dobrudzha	98	160			72,85
Industry	Bulgaria	BG15	Low	Industrial Waste Water Treatment Plant - mining complex "Elatzite"	12 Mizia-Dobrudzha					8,18
Subtotal						**5.921**	**12.211**	**273**	**551**	**186,85**

Significant Impact Area: 37 Ossam at Troyan (BG)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Bulgaria	BG07	High	Municipally Waste Water Treatment Plant - Troyan	12 Mizia-Dobrudzha	1.634	3.996	121	56	16,98
Subtotal						**1.634**	**3.996**	**121**	**56**	**16,98**

Significant Impact Area: 38 Ossam at Lovetch (BG)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil.USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Bulgaria	BG01	High	Municipally Waste Water Treatment Plant - Lovetch	12 Mizia-Dobrudzha	1.382	2.927	69	44	17,83
Subtotal						**1.382**	**2.927**	**69**	**44**	**17,83**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 39 Rossitza at Sevlievo (BG, MD)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Bulgaria	BG04	High	Municipally Waste Water Treatment Plant - Sevlievo	12 Mizia-Dobrudzha	1.014	2.062	136	43	8,91
Subtotal						**1.014**	**2.062**	**136**	**43**	**8,91**

Significant Impact Area: 40 Middle Yantra (BG)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Bulgaria	BG10	High	Municipal Waste Water treatment Plant Gorna Oryahovitza & Lyaskovetz	12 Mizia-Dobrudzha	6.559	14.370	464	247	
Industry	Bulgaria	BG11	High	Industrial Waste Water Treatment Plant - Sugar and Alcohol Factory Gorna Oriahovitza	12 Mizia-Dobrudzha	5.440	11.360	350	60	3,23
Subtotal						**11.999**	**25.730**	**814**	**307**	**3,23**

Significant Impact Area: 41 Lom Rivers (BG)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Bulgaria	BG06	Medium	Municipally Waste Water Treatment Plant - Popovo	12 Mizia-Dobrudzha	971	2.191	81	31	8,73
Municipalities	Bulgaria	BG24	Low	WWTP Russe	12 Mizia-Dobrudzha	3.883	8.987	603	219	
Industry	Bulgaria	BG13	High	Industrial Waste Water Treatment Plant - Pharmaceutical plant "ANTIBIOTIC" Razgrad	12 Mizia-Dobrudzha	200	331	9	2	4,48
Subtotal						**5.054**	**11.509**	**693**	**252**	**13,21**

Significant Impact Area: 42 Arges at Bucuresti (BG, RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Romania	RO13	High	Development of wastewater treatment plant of Campulung Muscel City	13 Muntenia	237	282	37	18	1,50
Municipalities	Romania	RO53	High	WWTP of the city of Bucharest	13 Muntenia	42.730	56.566	7.509	1.744	250,00
Industry	Romania	RO41	High	Modernising the secondary treatment of WWTP – S.C. SIDERCA - CALARASI	13 Muntenia		18			2,50
Industry	Romania	RO43	High	WWTP at ARPECHIM S.A PITESTI	13 Muntenia	50				13,90
Agriculture	Romania	RO62	High	Expansion of WWTP at SC ULMENI	13 Muntenia	221	488	330	1	0,98
Wetlands	Bulgaria	BG28	High	Balta Greaca / Tutrakan	12 Mizia-Dobrudzha			675	68	8,10
Wetlands	Romania	RO66	High	Balta Greaca / Tutrakan	13 Muntenia			2.700	270	32,40
Subtotal						**43.238**	**57.354**	**11.251**	**2.100**	**309,38**

Significant Impact Area: 43 Lalomita near Ploiesti (RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Industry	Romania	RO42	High	Modernising WWTP for oil products and slug recovery at PETROBRAZI – PLOIESTI	13 Muntenia					2,80
Industry	Romania	RO50	High	Pollution with petroleum products abatement in PLOIESTI Zone (pilot project)	13 Muntenia					3,00
Industry	Romania	RO34	Medium	Ecological reconstruction of polluted zone around SC ROMFOSFOCHIM SA Valea Calugareasca	13 Muntenia					2,80
Agriculture	Romania	RO19	High	Agricultural turning to good account of zootechnical waste at ROMSUIN TEST PERIS	13 Muntenia	336	456	245		1,30
Subtotal						**336**	**456**	**245**	**0**	**9,90**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 44 Upper Siret (UA)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
				no project identified						
Subtotal						**0**	**0**	**0**	**0**	**0,00**

Significant Impact Area: 45 Middle Siret-Bistrita&Trotus (RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Industry	Romania	RO36	High	Modernisation of installations from SC LETEA SA.- Bacau	14 Prut-Siret		1.699	551	155	1,50
Industry	Romania	RO59	High	Modernisation and completion of the WWTP at FIBREX Savinesti	14 Prut-Siret					1,16
Subtotal						**0**	**1.699**	**551**	**155**	**2,66**

Significant Impact Area: 46 Upper Prut (UA)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Ukraine	UA13	High	Extension and reconstruction of the Kolomiya Waste Water Treatment Facilities up to 45,000 m3 capacity	14 Prut-Siret	149	223	71	22	8,80
Municipalities	Ukraine	UA14	High	Additional engineering networks and facilities for the processing for the Kolomiya WWTP	14 Prut-Siret					
Municipalities	Ukraine	UA16	High	Processing and raise of environmental safety of mud formations in “Vodokanal” enterprise (Chernivtsi)	14 Prut-Siret	95		29	4	1,00
Municipalities	Ukraine	UA17	High	Sanation, design and demonstration reconstruction of water supply and canalization facil. in Chernivtsi area of old building up aimed at improv. of water supply and reduction of soil displacement risk	14 Prut-Siret					0,35
Municipalities	Ukraine	UA18	High	Construction of the polygon for storage of solid waste in Chernivtsi (2nd stage).	14 Prut-Siret					1,65
Municipalities	Ukraine	UA19	High	Expansion and reconstruction of Chernivtsi canalization system including increase of its daily capacity up to 200.000 m3	14 Prut-Siret	467	966	53	16	1,60
Industry	Ukraine	UA15	Low	Implementation of the extended project of sewer erection designated for Luzhany industrial area waste water discharge and implem. of w. water purification technology at Luzhany Pilot Distillery Plant	14 Prut-Siret					1,35
Subtotal						**711**	**1.189**	**153**	**42**	**14,75**

Significant Impact Area: 47 Middle Prut (RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Romania	RO52	High	Wastewater Treatment Plant of Iasi city	14 Prut-Siret	1.390	772	165	354	1,90
Industry	Romania	RO39	High	Wastewater treatment plant expansion at SC ANTIBIOTICE SA Iasi	14 Prut-Siret	343	547	8	3	1,80
Agriculture	Romania	RO20	High	Capacity increase of WWTP of COMTM TOMESTI	14 Prut-Siret	35	73	27		10,00
Municipalities	Moldova	MD12	High	Installation of Nutrient Removal Facilities at the Waste Water Treatment Plant Ungheni	14 Prut-Siret	800	1.600	464		
Subtotal						**2.568**	**2.992**	**664**	**357**	**13,70**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 48 Lower Prut (RO, MD)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Moldova	MD14	High	Installation of second and advanced stages of treatment at the Waste Water Treatment Plant in Cantemir	14 Prut-Siret	53		14		
Municipalities	Moldova	MD08	Low	Water and sewage Completion Programme	14 Prut-Siret					54,00
Municipalities	Moldova	MD24	Low	Pilot project on sewerage systems in rural area	14 Prut-Siret					
Industry	Moldova	MD03	High	Giurgiulesti Oil Terminal	14 Prut-Siret					38,00
Industry	Moldova	MD15	High	Vulcanesti pesticide dump site	14 Prut-Siret					
Industry	Moldova	MD16	High	Utilization of toxic industrial waste	14 Prut-Siret					
Industry	Moldova	MD17	High	Rehabilitation of waste water facilities in industrial enterprises	14 Prut-Siret					
Industry	Moldova	MD18	High	Modernization of waste water treatment facilities and improving waste management at wineries	14 Prut-Siret					
Agriculture	Moldova	MD04	High	Water Resources Development Project	14 Prut-Siret					12,00
Agriculture	Moldova	MD20	High	Animal waste management	14 Prut-Siret					
Agriculture	Moldova	MD19	Medium	Edinet pig farm	14 Prut-Siret					
Wetlands	Moldova	MD23	High	Lower Prut	14 Prut-Siret			1.395	140	16,74
Wetlands	Romania	RO68	High	Lower Prut	14 Prut-Siret			930	93	11,16
Subtotal						**53**	**0**	**2.339**	**233**	**131,90**

Significant Impact Area: 49 Yalpugh (MD)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Moldova	MD13	Medium	WWTP Comrat & Taraclia	14 Prut-Siret	2		2		
Subtotal						**2**	**0**	**2**	**0**	**0,00**

Significant Impact Area: 50 Lower Danube - Siret & Prut (BG, RO)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities	Romania	RO03	High	Wastewater treatment plant Craiova	13 Muntenia	5.997	5.862	597	245	32,00
Municipalities	Romania	RO08	High	Expansion of Waste Water Treatment Plant from Mangalia city	13 Muntenia					5,40
Municipalities	Romania	RO09	High	Waste water treatment plant of Braila Nord city	13 Muntenia	4.526	3.750	822	0	21,90
Municipalities	Romania	RO10	High	Waste water treatment plant of Galati city	13 Muntenia	6.028	5.540	812	275	29,50
Municipalities	Bulgaria	BG09	Low	Municipally Waste Water Treatment Plant - Levski	12 Mizia-Dobrudzha	1.126	2.300	152	10	10,26
Industry	Romania	RO37	High	Wastewater treatment plant at SC CELOHART DONARIS - Braila	13 Muntenia	621				2,70
Industry	Romania	RO40	High	Works for pollution reduction at UPS GOVORA S.A	13 Muntenia					13,60
Industry	Romania	RO58	High	Modernisation of water treatment installation at SC OLTCHIM SA	13 Muntenia					0,66
Industry	Romania	RO60	High	Modernizing of the industrial WWT at SIDEX Galati	14 Prut-Siret	1.774	2.535	755	11	73,20
Agriculture	Romania	RO63	High	WWTP at SC SUINPROD Independanta - jud. Galati	14 Prut-Siret	350	409	226		0,80
Subtotal						**20.422**	**20.396**	**3.364**	**541**	**190,02**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
List of projects per Significant Impact Area

Significant Impact Area: 51 Ukrainian Delta&Liman Lakes (RO, MD, UA)

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Municipalities and Industry	Ukraine	UA11	Medium	Extension of the Waste Water Treament Faciclities in the Izmail Paper Factory (city WWTP)	15 Delta-Liman	41	109	133	24	3,60
Municipalities	Ukraine	UA07	Low	Priority measures on protection against flooding and improvement of sanitary and epidemic situation in Vilkovo	15 Delta-Liman					8,50
Municipalities	Ukraine	UA08	Low	Kiliya protection against flooding (emergency measures)	15 Delta-Liman					1,90
Municipalities	Ukraine	UA09	Low	Creation of the Waste Water Treatment Facilities in Reni, Reni Seaport	15 Delta-Liman					2,80
Municipalities	Ukraine	UA10	Low	Construction of Vilkovo Waste Water Treatment Facilities	15 Delta-Liman					6,50
Municipalities	Ukraine	UA12	Low	Vilkovo city-chanels erec reconstruction	15 Delta-Liman					2,40
Agriculture	Ukraine	UA23	High	Reconstruction of irrigation systems taking into account their impact on the environment	15 Delta-Liman					
Agriculture	Ukraine	UA24	High	Rehabilitation of deteriorated pastureland	15 Delta-Liman					
Agriculture	Ukraine	UA27	Low	Animal farms in Kylia region - Put Lenina and Pogranichnik	15 Delta-Liman					
Wetlands	Romania	RO69	High	Polder Pardina	15 Delta-Liman			2.250	225	27,00
Wetlands	Moldova	MD25	High	Liman Lakes	15 Delta-Liman			585	59	7,02
Wetlands	Ukraine	UA32	High	Liman Lakes	15 Delta-Liman			1.365	137	16,38
Wetlands	Ukraine	UA33	High	Ukrainian part of Danube Delta	15 Delta-Liman			1.000	100	12,00
Subtotal						**41**	**109**	**5.333**	**545**	**88,10**

Significant Impact Areas

Sector	Country	Project			Sub-river Basin	Expected Load Reduction				Total Investment Costs
		ID-No	Priority	Title		BOD	COD	N	P	
						t/y				(mil USD)
1	2	3	4	5	6	7	8	9	10	11
Total						422.876	628.637	71.362	19.674	5.086

Potential Nutrient Reduction through Restoration of Wetlands and Floodplains

Source: Report on "Evaluation of floodplain areas in the Danube River Basin", February 1999, WWF

Name of wetland/floodplain	Proposed study area	Area of recent/existing floodplains	Potential area for restoration		pot. N-reduction after restoration		pot. P-reduction after restoration		Value of additional nutrient reduction	
			min	max	min	max	min	max	min	max
	ha	ha	ha	ha	t/y	t/y	t/y	t/y	USD/y	USD/y
1	2	3	4	5	6	7	8	9	10	11
1. Floodplains next to Ingolstadt	1,500	0	1,125	1,125	113	113	11	11	281,250	281,250
2. Mouth of Isar	1,700	400	650	975	65	98	7	10	162,500	243,750
3. Drösinger Wald	3,000	800	1,100	1,650	110	165	11	17	275,000	412,500
4. Floodplains next to Hodonin	7,700	770	3,465	5,198	347	520	35	52	866,250	1,299,500
5. Area between Gemenc and Kopaci Rit	250,000	70,000	45,000	90,000	4,500	9,000	450	900	11,250,000	22,500,000
6. Area of Mouth of Drina	60,000	10,000	12,500	25,000	1,250	2,500	125	250	3,125,000	6,250,000
7. Makro Polje	12,400	1,240	5,580	8,370	558	837	56	84	1,395,000	2,092,500
8. Mouth of Bodrog	10,000	7,000	2,250	2,250	225	225	23	23	562,500	562,500
9. Lower Tisza	36,000	3,600	9,000	18,000	900	1,800	90	180	2,250,000	4,500,000
10. Balta Potelu	27,000	7,500	14,625	14,625	1,463	1,463	146	146	3,656,250	3,656,250
11. Area of Bulg. Danube Islands	27,000	7,000	15,000	15,000	1,500	1,500	150	150	3,750,000	3,750,000
12. Balta Greaca/ Tutrakan	54,000	9,000	33,750	33,750	3,375	3,375	338	338	8,437,500	8,437,500
13. Kalarasch	10,000	0	7,500	7,500	750	750	75	75	1,875,000	1,875,000
14. Lower Prut	51,000	20,000	15,500	23,250	1,550	2,325	155	233	3,875,000	5,812,500
15. Liman Lakes	38,000	12,000	19,500	19,500	1,950	1,950	195	195	4,875,000	4,875,000
16. Polder Pardina	30,000	0	22,500	22,500	2,250	2,250	225	225	5,625,000	5,625,000
17. Ukr. Part of Danube Delta	27,000	7,000	5,000	10,000	500	1,000	50	100	1,250,000	2,500,000
Total	**646302**	**156,310**	**214,045**	**298,693**	**21,405**	**29,869**	**2,140**	**2,987**	**53,511,250**	**74,673,250**

Legend

Column 4/5: Estimated restoration area, studied by WWF

6/7: N- reduction calculated with 100 kg/ha/y

8/9: P- reduction calculated with 10 kg/ha/y

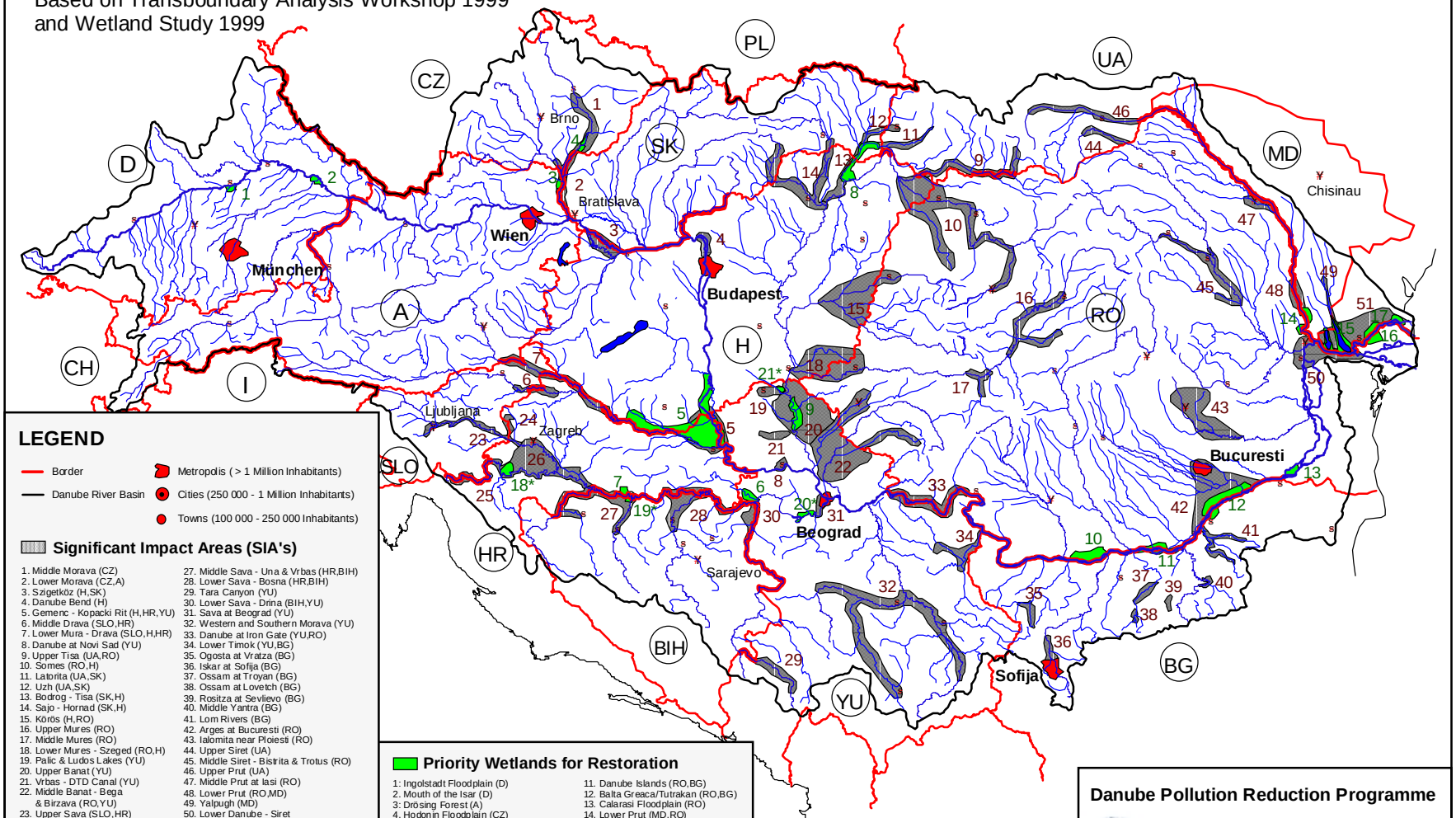
10/11: Nutrient reduction value calculated with 250 USD/ha/year

Annex 10.

Characteristics of Significant Impact Areas and Sub-river Basins

Map 10: Significant Impact Areas and Priority Wetlands for Restoration

Based on Transboundary Analysis Workshop 1999
and Wetland Study 1999



LEGEND

- Border
- Danube River Basin
- Metropolis (> 1 Million Inhabitants)
- Cities (250 000 - 1 Million Inhabitants)
- Towns (100 000 - 250 000 Inhabitants)

Significant Impact Areas (SIA's)

1. Middle Morava (CZ)
2. Lower Morava (CZ,A)
3. Szigetköz (H,SK)
4. Danube Bend (H)
5. Gemenc - Kopacki Rit (H,HR,YU)
6. Middle Drava (SLO,HR)
7. Lower Mura - Drava (SLO,H,HR)
8. Danube at Novi Sad (YU)
9. Upper Tisa (UA,RO)
10. Somes (RO,H)
11. Latorita (UA,SK)
12. Uzh (UA,SK)
13. Bodrog - Tisa (SK,H)
14. Sajo - Hornad (SK,H)
15. Körös (H,RO)
16. Upper Mures (RO)
17. Middle Mures (RO)
18. Lower Mures - Szeged (RO,H)
19. Palic & Ludos Lakes (YU)
20. Upper Banat (YU)
21. Vrbas - DTD Canal (YU)
22. Middle Banat - Bega & Birzava (RO,YU)
23. Upper Sava (SLO,HR)
24. Sutla (SLO,HR)
25. Kupa (SLO,HR)
26. Middle Sava - Kupa (HR)
27. Middle Sava - Una & Vrbas (HR,BIH)
28. Lower Sava - Bosna (HR,BIH)
29. Tara Canyon (YU)
30. Lower Sava - Drina (BIH,YU)
31. Sava at Beograd (YU)
32. Western and Southern Morava (YU)
33. Danube at Iron Gate (YU,RO)
34. Lower Timok (YU,BG)
35. Ogosta at Vratza (BG)
36. Iskar at Sofija (BG)
37. Ossam at Troyan (BG)
38. Ossam at Lovetch (BG)
39. Rositza at Sevlievo (BG)
40. Middle Yantra (BG)
41. Lom Rivers (BG)
42. Arges at Bucuresti (RO)
43. Ialomita near Ploiesti (RO)
44. Upper Siret (UA)
45. Middle Siret - Bistrita & Trotus (RO)
46. Upper Prut (UA)
47. Middle Prut at Iasi (RO)
48. Lower Prut (RO,MD)
49. Yalpugh (MD)
50. Lower Danube - Siret & Prut (RO,MD,UA)
51. Ukrainian Delta & Liman Lakes (UA)

50 0 50 100 150 Kilometers

Scale: 1: 4 500 000

N

Priority Wetlands for Restoration

1: Ingolstadt Floodplain (D)
2. Mouth of the Isar (D)
3: Drösing Forest (A)
4. Hodonin Floodplain (CZ)
5. Gemenc - Béda - Karapancsa (H), Kopacki Rit (HR,YU) & Ormánság (H)
6. Mouth of the Drina River (BIH,YU) & Bosut Forest (YU)
7. Floodplain next to Mokro Polje (HR)
8. Lower Bodrog (H,SK)
9. Lower Tisa (YU)
10. Balta Potelu (RO,BG)
11. Danube Islands (RO,BG)
12. Balta Greaca/Tutrakan (RO,BG)
13. Calarasi Floodplain (RO)
14. Lower Prut (MD,RO)
15. Liman Lakes (UK,MD)
16. Polder Pardina (RO)
17. Ukrainian Danube Delta (UA)
18. Kupa Floodplain (HR)*
19. Mouth of the Vrbas River (BIH)*
20. Obedska Bara (YU)*
21. Palic and Ludos Lakes (YU)*

* added on Transboundary Analysis Workshop

Danube Pollution Reduction Programme

United Nations Development Programme
Global Environmental Facility
ICPDR - Programme Coordination Unit
1400 Vienna, P.O. Box 500, Austria

Produced by ZINKE ENVIRONMENT CONSULTING
for Central and Eastern Europe, Vienna, 1999
(Cartography by U.SCHWARZ)

Characteristics of SIA

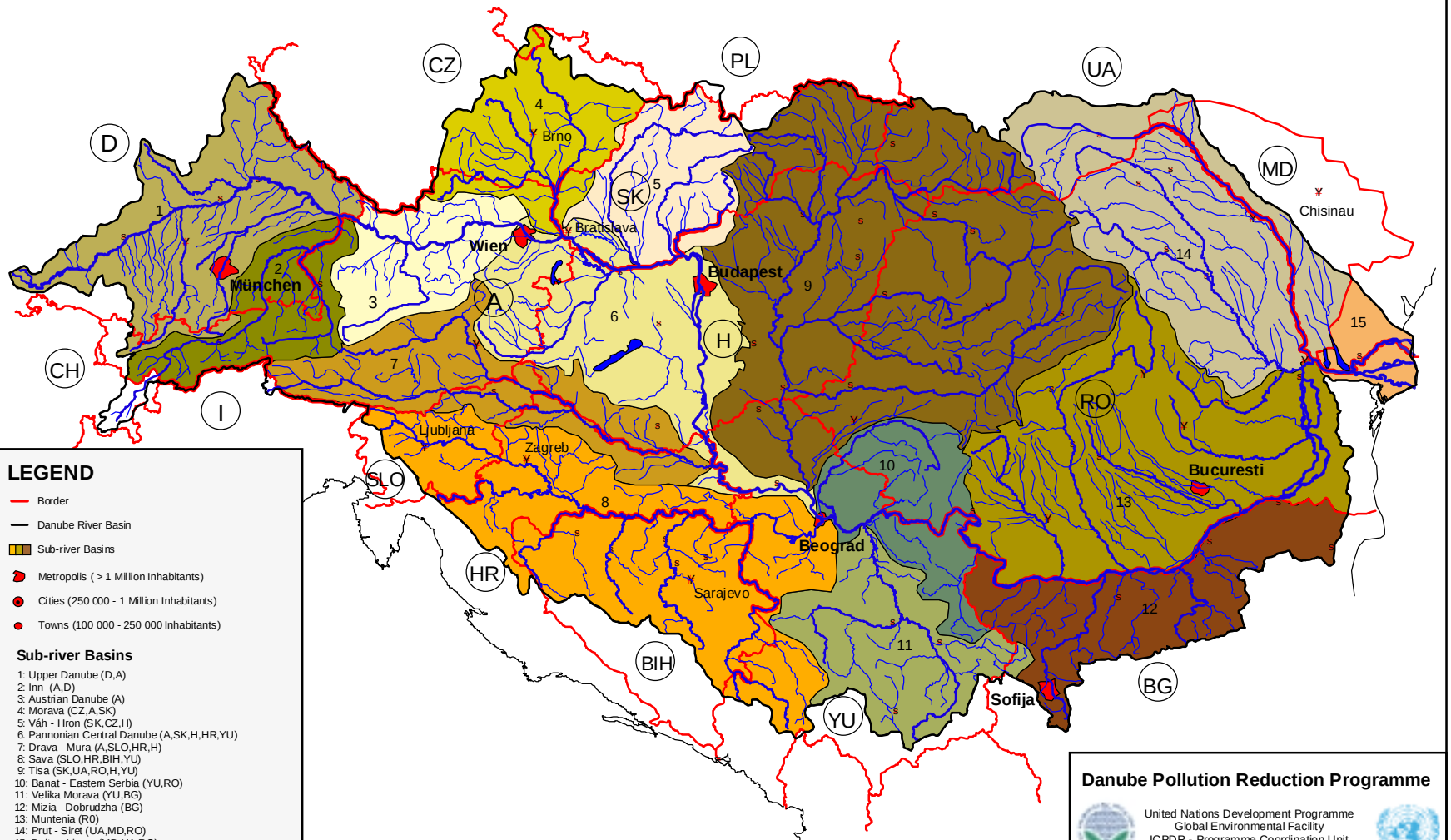
No	Significant Impact Areas	Protected areas	Wetlands, Proposed to be restored	Relation to the border	Notable population centers	Size of SIA
		sites	ha		inhabitants	km²
1	Middle Morava	9+ 1 Ramsar	7,500	National	Olomouc 105,000	1,370
2	Lower Morava	2 Ramsar	3,000 (Austria)	3 transboundary	Bratislava 450,000	380
3	.Szigetköz	1(H)+1(Sk)		2 transboundary	Gyor 127,000	750
4	Danube Bend	Szentendre-island		National	Budapest 1,886,000	350
5	Gemenc – Kopacki Rit	National park, special nature reserve	250,000	3 transboundary		1980
6	Middle Drava			2 transboundary		450
7	Lower Mura – Drava			3 transboundary		1410
8	Danube at Novi Sad	Protected Drinking water zone		National	Novi Sad 265,000	160
9	Upper Tisza			2 transboundary		1230
10	Szamos – Somes			2 transboundary	Cluj Napoca 331,000 Baia Mare 150,000 Satu Mare 131,000	4980
11	Latoritza			2 transboundary		410
12	Uzh			2 transboundary	Uzhgorod 125,000	380
13	Bodrog-Tisza	1 Ramsar	10,000	2transboundary		610
14	Hornad-Sajo			2transboundary	Kosice 240,000 Miskolc 177,000	2210
15	Körös (Crisul)			2transboundary	Oradea 223,000	3160
16	Upper Mures			National	Tg.Mures 167,000	1560
17	Middle Mures			National		410
18	Lower Mures – Szeged			2 transboundary	Arad 187,000 Szeged 161,000	2860
19	Ludos Lakes	Ramsar		National	Subotica 151,000	330
20	Upper Banat		36,000	National		3290
21	Vrbas - DTD Canal			National		290
22	Middle Banat – Bega & Birzava			2 transboundary	Timisoara 333,000	3680

No	Significant Impact Areas	Protected areas	Wetlands, Proposed to be restored	Relation to the border	Notable population centers	Size of SIA
		sites	ha		inhabitants	km²
23	Upper Sava	1 Ramsar		2 transboundary	Ljubliana 263,000	670
24	Sotla (Sutla)			2 transboundary		230
25	Kolpa (Kupa)			2 transboundary		500
26	Middle Sava-Kupa	Nature park ornthology reserve		National	Zagreb 707,000	2820
27	Middle Sava – Una & Vrbas		12,400	2 transboundary	Prijedov 120,000 Banja Luka 240,000	1770
28	Lower Sava – Bosna			2transboundary	Sarajevo 437,000 Zenica 146,000 Doboj 110,000	1320
29	Tara Canyon	UNESCO heritage site		National		660
30	Lower Sava – Drina		60,000	2transboundary		960
31	Sava at Beograd			National	Beograd 1,602,000	260
32	Western & Southern Morava			National	Pristina 200,000 Krusevac 138,000 Nis 248,000	5029
33	Danube at Iron Gate	Reservoir		National	Drobeta Transboundary Severin 119,000	1500
34	Lower Timok			2 transboundary		780
35	Ogosta at Vratza			National		300
36	Iskar at Sofija			National	Sofija 1,113,000	330
37	Ossam at Troyan			National		300
38	Ossam at Lovetch			National		100
39	Rositza at Sevlievo			National		20
40	Middle Yantra			National		120
41	Lom Rivers			National		620
42	Arges at Bucharest	Protected drinking water zones	54,000	National	Bucharest 2,054,000 Pitesti 185,000	3180
43	Ialomita near Ploiesti			National	Ploiesti 254,000 Buzau 150,000	2350
44	Upper Siret			National		380

No	Significant Impact Areas	Protected areas	Wetlands, Proposed to be restored	Relation to the border	Notable population centers	Size of SIA
		sites	ha		inhabitants	km²
45	Middle Siret – Bistrita & Trotus			National	Bacau 209,000	1360
46	Upper Prut			National	Chernivtsi 261,000	1000
47	Middle Prut			National	Iasi 343,000 Botosani 129,000	370
48	Lower Prut		51,000	2 transboundary		520
49	Yalpugh			National		259
50	Lower Danube – Siret & Prut	Biosphere reserve		3 transboundary	Braila 236,000 Galati 328,000	1590
51	Ukrainian Delta & Liman Lakes	Biosphere reserve	38,000	National		2470

Map 2: Sub-river Basins

Based on Transboundary Analysis Workshop 1999



LEGEND

- Border
- Danube River Basin
- Sub-river Basins
- Metropolis (> 1 Million Inhabitants)
- Cities (250 000 - 1 Million Inhabitants)
- Towns (100 000 - 250 000 Inhabitants)

Sub-river Basins

1: Upper Danube (D,A)
2: Inn (A,D)
3: Austrian Danube (A)
4: Morava (CZ,A,SK)
5: Váh - Hron (SK,CZ,H)
6. Pannonian Central Danube (A,SK,H,HR,YU)
7: Drava - Mura (A,SLO,HR,H)
8: Sava (SLO,HR,BIH,YU)
9: Tisa (SK,UA,RO,H,YU)
10: Banat - Eastern Serbia (YU,RO)
11: Velika Morava (YU,BG)
12: Mizia - Dobrudzha (BG)
13: Muntenia (R0)
14: Prut - Siret (UA,MD,RO)
15: Delta - Liman (MD,UA,RO)

50 0 50 100 150 Kilometers

Scale: 1: 4 500 000

N

Danube Pollution Reduction Programme

United Nations Development Programme
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(Cartography by U.SCHWARZ)

Sub-river basins in relation to SIA

No	Sub-Basin Area	Remarks on wetlands and SIA's
1	Upper Danube (G,A)	Two priority wetlands for restoration Ingolstadt Floodplain Mouth of the Isar into the Danube. There are no SIA's
2	Inn (G,A)	No SIAs or priority wetlands
3	Austrian Danube (A)	No SIAs or priority wetlands
4	Morava (CZ, A, SK)	14% of the Czech area is protected one national park, two biosphere reserves and three Ramsar Wetlands Drösing Forest in Lower Austria Hodonin Floodplains in the South-Western Czech Republic were identified as priority wetlands for restoration. They are located in the SIA nr.1 "Middle Morava" and SIA nr.2 "Lower Morava".
5	Váh - Hron (SK, CZ, H)	No priority wetlands
6	Pannonian Central Danube Region (A, SK, H, HR, YU)	*Vienna national park area* *Szigetköz/NW Hungary* *Gemenc-Béda-Karapancsa – Kopacki Rit area (SIA 5)* *Neusiedlersee in Austria/Hungary* *Lake "Balaton" in Hungary* Danube Bend before Budapest (SIA 4) Novi Sad. (SIA 8)
7	Drava-Mura (A, SLO, HR, H)	"Kopacki rit" (SIA 5)
8	Sava (SLO, HR, BIH,YU)	*SIA 23-28 Upper and Lower Sava* Five wetlands overlap with SIAs (Sotla, Kolpa, Una, Vrbas, Bosna and Drina in the Sava as well as Tara Canyon)
9	Tisa (SK, UA, RO, H, YU)	Wetland lower Bodrog (northern Hungary) SIA 13 Three wetlands on Lower Tisza. (YU) SIA20
10	Banat – Eastern Serbia (YU, RO)	Iron Gate gorge and national park (SIA 33) (YU-RO) (Middle Banat – Bega & Birzava (SIA 22) (YU-RO) Lower Timok. (SIA 34) (YU-BG)
11	Velika Morava (YU, BG)	SIA 32 "Western and Southern Morava" No priority wetlands
12	Mizia - Dobrudzha (BG)	SIA 39 Rositza at Sevlievo SIA 40 Middle Yantra SIA 41 Lom Rivers.
13	Muntenia (RO)	*SIA 43 Ialomita near Ploiesti* *SIA 42 Arges* *SIA 50Lower Danube* Three wetlands in Muntenia (Balta Potelu, Bulgarian islands and Balta Greaca)

14	Prut - Siret (UA, MD, RO)	SIA 44 Upper Siret (UA) SIA 46 Upper Prut near Cernivci SIA 47 Middle Prut at Iasi SIA 48 Lower Prut *SIA 49 Yalpugh-Cahul lakes*
15	Delta – Liman (MD, UA, RO)	Danube delta (5.800 km²) biosphere reserve Liman lakes SIA 50 and SIA 51

Annex 11.

Table of investment indicators

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Investment Indicator

Country	Population in DRB	GNP per Capita	Total GNP in DRB Part of the Country	Total Investment Costs	Total Investment/GNP	Investment Indicator
		(USD)	(mill. USD)	(mil.USD)	(Invstm. Indicator)	
1	2	3	4	5	6	
Germany	9.100.000	25.606	233014,6	233,46	0,10	D
Austria	7.700.000	24.691	190120,7	700,15	0,37	A
Czech Republic	2.800.000	4.771	13358,8	210,82	1,58	CZ
Slovakia	5.200.000	3.662	19042,4	188,18	0,99	SK
Hungary	10.200.000	4.382	44696,4	460,33	1,03	H
Slovenia	1.700.000	9.053	15390,1	341,92	2,22	SLO
Croatia	3.200.000	3.919	12540,8	914,64	7,29	HR
Bosnia-Herzegovina	2.900.000	776	2250,4	364,55	16,20	BH
Yugoslavia	9.000.000	1.462	13158	905,47	6,88	YU
Bulgaria	3.900.000	1.118	4360,2	317,99	7,29	BG
Romania	22.600.000	1.532	34623,2	758,54	2,19	RO
Moldova	1.100.000	1.624	1786,4	161,25	9,03	MD
Ukraine	3.100.000	981	3041,1	107,05	3,52	UA
Total	**82.500.000,00**		**587.383,10**	**5.664,34**		

Annex 12.

Top 5 projects with largest pollution reduction

25 projects with largest pollution reduction

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME

Projects included in the list of 5 projects with the largest reduction of BOD-, COD-, N-, P-discharge

	Sector	ID-No	Title	Expected Load Reduction (t/y)			
				BOD	COD	N	P
	1	2	3	6	7	8	9
1	Municipalities	RO53	WWTP of the city of Bucharest	42.730	56.566	7.509	1.744
2	Municipalities	YU01	WWTP "Veliko Selo" - Belgrade (central)	31.536	65.000	876	1.183
3	Municipalities	H01	Expansion of WWTP at North Budapest	28.000	56.000	308	183
4	Municipalities	H02	Expansion of WWTP at South Pest	18.700	37.400	203	122
5	Municipalities	BH01	Construction of regional sewerage system Tuzla-Lukavac with central WWTP for cities and industry.	15.840		1.080	160
6	Municipalities	HR19	The central WWTP of Zagreb	10.438	29.743	1.320	220
7	Municipalities	BG03	Municipally WWTP of Sofia	5.823	12.051	273	551
8	Municipalities	RO12	Development of WWTP of Resita city	1.502	1.729	241	527
9	Industry	YU22	IHP Prahovo (fertilizers)	440	2.020	460	3.800
10	Wetlands	H10	Area between Gemenec and Kopacki Rit - Danube-Drava Region			4.050	405
11	Wetlands	HR67	Area between Gemenc and Kopacki Rit - Drava river basin wetlands in Baranja region			4.050	405
12	Municipalities	D05	Munchen I - Isar	1	36	2.704	3
13	Wetlands	RO66	Balta Greaca / Tutrakan			2.700	270
			Total	**155.010**	**260.545**	**25.774**	**9.573**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME

5 projects with largest reduction of BOD - discharge

	Sector	ID-No	Title	Expected Load Reduction (t/y)			
				BOD	COD	N	P
	1	2	3	6	7	8	9
1	Municipalities	RO53	WWTP of the city of Bucharest	**42.730**	56.566	7.509	1.744
2	Municipalities	YU01	WWTP "Veliko Selo" - Belgrade (central)	**31.536**	65.000	876	1.183
3	Municipalities	H01	Expansion of WWTP at North Budapest	**28.000**	56.000	308	183
4	Municipalities	H02	Expansion of WWTP at South Pest	**18.700**	37.400	203	122
5	Municipalities	BH01	Construction of regional sewerage system Tuzla-Lukavac with central WWTP for cities and industry.	**15.840**		1.080	160
			Total	**136.806**			

5 projects with largest reduction of COD - discharge

	Sector	ID-No	Title	Expected Load Reduction (t/y)			
				BOD	**COD**	N	P
	1	2	3	6	7	8	9
1	Municipalities	YU01	WWTP "Veliko Selo" - Belgrade (central)	31.536	**65.000**	876	1.183
2	Municipalities	RO53	WWTP of the city of Bucharest	42.730	**56.566**	7.509	1.744
3	Municipalities	H01	Expansion of WWTP at North Budapest	28.000	**56.000**	308	183
4	Municipalities	H02	Expansion of WWTP at South Pest	18.700	**37.400**	203	122
5	Municipalities	HR19	The central WWTP of Zagreb	10.438	**29.743**	1.320	220
			Total		**244.709**		

5 projects with largest reduction of N - discharge

	Sector	ID-No	Title	Expected Load Reduction (t/y)			
				BOD	COD	**N**	P
	1	2	3	6	7	8	9
1	Municipalities	RO53	WWTP of the city of Bucharest	42.730	56.566	**7.509**	1.744
3	Wetlands	H10	Area between Gemenec and Kopacki Rit - Danube-Drava Region			**4.050**	405
4	Wetlands	HR67	Area between Gemenc and Kopacki Rit - Drava river basin wetlands in Baranja region			**4.050**	405
4	Municipalities	D05	Munchen I - Isar	1	36	**2.704**	3
5	Wetlands	RO66	Balta Greaca / Tutrakan			**2.700**	270
			Total			**21.013**	

5 projects with largest reduction of P - discharge

	Sector	ID-No	Title	Expected Load Reduction (t/y)			
				BOD	COD	N	**P**
	1	2	3	6	7	8	9
1	Industry	YU22	IHP Prahovo (fertilizers)				**3.800**
2	Municipalities	RO53	WWTP of the city of Bucharest	42.730	56.566	7.509	**1.744**
3	Municipalities	YU01	WWTP "Veliko Selo" - Belgrade (central)	31.536	65.000	876	**1.183**
4	Municipalities	BG03	Municipally WWTP of Sofia	5.823	12.051	273	**551**
5	Municipalities	RO12	Development of WWTP of Resita city	1.502	1.729	241	**527**
			Total				**7.805**

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Projects with largest reduction of BOD - , COD - , N - , P - discharge

A/ BOD - reduction

	Sector	ID-No	Title	Sub-river Basin	Significant Impact Areas	Expected Load Reduction (t/y)			
						BOD	COD	N	P
	1	2	3	4	5	**6**	7	8	9
1	Municipalities	RO53	WWTP of the city of Bucharest	13 Muntenia	42 Arges at Bucuresti	**42.730**	56.566	7.509	1.744
2	Municipalities	YU01	WWTP "Veliko Selo" - Belgrade (central)	10 Banat-Eastern Serbia	31 Sava at Beograde	**31.536**	65.000	876	1.183
3	Municipalities	H01	Expansion of wastewater treatment plant at North Budapest	6 Pannonian Central Danube	5 Gemenc-Kopacki Rit	**28.000**	56.000	308	183
4	Municipalities	H02	Expansion of wastewater treatment plant at South Pest	6 Pannonian Central Danube	5 Gemenc-Kopacki Rit	**18.700**	37.400	203	122
5	Municipalities	BH01	Construction of regional sewerage system Tuzla-Lukavac with central waste water treatment plant for cities and industry.	8 Sava	28 Lower Sava-Bosna	**15.840**		1.080	160
6	Municipalities	BH02	Rehabilitation and reconstruction sewerage and industry waste water treatment plant of city Sarajevo	8 Sava	28 Lower Sava-Bosna	**14.850**		1.015	150
7	Municipalities	BH03	Construction of regional sewerage system Banja Luka with central waste water treatment plant city and industry	8 Sava	27 Middle Sava-Una&Vrbas	**13.500**		910	140
8	Municipalities	SLO10	Wastewater treatment plan municipality Ljubljana	8 Sava	23 Upper Sava	**10.460**	23.750	1.575	350
9	Municipalities	HR19	The central waste water treatment plant of city of Zagreb	8 Sava	26 Middle Sava-Kupa	**10.438**	29.743	1.320	220
10	Agriculture	BH20	Construction of waste water treatment plant for pigs breeding farm in the Brcko	8 Sava	30 Lower Sava-Drina	**9.900**		1.570	350
11	Industry	SLO04	Wastewater treatment plant of the Paper Factory ICEC Krško	8 Sava	23 Upper Sava	**9.400**	21.380	1.418	315
12	Industry	BH13	Rehabilitation and reconstruction waste water treatment plant in "Natron" Maglaj	8 Sava	28 Lower Sava-Bosna	**7.920**			
13	Agriculture	BH19	Construction of waste water treatment plant for dairy and pigs breeding farm in the Nova Topola.	8 Sava	27 Middle Sava-Una&Vrbas	**7.200**		1.130	250
14	Municipalities	BG10	Municipal Waste Water treatment Plant Gorna Oryahovitza & Lyaskovetz	12 Mizia-Dobrudzha	40 Middle Yantra	**6.559**	14.370	464	247
15	Municipalities	SLO12	Construction of the Central Waste Water Treatment Plant Maribor and the Consession for the Treatment of Waste Water in Maribor	7 Drava-Mura	7 Lower Mura - Drava	**6.270**	14.250	945	210
16	Municipalities	RO10	Waste water treatment plant of Galati city	13 Muntenia	50 Lower Danube-Siret&Prut	**6.028**	5.540	812	275
17	Municipalities	RO03	Wastewater treatment plant Craiova	13 Muntenia	50 Lower Danube-Siret&Prut	**5.997**	5.862	597	245
18	Municipalities	H06	Construction of the wastewater treatment plant of Szeged, Mechanical treatment I/b Phase	9 Tisa	18 Lower Mures-Szeged	**5.980**	11.960	270	30
19	Municipalities	BG03	Municipally Waste Water Treatment Plant - Sofia	12 Mizia-Dobrudzha	36 Iskar at Sofija	**5.823**	12.051	273	551
20	Municipalities	YU03	City of Novi sad WWTP	6 Pannonian Central Danube	8 Danube At Novi Sad	**5.657**	12.000	148	268
21	Municipalities	A01	Wien - HKA - extension and upgrade of NP removal	3 Austrian Danube	3 Szigetköz	**5.500**	10.000	2.000	
22	Industry	A05	PCA Fine Paper Hallein	2 Inn		**5.500**	4.500		
23	Industry	BG11	Industrial Waste Water Treatment Plant - Sugar and Alcohol Factory Gorna Oriahovitza	12 Mizia-Dobrudzha	40 Middle Yantra	**5.440**	11.360	350	60
24	Municipalities	YU04	City of Nis WWTP	11 Velika Morava	32 Western & Southern Morava	**5.302**	11.000	124	260
25	Municipalities	H04	Construction of the wastewater treatment plant at Dunaujvaros	6 Pannonian Central Danube	5 Gemenc-Kopacki Rit	**4.620**	9.240	53	32
						289.150	411.972	24.950	7.345

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Projects with largest reduction of BOD - , COD - , N - , P - discharge

B/ COD - reduction

	Sector	ID-No	Title	Sub-river Basin	Significant Impact Areas	Expected Load Reduction (t/y)			
						BOD	**COD**	N	P
	1	2	3	4	5	6	**7**	8	9
1	Municipalities	YU01	WWTP "Veliko Selo" - Belgrade (central)	10 Banat-Eastern Serbia	31 Sava at Beograde	31.536	**65.000**	876	1.183
2	Municipalities	RO53	WWTP of the city of Bucharest	13 Muntenia	42 Arges at Bucuresti	42.730	**56.566**	7.509	1.744
3	Municipalities	H01	Expansion of wastewater treatment plant at North Budapest	6 Pannonian Central Danube	5 Gemenc-Kopacki Rit	28.000	**56.000**	308	183
4	Municipalities	H02	Expansion of wastewater treatment plant at South Pest	6 Pannonian Central Danube	5 Gemenc-Kopacki Rit	18.700	**37.400**	203	122
5	Municipalities	HR19	The central waste water treatment plant of city of Zagreb	8 Sava	26 Middle Sava-Kupa	10.438	**29.743**	1.320	220
6	Municipalities	SLO10	Wastewater treatment plan municipality Ljubljana	8 Sava	23 Upper Sava	10.460	**23.750**	1.575	350
7	Industry	SLO04	Wastewater treatment plant of the Paper Factory ICEC Krško	8 Sava	23 Upper Sava	9.400	**21.380**	1.418	315
8	Industry	BH12	Reconstruction and improve waste water treatment plant from “Incel” Banja Luka	8 Sava	27 Middle Sava-Una&Vrbas	3.960	**19.400**		
9	Industry	YU21	FOPA paper mill, Vladicin Han	11 Velika Morava	32 Western & Southern Morava		**15.000**		
10	Municipalities	BG10	Municipal Waste Water treatment Plant Gorna Oryahovitza & Lyaskovetz	12 Mizia-Dobrudzha	40 Middle Yantra	6.559	**14.370**	464	247
11	Municipalities	SLO12	Construction of the Central Waste Water Treatment Plant Maribor and the Consession for the Treatment of Waste Water in Maribor	7 Drava-Mura	7 Lower Mura - Drava	6.270	**14.250**	945	210
12	Industry	BH14	Construction waste water treatment plant for "Celpak" Prijedor	8 Sava	27 Middle Sava-Una&Vrbas	2.380	**12.370**		
13	Municipalities	BG03	Municipally Waste Water Treatment Plant - Sofia	12 Mizia-Dobrudzha	36 Iskar at Sofija	5.823	**12.051**	273	551
14	Municipalities	YU03	City of Novi sad WWTP	6 Pannonian Central Danube	8 Danube At Novi Sad	5.657	**12.000**	148	268
15	Municipalities	H06	Construction of the wastewater treatment plant of Szeged, Mechanical treatment I/b Phase	9 Tisa	18 Lower Mures-Szeged	5.980	**11.960**	270	30
16	Industry	BG11	Industrial Waste Water Treatment Plant - Sugar and Alcohol Factory Gorna Oriahovitza	12 Mizia-Dobrudzha	40 Middle Yantra	5.440	**11.360**	350	60
17	Municipalities	YU04	City of Nis WWTP	11 Velika Morava	32 Western & Southern Morava	5.302	**11.000**	124	260
18	Municipalities	A01	Wien - HKA - extension and upgrade of NP removal	3 Austrian Danube	3 Szigetköz	5.500	**10.000**	2.000	
19	Municipalities	SLO17	Upgrading of the central waste water treatment plant Domzale - Kamnik - nitrification/denitrification	8 Sava	23 Upper Sava	4.180	**9.500**	630	140
20	Municipalities	H04	Construction of the wastewater treatment plant at Dunaujvaros	6 Pannonian Central Danube	5 Gemenc-Kopacki Rit	4.620	**9.240**	53	32
21	Municipalities	BG24	WWTP Russe	12 Mizia-Dobrudzha	41 Lom Rivers	3.883	**8.987**	603	219
22	Municipalities	YU05	City of Pristina WWTP	11 Velika Morava	32 Western & Southern Morava	3.563	**7.500**	86	133
23	Municipalities	RO03	Wastewater treatment plant Craiova	13 Muntenia	50 Lower Danube-Siret&Prut	5.997	**5.862**	597	245
24	Municipalities	BG05	Municipally Waste Water Treatment Plant - Montana	12 Mizia-Dobrudzha	35 Ogosta at Vratza	2.473	**5.577**	243	88
25	Municipalities	RO10	Waste water treatment plant of Galati city	13 Muntenia	50 Lower Danube-Siret&Prut	6.028	**5.540**	812	275
						234.879	**485.806**	20.807	6.875

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Projects with largest reduction of BOD - , COD - , N - , P - discharge

C/ N - reduction

	Sector	ID-No	Title	Sub-river Basin	Significant Impact Areas	Expected Load Reduction (t/y)			
						BOD	COD	**N**	P
	1	2	3	4	5	6	7	**8**	9
1	Municipalities	RO53	WWTP of the city of Bucharest	13 Muntenia	42 Arges at Bucuresti	42.730	56.566	**7.509**	1.744
2	Wetlands	H10	Area between Gemenec and Kopacki Rit - Rehabilitation and management of the water related ecosystems in the Danube-Drava Region	7 Drava-Mura	5 Gemenc-Kopacki Rit			**4.050**	405
3	Wetlands	HR67	Area between Gemenc and Kopacki Rit - Preservation and rehabilitation of the Drava river basin wetlands in Baranja region	7 Drava-Mura	6 Middle Drava			**4.050**	405
4	Municipalities	D05	Munchen I - Isar	1 Upper Danube		1	36	**2.704**	3
5	Wetlands	RO66	Balta Greaca / Tutrakan	13 Muntenia	42 Arges at Bucuresti			**2.700**	270
6	Wetlands	RO69	Polder Pardina	15 Delta-Liman	51 Ukrainian Delta&Liman Lakes			**2.250**	225
7	Wetlands	BH24	Area of Mouth of Drina	8 Sava	30 Lower Sava-Drina			**2.000**	200
8	Municipalities	A01	Wien - HKA - extension and upgrade of NP removal	3 Austrian Danube	3 Szigetköz	5.500	10.000	**2.000**	
9	Wetlands	YU58	Lower Tisza	9 Tisa	20 Upper Banat			**1.800**	180
10	Municipalities	SLO10	Wastewater treatment plan municipality Ljubljana	8 Sava	23 Upper Sava	10.460	23.750	**1.575**	350
11	Agriculture	BH20	Construction of waste water treatment plant for pigs breeding farm in the Brcko	8 Sava	30 Lower Sava-Drina	9.900		**1.570**	350
12	Industry	SLO04	Wastewater treatment plant of the Paper Factory ICEC Krško	8 Sava	23 Upper Sava	9.400	21.380	**1.418**	315
13	Wetlands	MD23	Lower Prut	14 Prut-Siret	48 Lower Prut			**1.395**	140
14	Wetlands	UA32	Liman Lakes	15 Delta-Liman	51 Ukrainian Delta&Liman Lakes			**1.365**	137
15	Municipalities	HR19	The central waste water treatment plant of city of Zagreb	8 Sava	26 Middle Sava-Kupa	10.438	29.743	**1.320**	220
16	Municipalities	A03	Graz - extension and upgrade of NP removal	7 Drava-Mura	7 Lower Mura - Drava	240	750	**1.180**	340
17	Municipalities	D06	Munchen II - Isar	1 Upper Danube				**1.150**	
18	Agriculture	BH19	Construction of waste water treatment plant for dairy and pigs breeding farm in the Nova Topola.	8 Sava	27 Middle Sava-Una&Vrbas	7.200		**1.130**	250
19	Municipalities	BH01	Construction of regional sewerage system Tuzla-Lukavac with central waste water treatment plant for cities and industry.	8 Sava	28 Lower Sava-Bosna	15.840		**1.080**	160
20	Municipalities	BH02	Rehabilitation and reconstruction sewerage and industry waste water treatment plant of city Sarajevo	8 Sava	28 Lower Sava-Bosna	14.850		**1.015**	150
21	Municipalities	SLO12	Construction of the Central Waste Water Treatment Plant Maribor and the Consession for the Treatment of Waste Water in Maribor	7 Drava-Mura	7 Lower Mura - Drava	6.270	14.250	**945**	210
22	Municipalities	YU01	WWTP "Veliko Selo" - Belgrade (central)	10 Banat-Eastern Serbia	31 Sava at Beograde	31.536	65.000	**876**	1.183
23	Municipalities	RO09	Waste water treatment plant of Braila Nord city	13 Muntenia	50 Lower Danube-Siret&Prut	4.526	3.750	**822**	0
24	Municipalities	RO10	Waste water treatment plant of Galati city	13 Muntenia	50 Lower Danube-Siret&Prut	6.028	5.540	**812**	275
25	Municipalities	A02	Linz - Asten - extension and upgrade of NP removal	3 Austrian Danube	3 Szigetköz		1.278	**770**	64
						174.919	232.043	**47.486**	7.576

DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME
Projects with largest reduction of BOD - , COD - , N - , P - discharge

D/ P - reduction

	Sector	ID-No	Title	Sub-river Basin	Significant Impact Areas	Expected Load Reduction (t/y)			
						BOD	COD	N	**P**
	1	2	3	4	5	6	7	8	**9**
1	Industry	YU22	IHP Prahovo (fertilizers)	10 Banat-Eastern Serbia	34 Lower Timok	440	2.020	460	**3.800**
2	Municipalities	RO53	WWTP of the city of Bucharest	13 Muntenia	42 Arges at Bucuresti	42.730	56.566	7.509	**1.744**
3	Municipalities	YU01	WWTP "Veliko Selo" - Belgrade (central)	10 Banat-Eastern Serbia	31 Sava at Beograde	31.536	65.000	876	**1.183**
4	Municipalities	BG03	Municipally Waste Water Treatment Plant - Sofia	12 Mizia-Dobrudzha	36 Iskar at Sofija	5.823	12.051	273	**551**
5	Municipalities	RO12	Development of waste water treatment plant of Resita city	10 Banat	17 Middle Mures	1.502	1.729	241	**527**
6	Wetlands	H10	Area between Gemenec and Kopacki Rit Rehabilitation and management of the water related ecosystems in the Danube-Drava Region	7 Drava-Mura	5 Gemenc-Kopacki Rit			4.050	**405**
7	Wetlands	HR67	Area between Gemenc and Kopacki Rit - Preservation and rehabilitation of the Drava river basin wetlands in Baranja region	7 Drava-Mura	6 Middle Drava			4.050	**405**
8	Municipalities	RO52	Wastewater Treatment Plant of Iasi city	14 Prut-Siret	47 Middle Prut	1.390	772	165	**354**
9	Municipalities	SLO10	Wastewater treatment plan municipality Ljubljana	8 Sava	23 Upper Sava	10.460	23.750	1.575	**350**
10	Agriculture	BH20	Construction of waste water treatment plant for pigs breeding farm in the Brcko	8 Sava	30 Lower Sava-Drina	9.900		1.570	**350**
11	Municipalities	A03	Graz - extension and upgrade of NP removal	7 Drava-Mura	7 Lower Mura - Drava	240	750	1.180	**340**
12	Industry	SLO04	Wastewater treatment plant of the Paper Factory ICEC Krško	8 Sava	23 Upper Sava	9.400	21.380	1.418	**315**
13	Industry	YU28	HI "Zarka" - Sabac	8 Sava	31 Sava at Beograde	200	580	200	**280**
14	Municipalities	RO10	Waste water treatment plant of Galati city	13 Muntenia	50 Lower Danube-Siret&Prut	6.028	5.540	812	**275**
15	Wetlands	RO66	Balta Greaca / Tutrakan	13 Muntenia	42 Arges at Bucuresti			2.700	**270**
16	Municipalities	YU03	City of Novi sad WWTP	6 Pannonian Central Danube	8 Danube At Novi Sad	5.657	12.000	148	**268**
17	Municipalities	YU04	City of Nis WWTP	11 Velika Morava	32 Western&Southern Morava	5.302	11.000	124	**260**
18	Agriculture	BH19	Construction of waste water treatment plant for dairy and pigs breeding farm in the Nova Topola.	8 Sava	27 Middle Sava-Una&Vrbas	7.200		1.130	**250**
19	Municipalities	BG10	Municipal Waste Water treatment Plant Gorna Oryahovitza & Lyaskovetz	12 Mizia-Dobrudzha	40 Middle Yantra	6.559	14.370	464	**247**
20	Municipalities	RO03	Wastewater treatment plant Craiova	13 Muntenia	50 Lower Danube-Siret&Prut	5.997	5.862	597	**245**
21	Wetlands	RO69	Polder Pardina	15 Delta-Liman	51 Ukrainian Delta&Liman Lakes			2.250	**225**
22	Municipalities	HR19	The central waste water treatment plant of city of Zagreb	8 Sava	26 Middle Sava-Kupa	10.438	29.743	1.320	**220**
23	Municipalities	BG24	WWTP Russe	12 Mizia-Dobrudzha	41 Lom Rivers	3.883	8.987	603	**219**
24	Municipalities	YU06	City of Zrenjanin WWTP	9 Tisa	32 Western&Southern Morava	3.932		160	**214**
25	Municipalities	SLO12	Construction of the Central Waste Water Treatment Plant Maribor and the Consession for the Treatment of Waste Water in Maribor	7 Drava-Mura	7 Lower Mura - Drava	6.270	14.250	945	**210**
						174.887	286.350	34.820	**13.507**

Annex 13.

Danube Water Quality Model simulations to demonstrate the impact of pollution reduction from proposed projects (June 1999)

Computed longitudinal in-stream load profiles, subdivided per country

The Danube River - nitrogen load

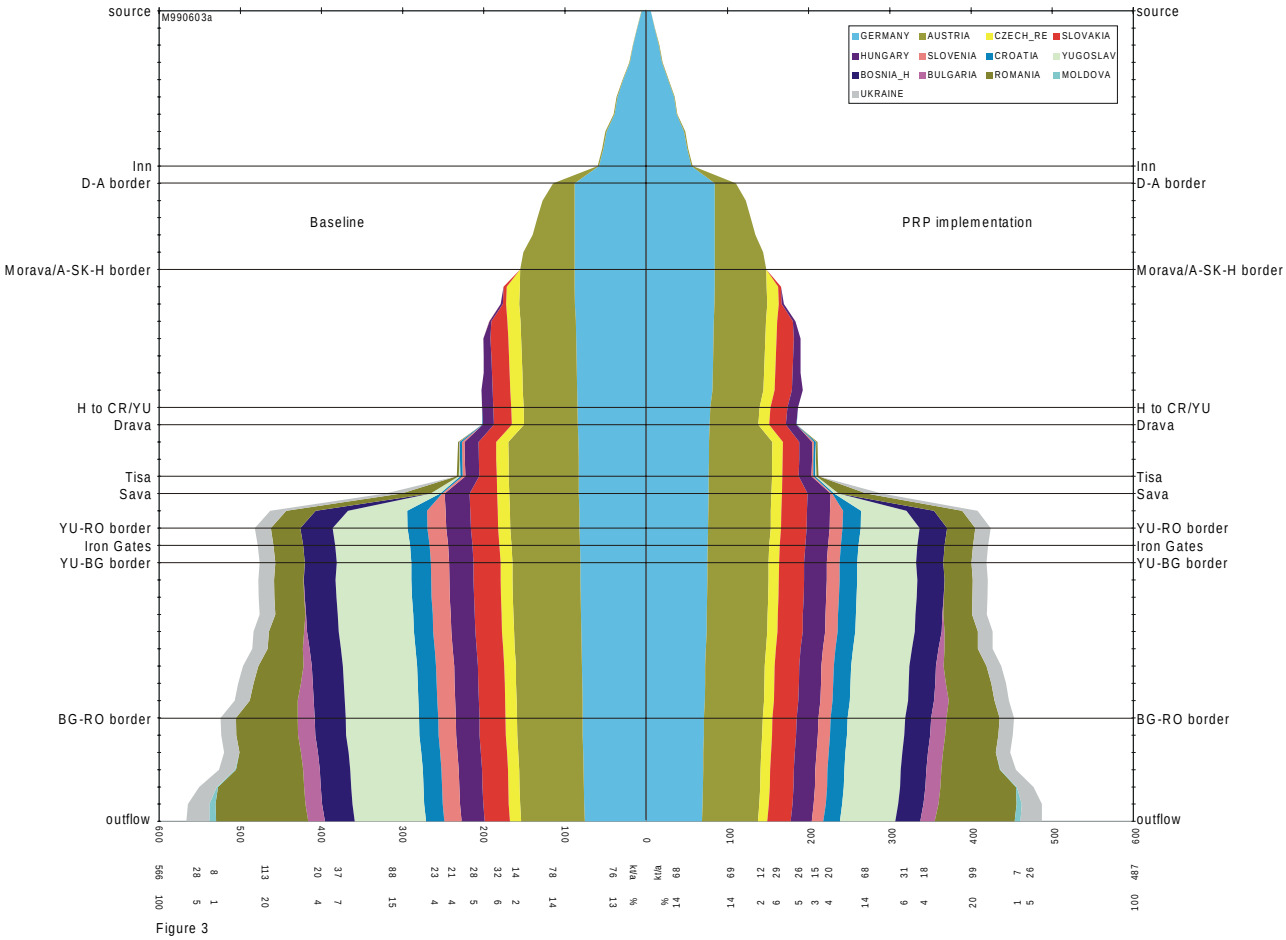


Figure 3

Figure 3: In-stream nitrogen load profiles per country for the Danube river, before (left side) and after (right side) implementation of the PRP.

Computed longitudinal in-stream load profiles, subdivided per country

The Danube River - phosphorus load

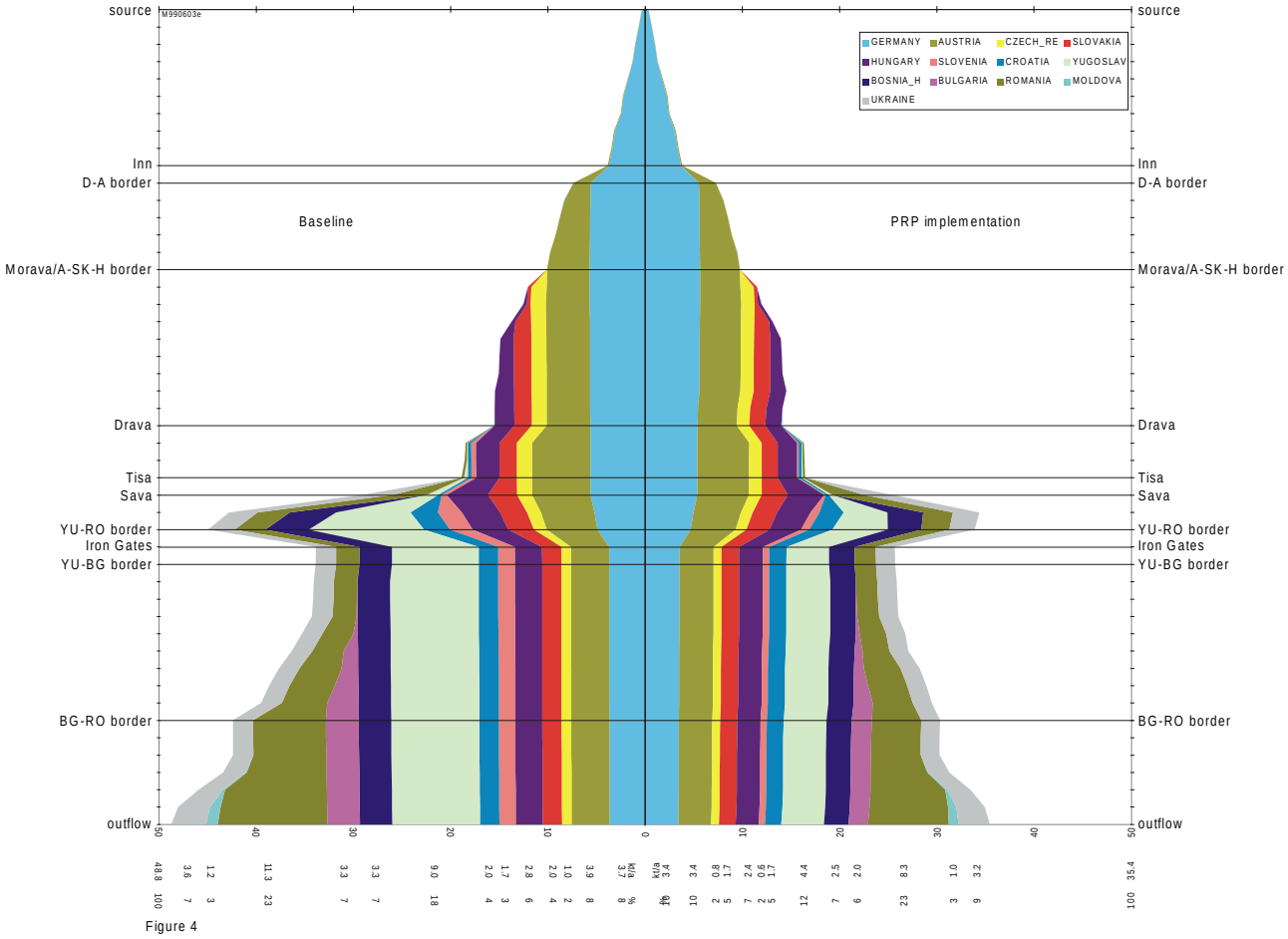


Figure 4

Figure 4: In-stream phosphorus load profiles per country for the Danube river, before (left side) and after (right side) implementation of the PRP.

Computed longitudinal in-stream load profiles, subdivided per country

The Drava River - nitrogen load

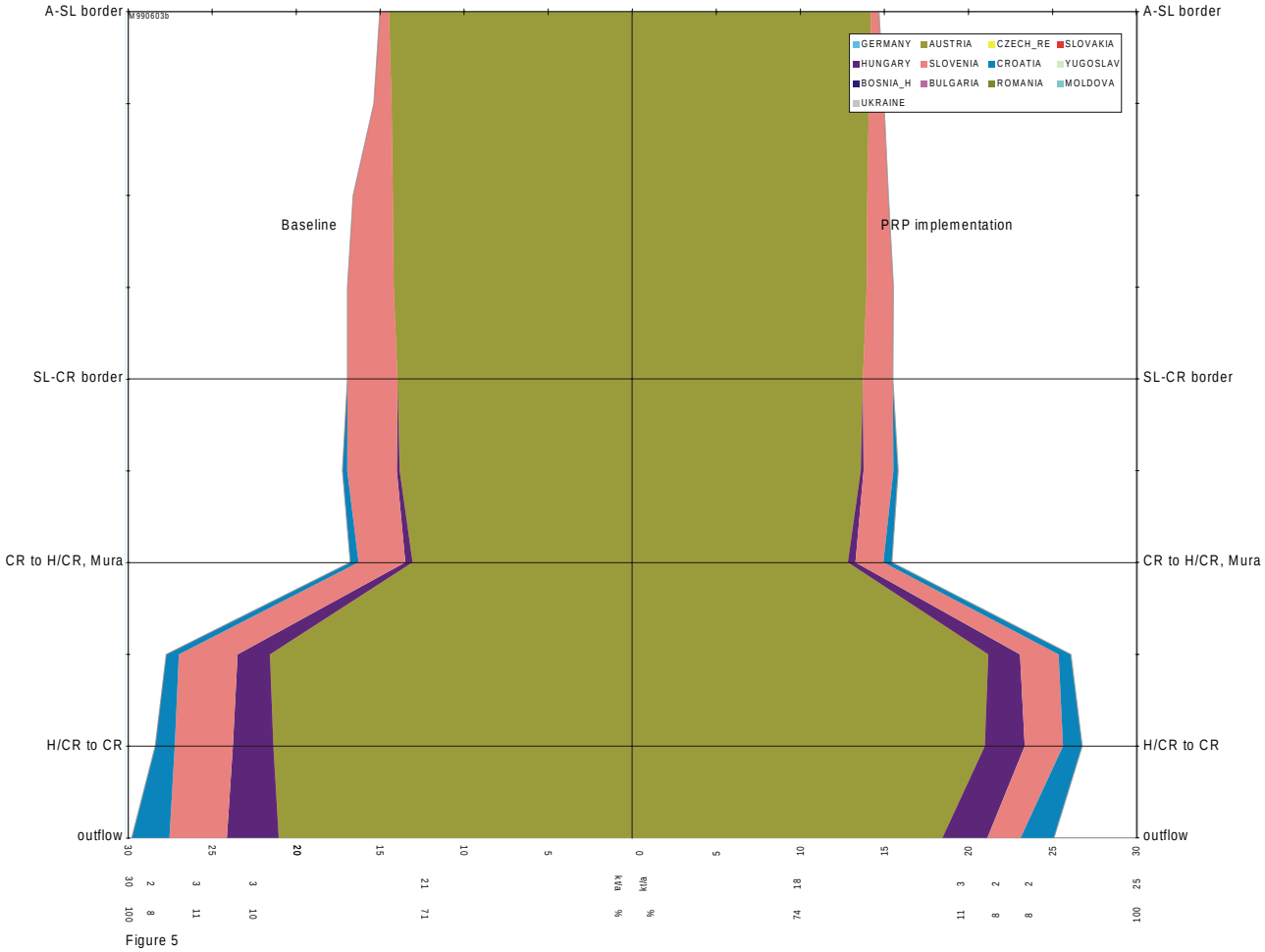


Figure 5

Figure 5: In-stream nitrogen load profiles per country for the Drava river, before (left side) and after (right side) implementation of the PRP.

Computed longitudinal in-stream load profiles, subdivided per country

The Drava River - phosphorus load

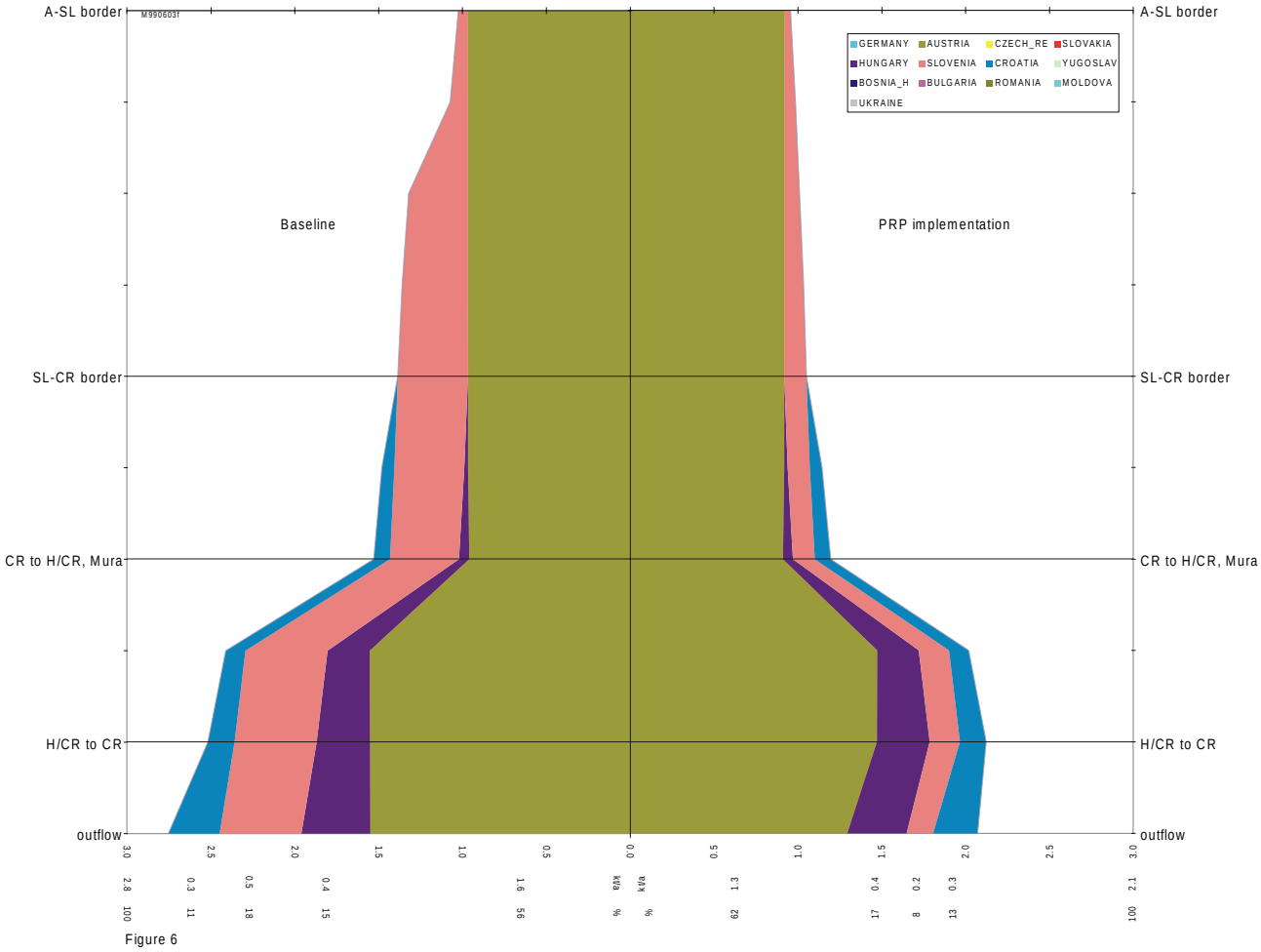


Figure 6: In-stream phosphorus load profiles per country for the Drava river, before (left side) and after (right side) implementation of the PRP.

Computed longitudinal in-stream load profiles, subdivided per country

The Tisa River - nitrogen load

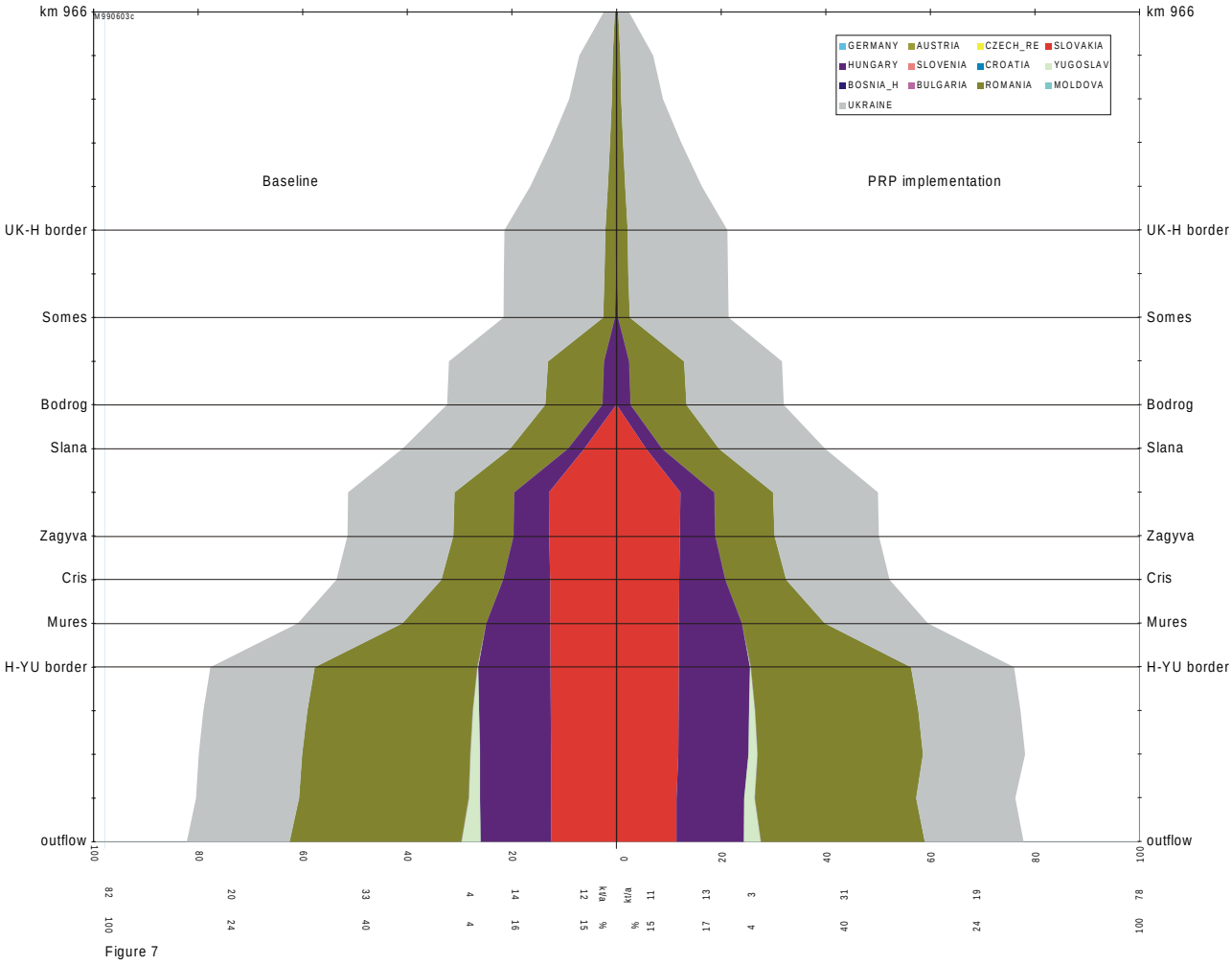


Figure 7

Figure 7: In-stream nitrogen load profiles per country for the Tisa river, before (left side) and after (right side) implementation of the PRP.

Computed longitudinal in-stream load profiles, subdivided per country

The Tisa River - phosphorus load

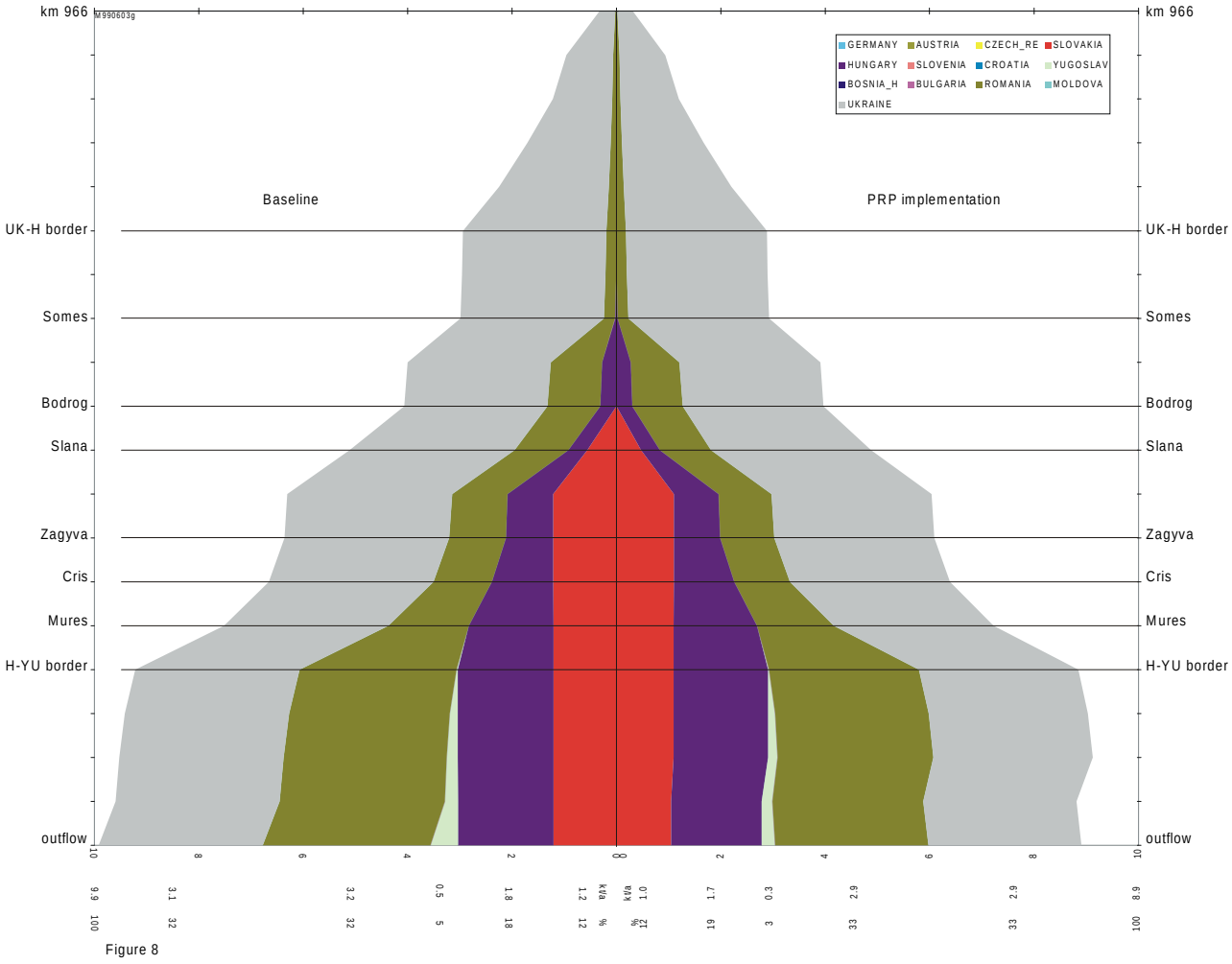


Figure 8: In-stream phosphorus load profiles per country for the Tisa river, before (left side) and after (right side) implementation of the PRP.

Computed longitudinal in-stream load profiles, subdivided per country

The Sava River - nitrogen load

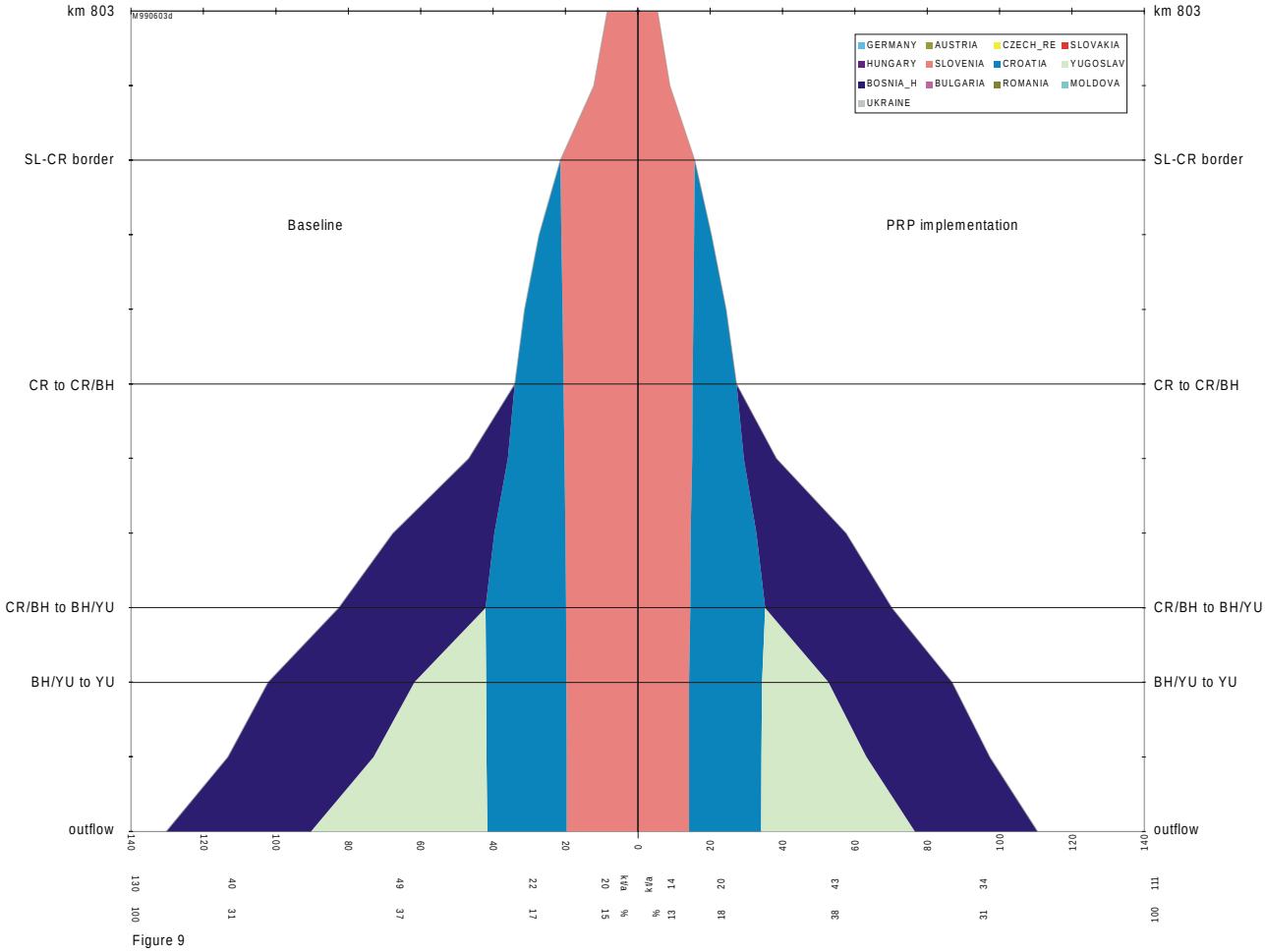


Figure 9

Figure 9: In-stream nitrogen load profiles per country for the Sava river, before (left side) and after (right side) implementation of the PRP.

Computed longitudinal in-stream load profiles, subdivided per country

The Sava River - phosphorus load

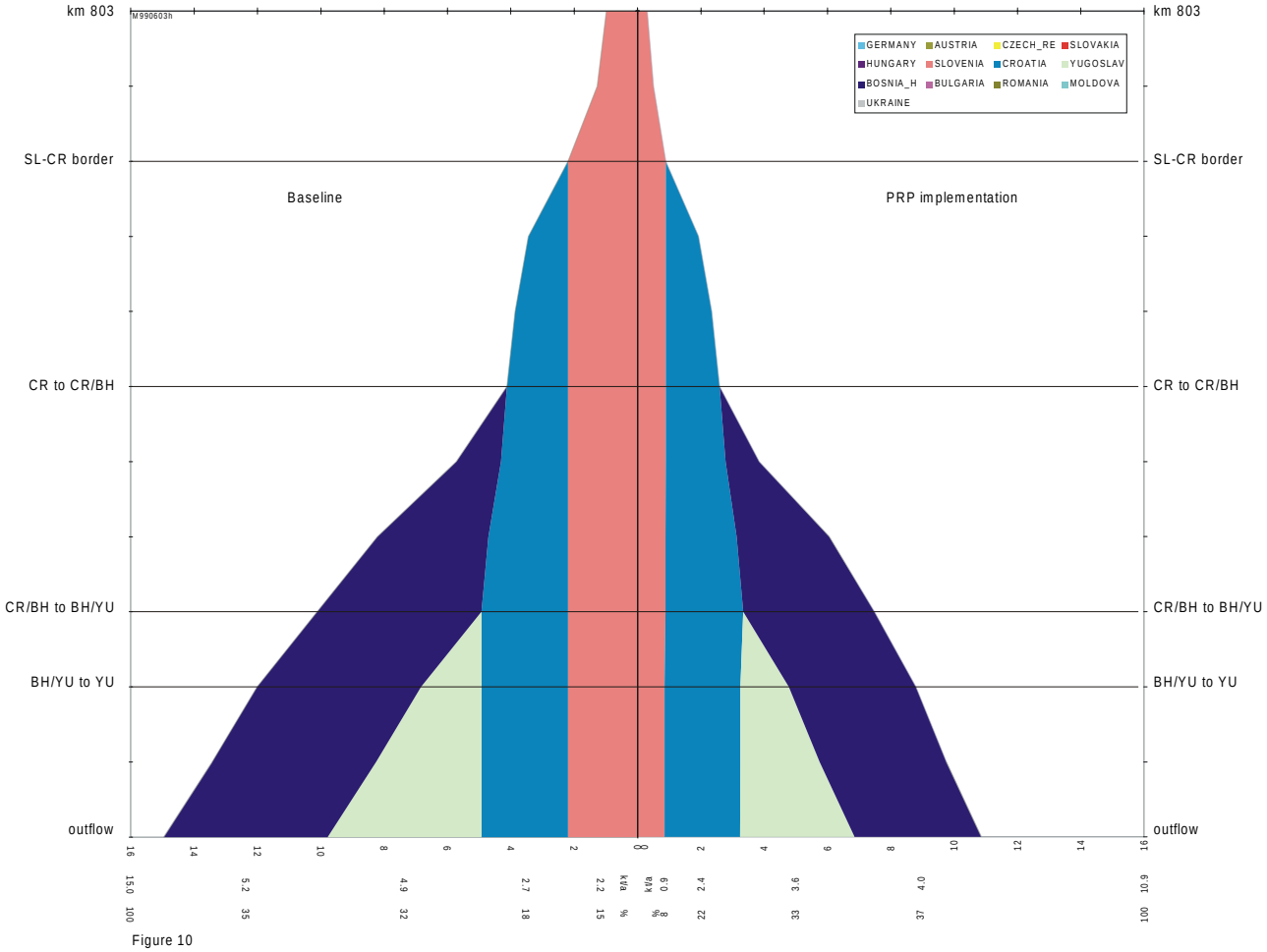


Figure 10

Figure 10: In-stream phosphorus load profiles per country for the Sava river, before (left side) and after (right side) implementation of the PRP.

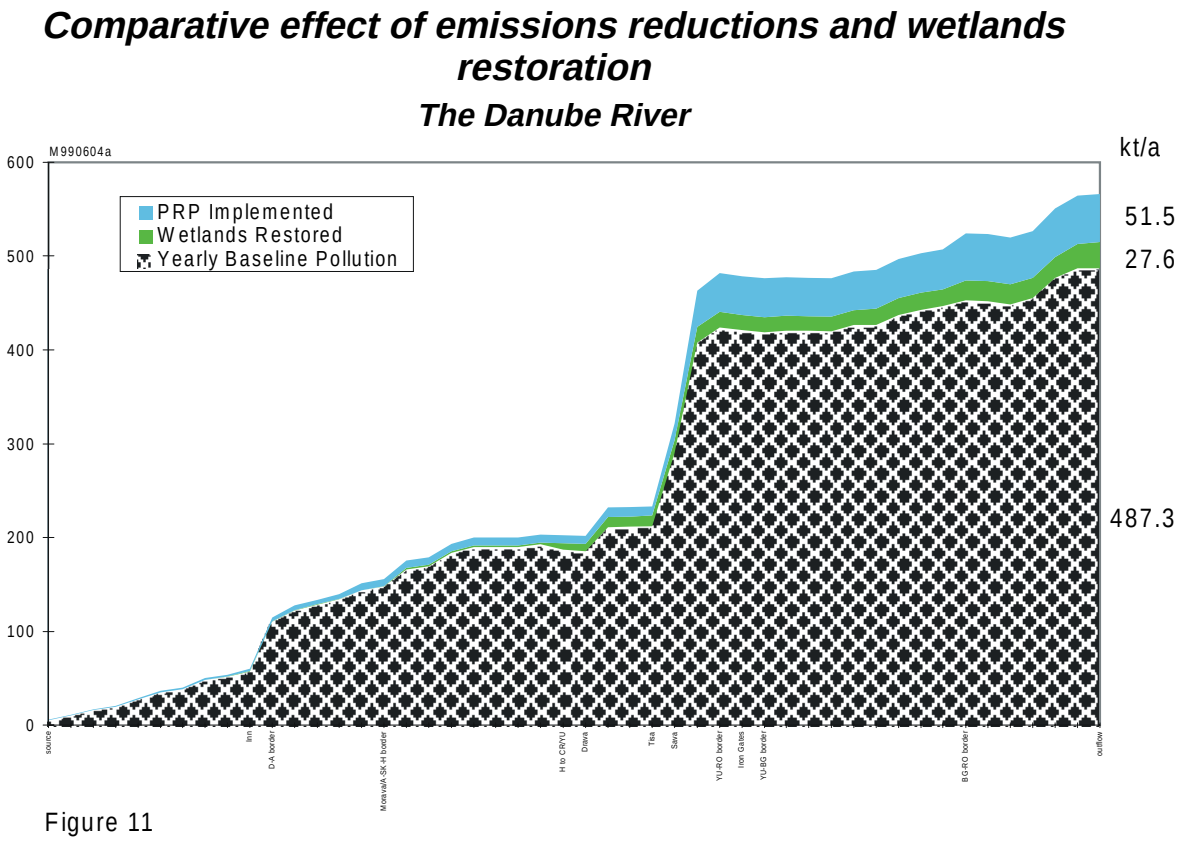


Figure 11

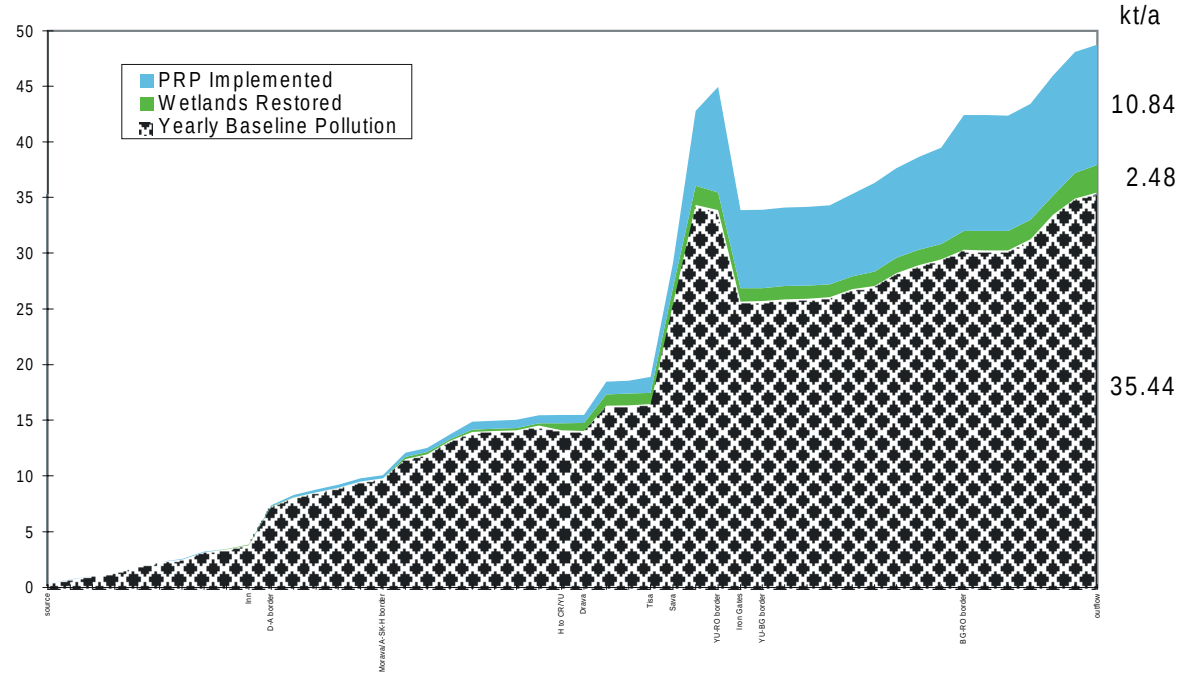


Figure 12

Figure 11: In-stream nitrogen load profile for the Danube river, before and after implementation of the PRP, with the additional effect of the restoration of 17 wetlands (top).

Figure 12: In-stream phosphorus load profile for the Danube river, before and after implementation of the PRP, with the additional effect of the restoration of 17 wetlands (bottom).

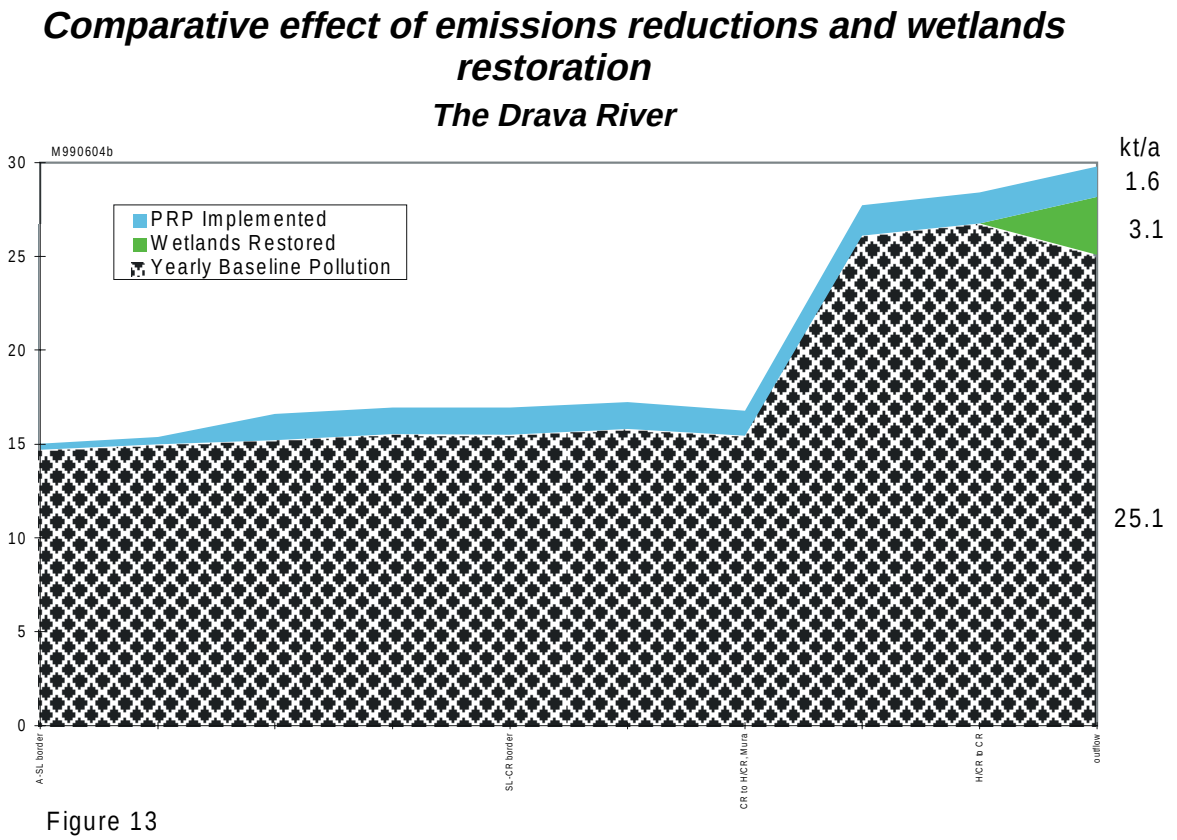


Figure 13

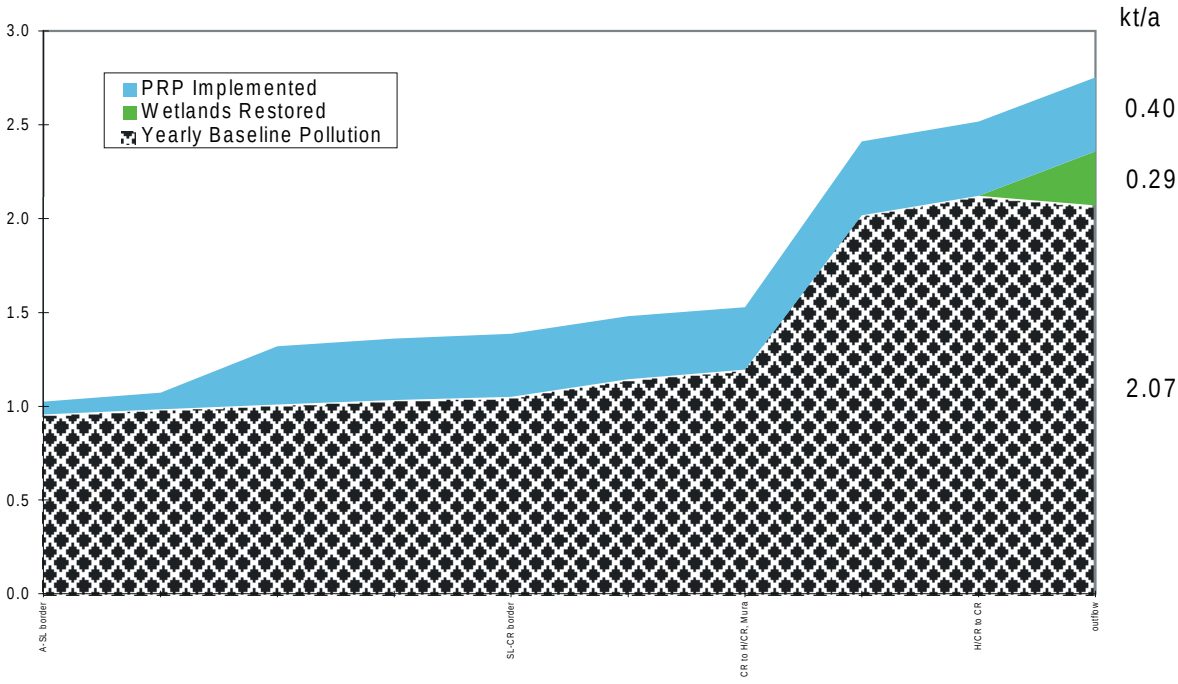


Figure 14

Figure 13: In-stream nitrogen load profile for the Drava river, before and after implementation of the PRP, with the additional effect of the restoration of 17 wetlands (top).

Figure 14: In-stream phosphorus load profile for the Drava river, before and after implementation of the PRP, with the additional effect of the restoration of 17 wetlands (bottom).

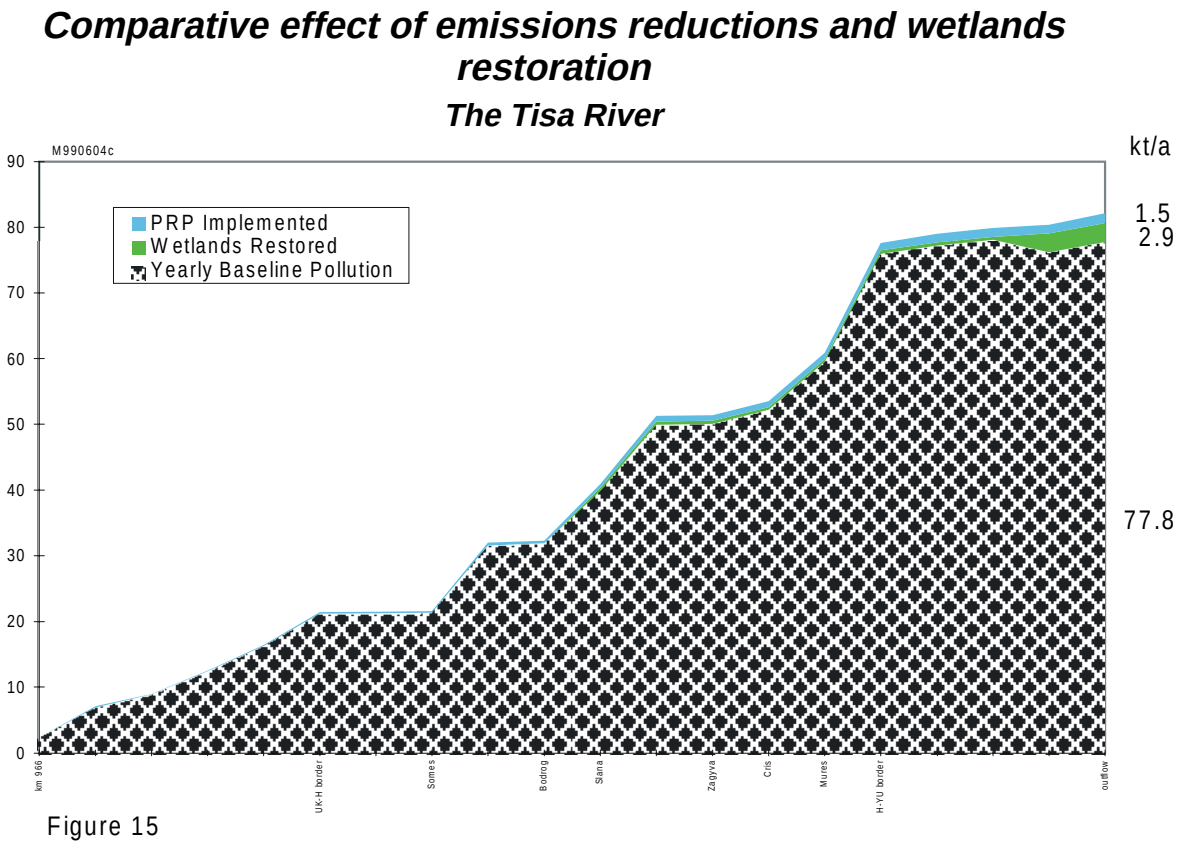


Figure 15

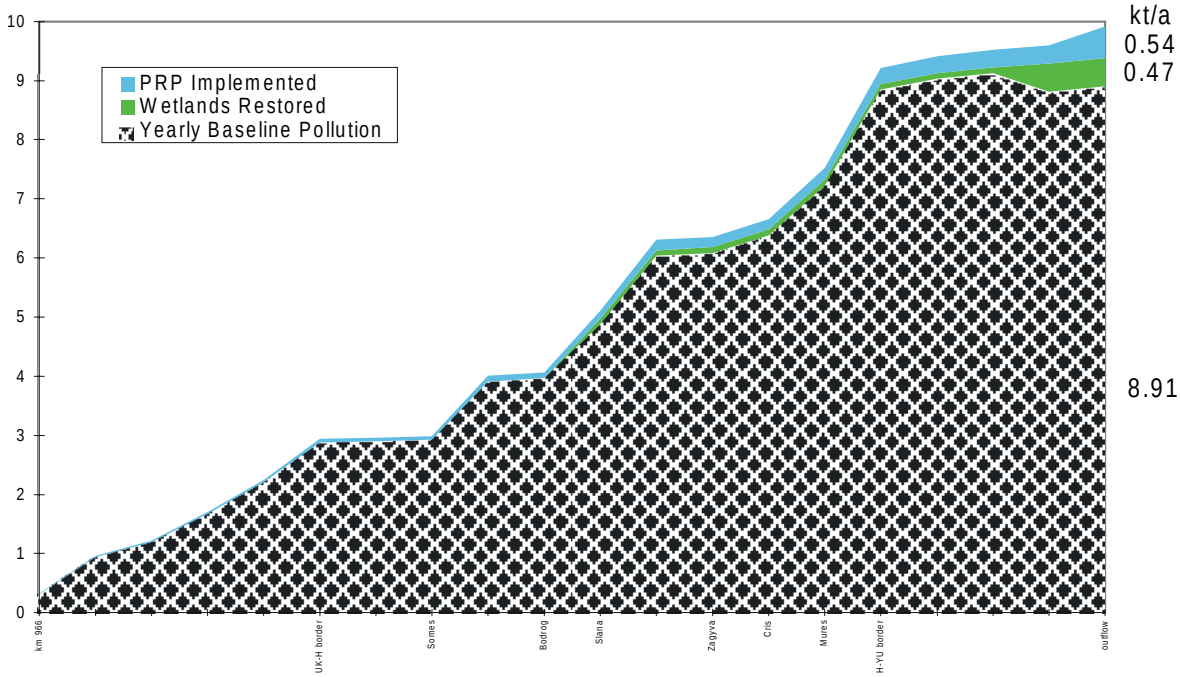


Figure 16

Figure 15: In-stream nitrogen load profile for the Tisa river, before and after implementation of the PRP, with the additional effect of the restoration of 17 wetlands (top).

Figure 16: In-stream phosphorus load profile for the Tisa river, before and after implementation of the PRP, with the additional effect of the restoration of 17 wetlands (bottom).

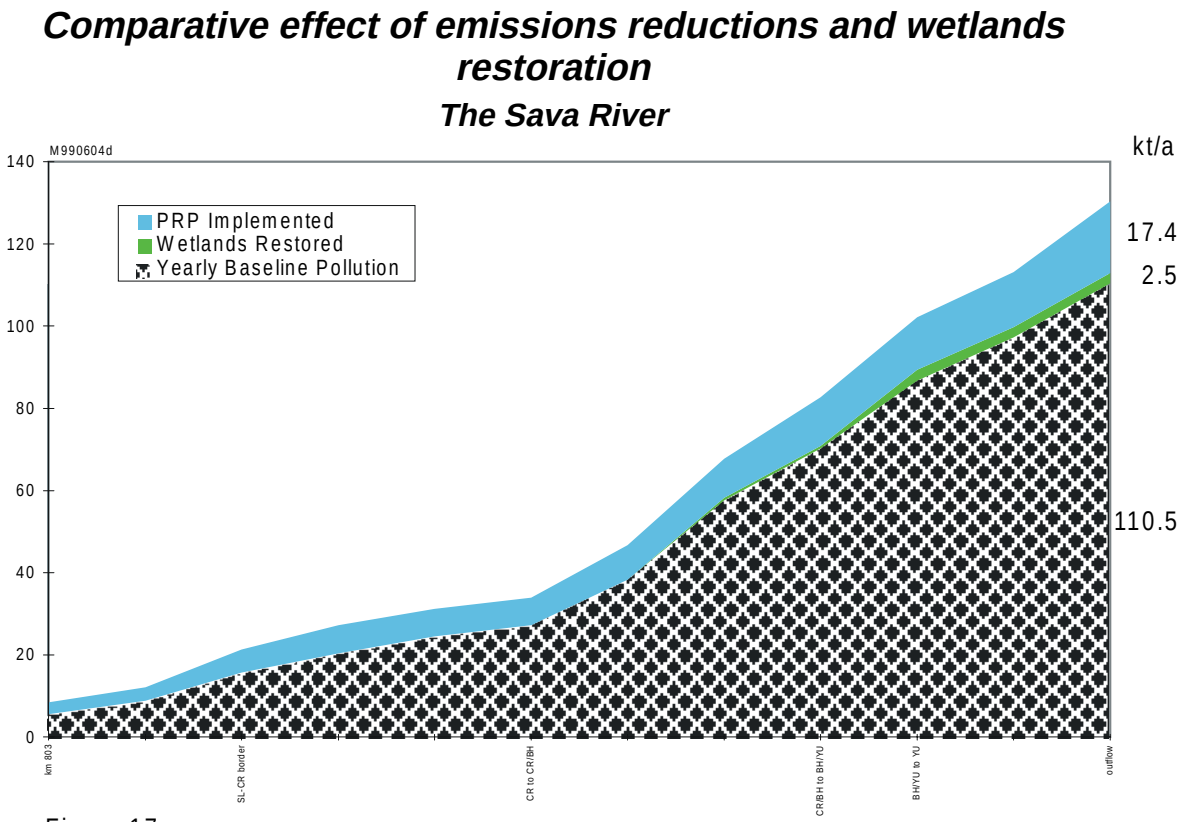


Figure 17

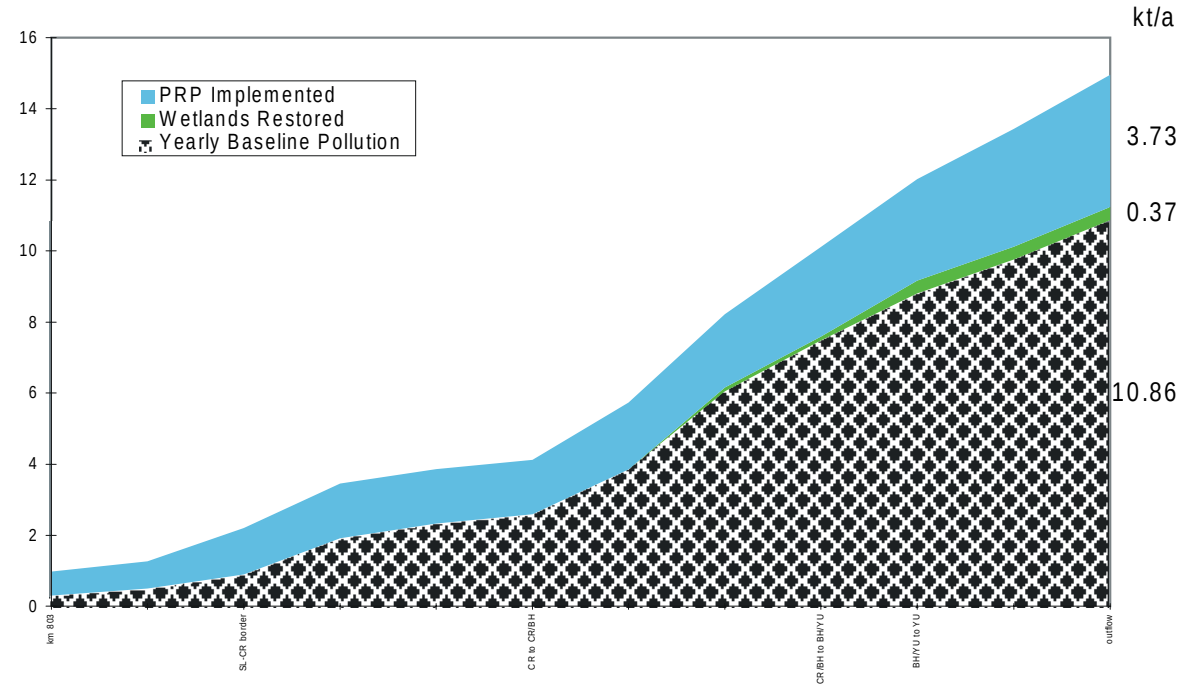


Figure 18

Figure 17: In-stream nitrogen load profile for the Sava river, before and after implementation of the PRP, with the additional effect of the restoration of 17 wetlands (top).

Figure 18: In-stream phosphorus load profile for the Sava river, before and after implementation of the PRP, with the additional effect of the restoration of 17 wetlands (bottom).

Computed longitudinal in-stream load profiles, subdivided per sector

The Danube River - nitrogen load

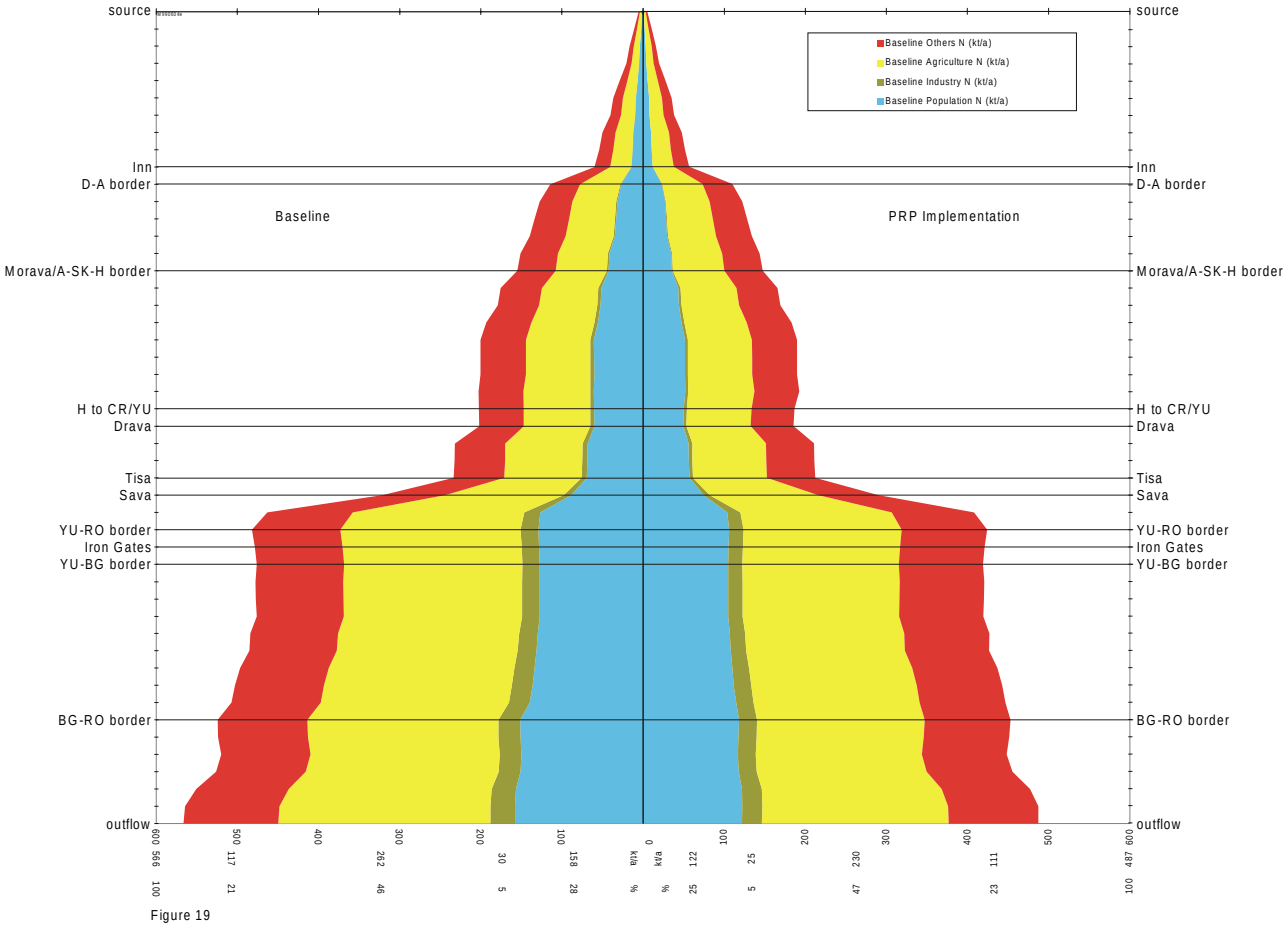


Figure 19

Figure 19: In-stream nitrogen load profile for the Danube river, before (left side) and after (right side) implementation of the PRP, subdivided over the sectors population, industry, agriculture and others.

Computed longitudinal in-stream load profiles, subdivided per sector

The Danube River - phosphorus load

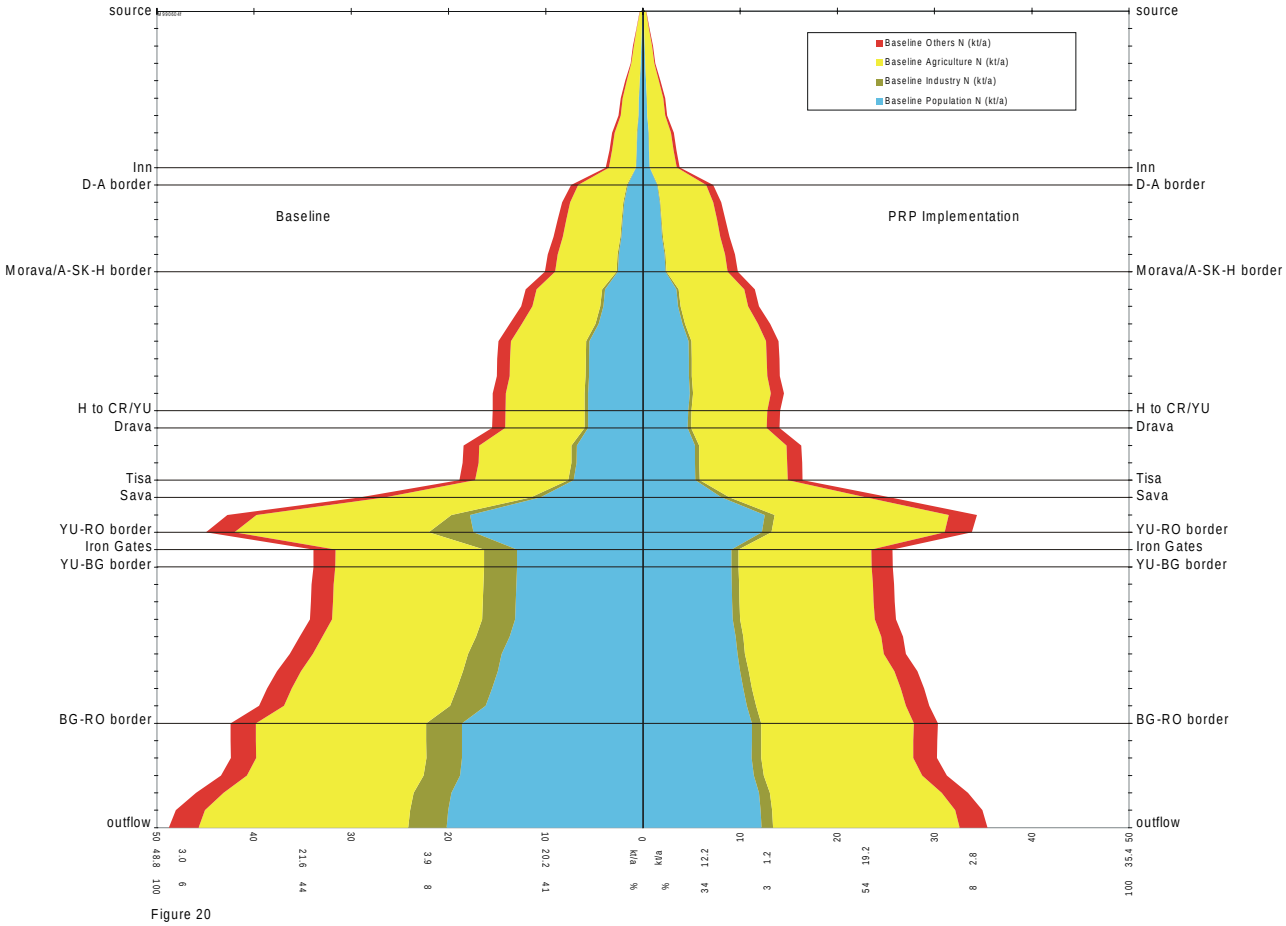


Figure 20

Figure 20: In-stream phosphorus load profile for the Danube river, before (left side) and after (right side) implementation of the PRP, subdivided over the sectors population, industry, agriculture and others.

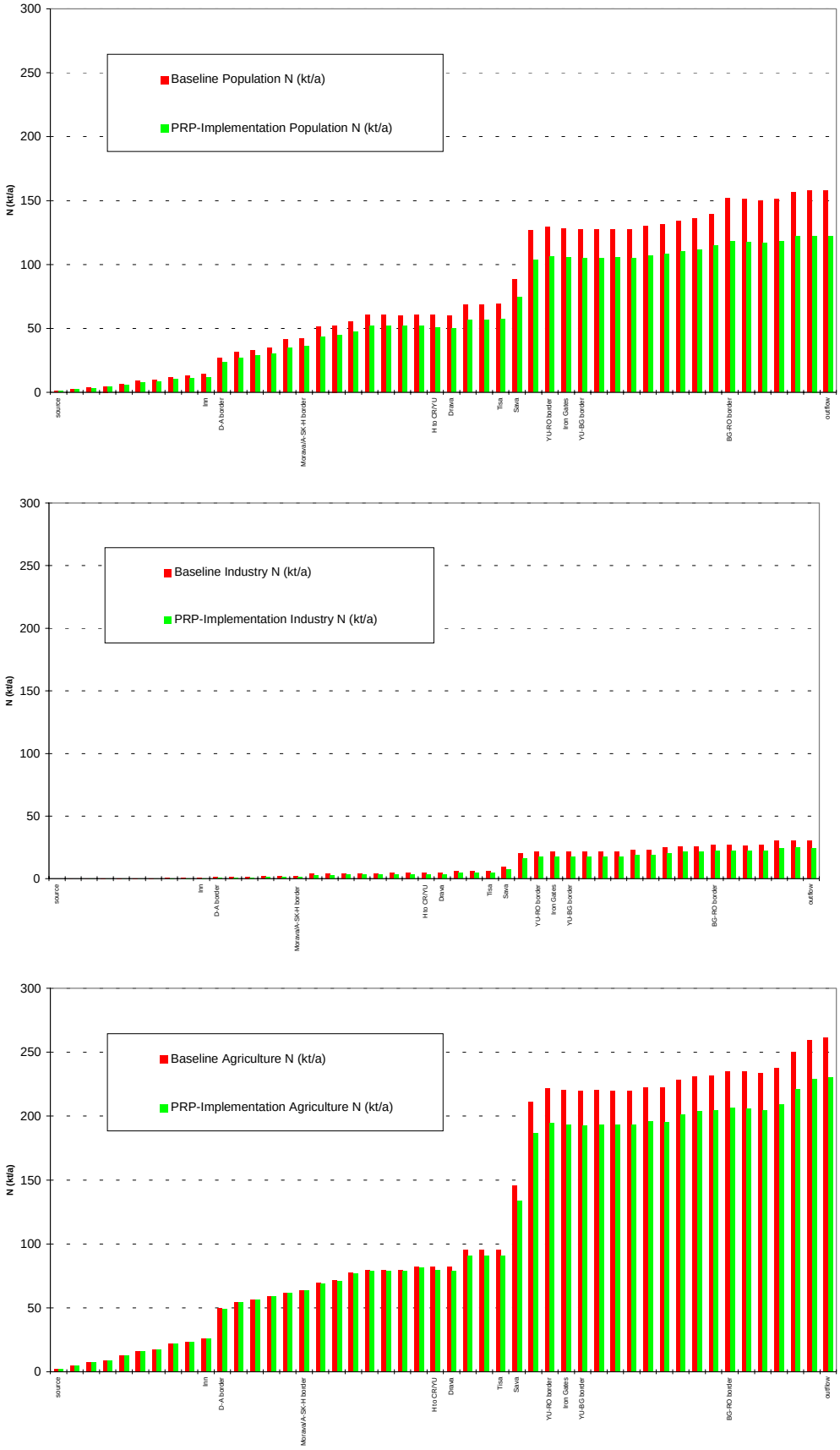


Figure 21: In-stream nitrogen load profiles for the Danube river, before and after implementation of the PRP, for the sectors population, industry and agriculture.

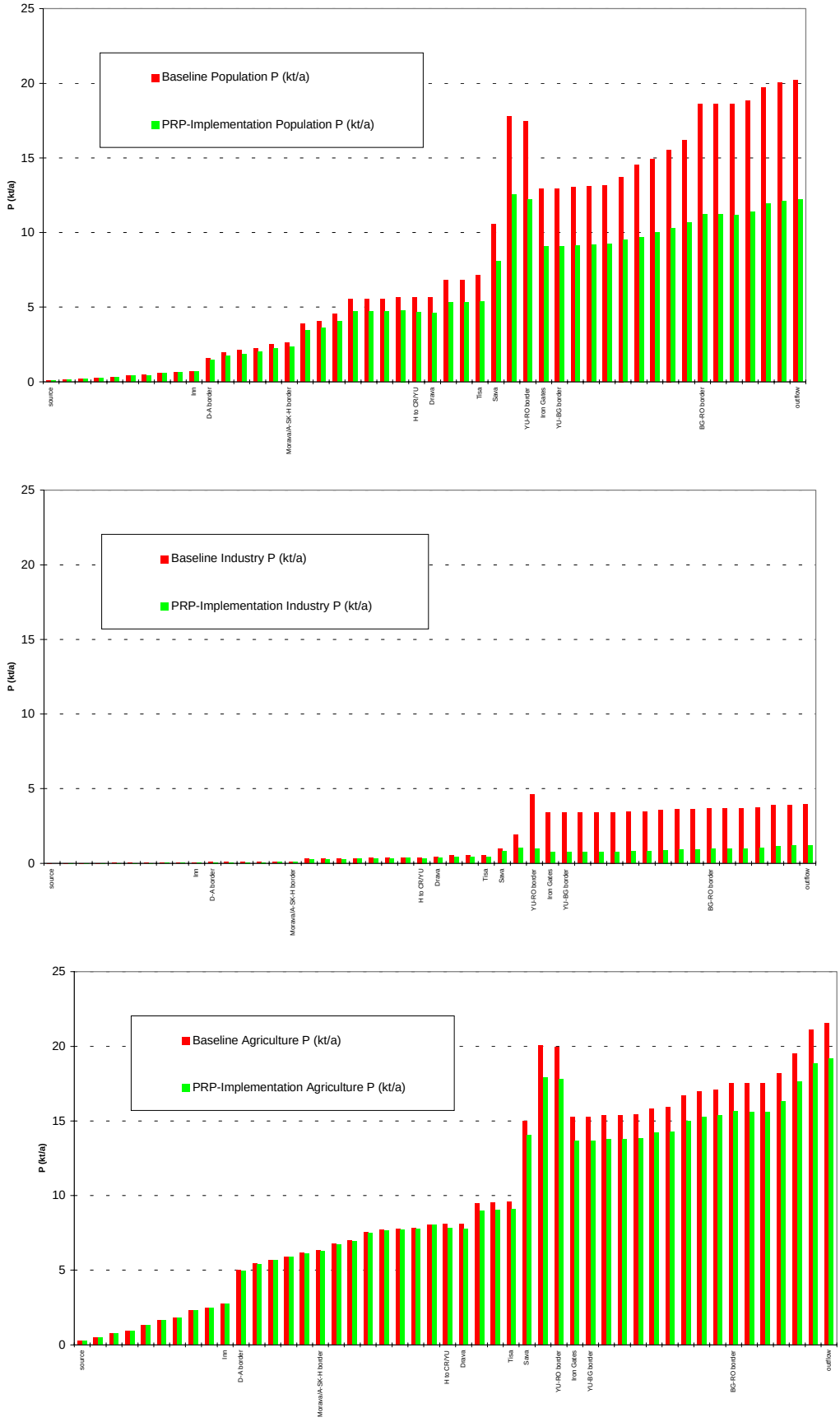


Figure 8.22: In-stream phosphorus load profiles for the Danube river, before and after implementation of the PRP, for the sectors population, industry and agriculture.

Annex 14.

GEF/World Bank Future Support to the ICPDR

GEF/World Bank Future Support to the ICPDR

Advances

Next Steps

GEF Projects

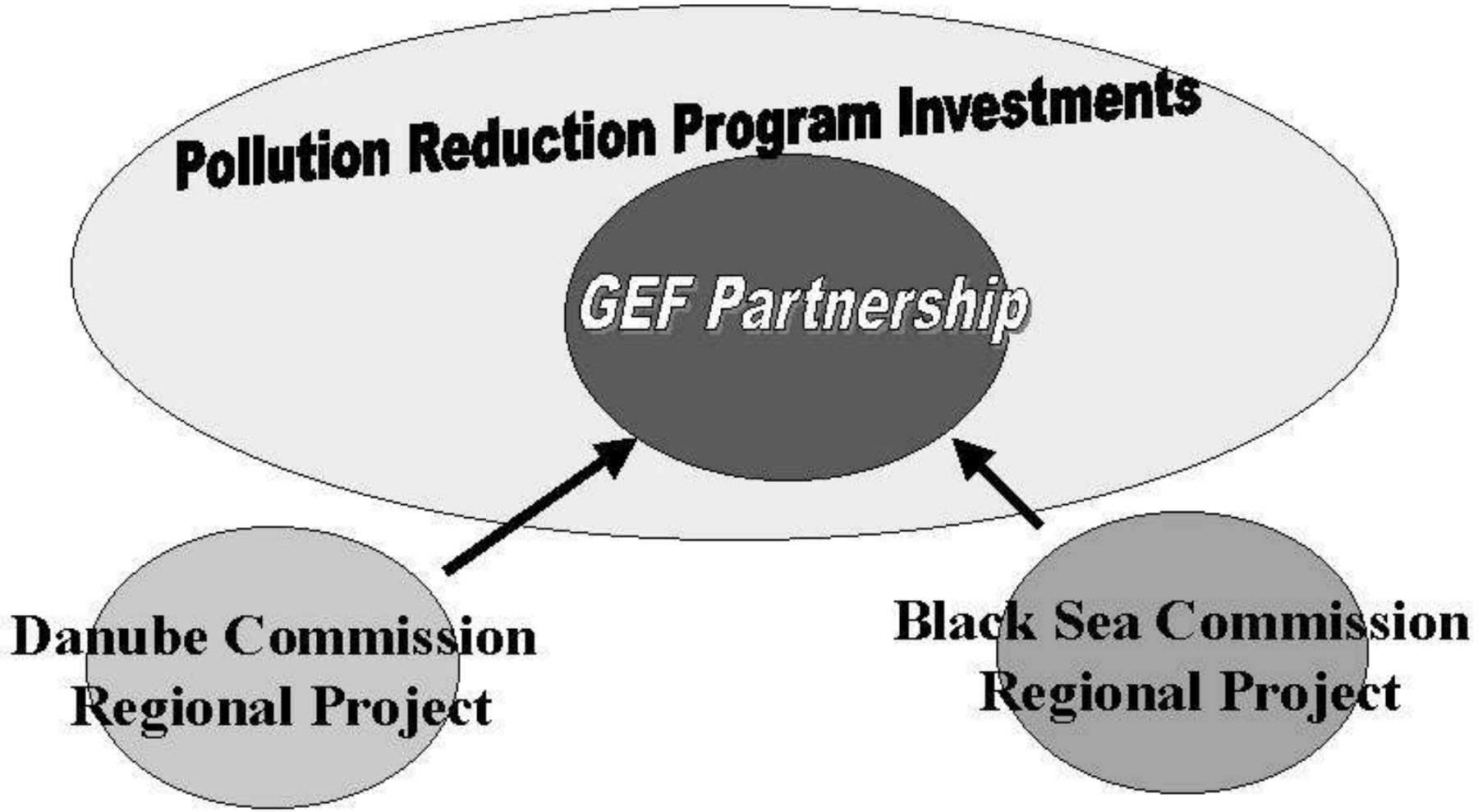
Impressive Progress

- Assessment of the Situation
  - Identified Possible projects
  - Defined Priorities
- Awareness
  - Mobilized support
  - Mobilized funding
- Developed Cooperation among Countries
  - Commission/Secretariat functioning and funded
  - Pollution reduction targets established

Next Step: *Translate Theory into Action*

- Develop Policies
  - Nutrient's market, cost sharing formulas, etc.
- Mobilize Investment Funds and Implement
  - Internal funds, subsidies (local and foreign)
  - Implementation capacity
- Further Knowledge Development
  - Monitoring and evaluation
  - New Emerging Challenges
- Further Awareness. Public Outreach

The GEF Projects (initial ideas)



The GEF/WB/… Partnership

- Finances incremental costs for nutrient's reduction (common vs. widespread problem)
- Projects in Pollution Reduction Programs of Danube and Black Sea Commissions
  - **Agriculture Reform**
  - **WWTP (small municipalities, industry?)**
  - **Wetlands restoration**
- About 5 million US$ per project (70 total)
- Opportunistic/Competitive selection

How to Access Partnership Funds?

- Country and Commission endorses and request preparation and funds
- Project Complies with Eligibility Criteria
  - Financing package, sustainability
  - Efficiency
  - Feasible
  - Country up to date in Comm. Obligations
- Proposal presented to GEF Secretariat
  - Additional or self-standing project

Regional Projects

- Two project, to support the Commission's Secretariats
- Costs-Sharing concept, on declining basis
- Support for specific functions, ie:
  - Monitoring and evaluation
  - Development of policies (ie. Nutrient's market)
  - Response to new challenges
  - Development of LBS protocols

Next Steps

- Prepare a proposal for the Partnership and the Regional Projects (Sept. 30)
  - Description and content of Partnership and Regional Projects
  - Eligibility criteria
  - Examples of projects (initial proposals)
- What do we need?
  - Endorsement from Commission/Countries
  - Identification of "Example Projects" (Jul. 15)
  - Preparation of Project proposals for Examples

Annex 15.

Results of Working Groups from Hernstein II – Pollution Reduction Programme Workshop, 12 to 15 May 1999

- **Strategic Partnership Programme**
- **Investment costs, incremental costs and cost effectiveness of proposed projects**
- **Evaluation of projects in relation to SIAs and analysis of transboundary effects**
- **Evaluation of measures and application of EU guidelines/directives with particular attention to agriculture and land use**
- **Evaluation of structural projects for N and P removal with particular attention to wetland restoration and their effects on the Black Sea**
- **Evaluation of environmental effects of war consequences in the Danube River Basin**

Strategic Partnership Programme

The representative of the WB provided a thorough outline of the background , the targets and the implications of the "Strategic Partnership Programme" designed by GEF/WB for project implementation in the context of the DRPRP. The key statements of his presentation and the supplementary contribution of the group members can be summarised as follows:

1. Target

Preparation of projects with particular environmental / incremental effects for GEF- co-funding:

i. Preparation of project documents for a not specified number of "country projects" proposed by the DRB countries (at least 3 demonstration projects);

ii. Preparation of one "regional project" for the DRB, and one "regional project" for the Black Sea, to support the Commission's Secretariats.

2. Basic Information for the Preparation of "Country Projects"

i. Projects should have significant effects in one of the following sectors:
   - wetlands
   - agriculture
   - municipality (preferably small scale WWTP)

ii. The total programme budget is about USD 70 million allocated over a period of 5 years (for Black Sea and DRB)

iii. First projects concepts should be elaborated by 10th June 1999 (Steering Committee Meeting)

iv. Deadline for delivery of the complete project documentation is 30th September 1999

v. The project documents for application should contain:
   - complete project report /documentation on feasibility level;
   - endorsement from the national government (a letter for the purpose of application from the relevant ministry);
   - endorsement from the Commission.

vi. Countries should as soon as possible define request for external support from WB and other institutions / organisations.

vii. A WB mission will visit the countries during the first two weeks of July.

3. Key Project Criteria for "Country Projects"

i. Utmost compatibility with the DRPRP
ii. Advanced status of project preparation
iii. Environmental transboundary effects
iv. Secured funding scheme (national and international funding components)
v. Policy implications
vi. Demonstration / pilot character
vii. Clearly defined implementation agency
viii. Linkage to other GEF priorities (biodiversity)

4. Key Elements to Be Covered by the Project Documents

i. Profound Background Information

ii. Institutional settings

iii. Support of policy settings

iv. Technical feasibility (best available technology, BAT)

v. Financial viability

vi. Environmental effects:
- global
- transboundary
- local

vii. Impact assessment

viii. Sustainability
- financial
- operational

ix. Definition of country specific baseline situation

x. Identification of incremental effects

xi. Estimate of incremental cost component

xii. Cost effectiveness / low cost solution

xiii. Funding scheme

xiv. Management and operation plan

xv. Implementation plan

xvi. Side effects:
- social;
- cultural;
- economic;
- resettlement aspects.

5. Eligibility Criteria (for GEF Co-funding)

i. Technical feasibility (BAT)

ii. Financial viability

iii. Sustainability

iv. Economic, cultural, social effects

v. Least costs solution

vi. Efficiency / cost effectiveness
- calculated by present value approach
- load reduction (t/USD)
- emission reduction (t/USD)

vii. Linkage with other GEF priorities

viii. Transboundary effects

ix. Policy implications

x. Sound funding concept (equity contribution of project sponsor)

xi. Support to the Danube Pollution Reduction Programme

6. Regional projects

In general terms all project components of the envisaged "regional projects" should basically support:

- transfer of knowledge
- practical implementation of legislation
- personnel training

6.1. Policy reform

1. Phosphorus elimination (detergents)
2. Land use
   - Amendment of the Convention (annex to the convention)
   - Model projects for interacting land use:
     - municipalities
     - agriculture
     - wetlands
     - manure management
3. Nutrient market
   - feasibility study

6.2. Monitoring

- co-ordination of water quality monitoring
- data management validation
- laboratory performance improvement
- linkage between MLIM Group and WQ Model
- utilization of GIS
- improvement of the procedures for emergency response

6.3. Institutional strengthening and capacity building

6.4. Awareness building

- NGO support on long tern (Danube Environment Forum – small grant programmes, etc.)

6.5. Legal aspects

- Facilitate protocol on land based sources pollution programme

Analysis of Investments and Cost Effectiveness with Particular Attention to Criteria for Incremental Costs for Pollution Reduction by Sector of Intervention

Working Group 1 should primarily deal with all relevant aspects of

- investment cost
- cost effectiveness
- incremental cost,

and should additionally discuss and indicate the links to and the consequences for the "Strategic Partnership Programme" developed by GEF/WB for project implementation in the context of the DRPRP.

1. Investment Cost

1. Statements / conclusions

Basically the group expressed some concern about the reliability of the investment cost provided by the project files:

- sometimes investment costs (e.g. SLO) were calculated on the basis of precise technical documentation;
- some of the costs were calculated by means of "population equivalent".

The main conclusions of the group can be summarised as follows:

- first of all: verify if the cost estimates are at least "logical" (to exclude obvious errors);
- clarify that the cost estimation include all cost components (not only construction cost);
- clarify that the projects do not include components which are not related to the effects of WWTP.

2. Proposals / output

- The investment costs compiled in Annex 7 should be checked and the data which were calculated on the basis of exact technical documentation should be marked in the table.
- Verify if cost estimates take into account inflation since the year of cost estimate and correct exchange rates (reflecting the actual situation):
- Checke plausibility of investment cost within a period of one week.

2. Cost Effectiveness

1. Statements / conclusions

There was some concern on the fact that only two parameters have been taken into account:

- basic cost / reduction of COD;
- incremental cost / reduction of N + P.

It was proposed that cost effective solutions should be elaborated for adequately defined "standards".

It was generally agreed that in the further process of this programme "cost effectiveness" should take into account both investments and operating and maintenenace cost; and this should be done by means of a "present value approach".

Basic knowledge and experience regarding this approach is usually available in the DRB countries, because it has to be used in any case in the project preparation for international financial assistance.

There are, however, substantial training needs for the introduction of this approach, in particular within the engineering sector.

2. Results / Proposals

- Add a new column showing the relation between total investment cost and nutrient reduction (N+P).
- Add, if sufficient information is available, a column indicating particular effects beside COD (in particular for industry).

3. Incremental cost

1. Statements / conclusions

Basic criteria for the identification of incremental cost according to GEF standards and requirements were agreed as follows:

- transboundary effecs;
- standards above the national standards defined by legislation, policy or practical country specific standards;
- low cost solution.

2. Proposals / output

Recognising that this approach cannot be adopted on the basis of the available project data, it was proposed that the relevant national experts should, according to available capacity, check the incremental cost portions proposed within the draft PRP report.

There was the (actually not fully agreed) idea to do this for three basically different project categories, (having in mind to assure utmost flexibility):

- Category I: projects with no or insignificant incremental effects;
- Category II: the majority of projects, for which the potential incremental component should be induvidually assessd by expert judgement;
- Category II: projects with obviously clear environmantal components (e.g. implementation of advanced treatment standards at existing WWTP).

There was no rejection to maintain the 5 project categories as proposed within the PRP report, if there is not sufficient capacity for individual judgement, within a period of one week; otherwise the individually assessments of the national experts should be used..

4. Strategic Partnership Programme (GEF/WB)

1. Statements / conclusions

It was fully recognised that projects to be developed for this programme should to the utmost extent comply with the GEF criteria for co-financing of projects with incremental effects, mainly focusing on the following features:

- Cost effectiveness of the project has to be carried out by means of a present value approach;
- Incremental effects and corresponding incremental cost have to be assessed in detail;
- Definition of incremental cost should be based on the criteria as outlines in the report of the Working Group "Strategic Partnership" (Section 5).
- The determination of incremental cost has to be elaborated individually, case by case.

2. Proposals / output

- The project should comply with the key criteria as outlines in the report of the Working Group "Strategic Partnership" (Section 3).
- The project should have full commitment of the national government.
- Continuously amendment of the list of "eligibility criteria" as compiled in the report of the Working Group "Strategic Partnership" (Section 5).

Evaluation of Projects in Relation to Significant Impact Areas and Analysis of Transboundary Effects in the Danube River Basin

The group was chaired by D. L. Graybill. Participants represented Slovenia, Croatia, Czech Republic, Slovak Republic, Hungary, Romania (2) and UNIDO.

Documents used by this group were the Pollution Reduction Programme Report – draft April 1999 (Annex 10 - list of projects by SIA), Ranking Significant Impact Areas and Setting Priorities (6 pages, copy attached) and Map 9 (Hot Spots, SIAs and Wetlands in the Aggregared Danube Sub-basin Areas).

There were four objectives for the session:

1. To verify, correct and update Annex 10.
2. To verify, correct and update the 6-page paper on Ranking Significant Impact Areas and Setting Priorities
3. To evaluate other parameters for characterizing the relative importance of SIAs.
4. To verify numbers of hot spots and projects for selected SIAs.

The results of the session were as follows:

1. Two major corrections were offered for Annex 10:
   - COD reduction for the Bucharest WWTP was corrected to 56,566 t/y.
   - Czech Project # Cz06 was deleted because this project is already in the pipeline.
2. The 6-page paper ranked SIAs on the basis of 4 parameters for the areas within each SIA - size of affected population, BOD water quality, GNP per capita, and number of high priority hot spots. Ms. Popovici explained that the methodology for estimating population and GNP involved the multiplication of average figures (taken from thematic maps) by the size of each SIA. Participants cited several examples of SIAs where the results were erroneous by large margins, and challenged the methodology on the basis of these examples.

   After a long debate the group concluded that:
   - BOD alone, with numerous missing observations, is not a very robust parameter for ranking SIA and should be dropped.
   - Size of affected population and GNP per capita should be deleted, unless the existing estimates can be corrected.
   - High priority hot spots within SIAs was accepted as a suitable parameter for ranking SIAs. Ramsar Sites, World Heritage Sites and protected areas were added to the list of parameters.
   - The group concluded that it is better summarize available information on SIAs (protected areas, hot spots, etc.) than to try to force a numerical ranking.
   - Basinwide ranking for SIAs (high, medium, low) is not appropriate. This was agreed by most - but not all - participants.
   - If time permits, before the end of the project, it would be useful to prepare regional / local ranking of the top 1 or 2 SIAs only (i.e., vs. all others), based on judgment / consensus involving many factors. The problem is that time probably does not permit.
3. Other parameters that were considered for basinwide ranking of SIAs were # of high priority hot spots within and near SIAs, # of all hot spots within and near SIAs, # of all projects within and near SIAs, # of transboundary hot spots within and near SIAs and

number of transboundary hot spots within and near SIAs. Each was rejected on the argument that large variations in the locations and features of hot spots would produce misleading results.

4. The Chairman explained the background of the lists of the top 25 and top 5 projects and referred to the three types of ranking that appear in the Pollution Reduction Programme Report.

   The group agreed that if time permits, the Plenary should debate different scenarios for overall project ranking from the viewpoint of financing (e.g., an approach like the top 25 projects, and

   an approach involving SIAs for upper, middle and lower parts of the Danube Basin) and try to reach agreement to adopt one approach. The problem is that time probably does not permit.

Evaluation of Measures and Application of EU Guidelines in Response to Non-point Sources Pollution with Particular Attention to Agricultural Practices and Land Use

The Group was chaired by Rolf Niemeyer. Participants sere Mr. Bach, Mr. Schwaiger, Mr. Jaksic, Ms. Galambos, Mr. Bedrich

Task:

Evaluation of measures and application of EU guidelines/directives in response to non-point sources of pollution with particular attention to agricultural practices and land use.

Reference:

Council Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources.

The main input was given by the group members of Germany and Austria, because they have the experience in implementation of the EU directives. From their experience the accession members can learn to prepare administrative and technical guidelines as well as the preparation and implementation of programmes.

The starting point of the discussion was:

According to DWQM the agricultural sector contributes to emission into the Black Sea (Annex 11 of pollution reduction report, draft April 1999) with 48% of N and 47% of P.

General perspective in Middle and Lower Danube countries:

Nutrient application in agriculture will increase in future to assure the balance between crop demand and nutrient input in order to be competitive.

Output of the working group, recommendations for accession countries:

The main problem concerning the manure management Is the lack of proper handling. This means that there is not any or inappropriate application of manure to arable land or not treatment facilities to protect the water bodies, Because of inadequate measures the water bodies are heavily polluted by the manure. In many cases the manure is disposed directly into the rivers.

If the manure is applied to the arable land this often happens at the wrong time due to lack of appropriate storage capacities.

The overall objective is to reach the balance between nutrient demand by crop and nutrient input (fertilizer, manure, input by soil capacity and by air).

According to experiences there is a general limit for manure application which should not exceed 170 kg N/ha.

Measures for appropriate nutrient management in agriculture:

- Prepare technical fertilizer guidelines for farmers according to good agricultural practice
- Limit or reduce livestock density
- Assure green coverage of arable land during winter time
- Rehabilitate green belts along the river according to local conditions and river size (fight erosion and P - input into water bodies).
- Plant trees to reduce erosion and runoff of nutrient from cultivated lands to the rivers: (91/2091 EEC, title: afforestation?)

- Provide sufficient storage capacities and /or wastewater treatment facilities for edpremen large livestock holders
- Provide standardized technical guidelines for design and implementation of manure storage facilities

A strong support by government is essential by a legal framework setting obligations to farmers and financial support.

Indicators discussed or already accepted in Brussels actually:

- development of nitrate concentration in surface and ground water (aim: <50 mg NO_3/l) and avoid eutrophication in surface water
- use of agricultural statistics, extend of agricultural land, livestock density per hectare of agricultural land
- nutrient balances at farm level respectively at field level to assure tailor made nutrient application

Sequence of improvement measure:

1. Eliminate point sources of agro-industry WWTP, storage capacities, down sizing
2. Reduce non-point source pollution by
   a. strengthening and/or implementation of advisory boards
   b. elaboration and application of good agricultural practices (91/676/EEC)
   c. guidelines for fertilizing and different crops applicable for farmers (not scientists)
   d. standardized technical guidelines for manure storage facilities (plans ready for construction)
3. Introduce facilities for ecological farming including necessary marketing facilities

EU-Council directive 91/2078 EEC concerning the extensification of agriculture for environmentally sound practice (basis for financial support)

In this directive certain regulations are set for financial support of farmers to reduce negative impact of agriculture to the environment

- especially financial support for extensification of production
- financial support for bio-farming.

EU-Council Directive 86/278/EEC on the protection of the environment and in particular of the soil, when sewage sludge is used in agriculture

No certain points have been discussed according to this directive. In general it was stated that the use of sludge is limited by the concentration of heavy metals in the sludge as well as in the receiving soil.

Evaluation of Structural Projects for N and P Removal with Particular Attention to Wetland Restoration and Their Effects on the Black Sea

Participants

Andy Garner- *Group Leader (UNDP/GEF)*
Zeljko Ostojic, *Croatia*
Dimitru Drumea, *Moldova*
Gheorghe Constantin, *Romania*
N. Movchan, *Ukraine*
Petruta Moisi, *Danube Environment Forum*
Zinke, *UNDP/GEF Consultant*

Working Group 4 had the task of evaluating structural projects, wetland projects as well as agricultural policies in respect to impacts on the Black Sea. **WG4** used the draft Pollution Reduction Programme Report (PRP) and its annexes,), particularly Annex 5 of the PRP concerning wetlands, as well as the lists of top 25 structural projects based on nutrient reduction potential N + P list as well as N and P lists. The group was specifically asked not to rank projects and not to evaluate cost effectiveness. Rather it was to consider the types of projects that could most optimally reduce the nutrient loads to the Black Sea.

The following conclusions were made and are recommended for inclusion into the Danube Pollution Reduction Programme Report as appropriate..

Special Considerations

The group identified the following special considerations concerning nutrient loads from the Danube to the Black Sea:

- All Danube River Basin Countries contribute nutrient loads to the Black Sea (as demonstrated by the results of the Danube Water Quality Model, DWQM);
- Pollution reduction is a common task of all DRB countries.

<u>Objective 1:</u> Verify Information On Proposed Wetland Sites in Respect to Reduction of Nutrient Loads to the Black Sea

The Working Group reviewed the information concerning wetlands in the Pollution Reduction Report with the following outputs:

- A Danube Wetlands Rehabilitation Programme, based on the 17 priority rehabilitation sites from the Danube Wetlands Study, should be included as a core element of a strategy for nutrient reduction to the Black Sea;
- Multiple Benefits, particularly economic benefits, should be stressed in preparation and implementation of wetland projects (also should be stressed in the Pollution Reduction Programme Report). Success for implementation will depend on how much the local population benefits from restoration. Therefore, it must be clear to local populations the economic benefits before projects begin.
- The Agricultural Ministries should be integrated into land use decisions as soon as possible in projects such as the Middle and Lower Green Danube Corridor projects to assure implementation.

- NGOs should be included into all wetland restoration projects in order to assure appropriate public participation, increase public awareness, as well as to assist in developing and implementing management plans.
- Monitoring programmes should be established for each wetland restoration site to monitor results of implementation and to identify necessary technical and management changes that might be needed to the wetland sites. A Danube Wetlands monitoring programme should be considered possibly in the frame of a ICPDR Wetlands/Biodiversity Expert Group.
- The Danube Wetlands Rehabilitation Programme should include a component/project that would strive to improve the ecological functioning, particularly nutrient removal, of existing wetland and floodplains in the Danube River Basin. This could for example be a project that would develop a management plan (for the Danube Delta for example) to maximize nutrient reduction capacities in a given existing (fully or partially) wetland and/or floodplain.
- All existing wetland restoration projects should be input into the Project Database and included in the SIA and Sub-basin analysis of projects.

Objective 2: Evaluate Structural Projects With Particular Attention on the N + P Reduction and Associated Load Reduction to the Black Sea

The working group examined the list of top 25 and the top 5 list of projects, based on amount of nutrient reduction potential with the following outputs:

- The top 25 list should be included in the Pollution Reduction Programme in reference to strategies /targets for nutrient reduction to the Black Sea.
- The top 25 list indicated that large wastewater treatment plants had the highest potential for reducing point sources of nutrients. Large wastewater projects offer an economy of scale compared to smaller plants.
- Structural projects should also include components to reduce water consumption, thereby reducing the volume of wastewater going to the treatment facility.
- The highest concentration of hot spots are in the Middle Danube but also in the Lower Danube. As the DWQM results show that P reduction in respect to the Black Sea might be more effective the closer the distance to the Black Sea whereas N reduction does not appear to be so distance related, emphasis should be given to projects in the Middle and Lower Danube to reduce loads to the Black Sea.
- A comprehensive approach to implementation of structural projects should be taken and projects that address the demonstration of innovative wastewater treatment in small communities utilizing lagoons, constructed wetlands etc. particularly for countries that have mostly small municipalities.
- Industrial projects in industries that emit large amounts of nutrients i.e. Fertilizer Plants, Pulp and Paper, Food etc. should be given priority in a programme to reduce nutrients to the Black Sea. Projects should focus on introducing cleaner production processes that can be duplicated throughout the region.

Objective 3: Identify and Discuss Necessary Agricultural Policy Changes to Reduce Nutrient Loads to the Black Sea

The working group discussed possible policy alternatives in agriculture that would specifically assist to reduce nutrient loads to the Black Sea with the following outputs:

- For more immediate effects, policies should be introduced to reduce soil erosion and associated N and P from run-off such as policies that would stimulate or support agriculture belts or green banks.
- Further, policies with a more medium term effect in reducing nutrients could be changes in land use patterns as well as policies that would promote afforestation.
- Policies, to promote good agricultural practices (such as appropriate crop rotating procedures etc.) should be developed with a clear understanding on what „good agricultural practices" actually are. Training programmes on „good agricultural practices" should be offered particularly focussing on optimum nutrient applications in agricultural.
- The group felt that policies to reduce fertilizer usage even further, would be unrealistic, at least in downstream Danube countries, given the already low consumption due to markets in transition. New policy measures would assist primarily in preventing a large rise in consumption in the future.

Objective 4: Special Considerations for Implementation

The Group discussed special considerations for the implementation actions needed to reduce nutrient loads to the Black Sea:

- All Danube Countries contribute nutrient loads to the Black Sea.
- Pollution Reduction is therefore a task common to all Danube River Basin Countries.
- Given the results of the DWQM it seems that it may be more effective, at least in terms of the Black Sea, to remove P in the Lower Danube. The DWQM indicated that the relationship between N and the Black Sea is not so space dependent. These considerations should be balanced with the responsibility of all countries who contribute nutrients to the Danube to take action (Polluter Pays Principle).
- As upstream countries have few hot spots remaining and as these countries still remain significant suppliers of nutrient loads to the Black Sea, these countries should consider identifying and implementing more wetland rehabilitation projects as part of their own nutrient reduction strategies. Agricultural policy initiatives to reduce nutrients would also be another contribution from upstreamt countries.
- A project should be conducted to review the feasibility of the establishment of a Danube Nutrient Trading Regime (joint implementation) including the determination of national nutrient budgets and to establish the framework for operation.
- The nutrient trading regime should be designed in a way to support and encourage the implementation of the relevant EU Directives including the EU Water Framework Directive.

Evaluation of Environmental Effects in the Danube River Basin of Actual War Consequences and Identification of Remedial Measures in the Pollution Reduction Programme

Group Composition:

A.Hudson, UNDP-GEF (Chair)
L. Popescu, ICIM; Romania
B. Mehlhorn, Umweltbundesamt, Germany
R. Aertgeerts, UNOPS
W. Rast, UNEP
J. Bendow, UNDP/GEF Project Manager
G. Velcovsky, ICPDR
V. Spasojevic, FMDSE; Yugoslavia

I. Environmental Impacts:

In addition to the normal monitoring of water quality within the framework of routine national and international monitoring programmes Romania was engaged in an extensive sampling and analysis programme, 20-25 April, every 2 hours, in the Iron Gates area and along the Danube (all within Romanian territory). A number of parameters were measured including organics and heavy metals, using GCMS, AAS and other standard methods. High levels of total metal (Cd, Zn, Cr) were observed but were believed to be the result of sediment resuspension due to the high flow period. Due to equipment limitations, no mercury analyses have been done to date on these samples. Levels of PCBs and certain other hydrocarbons were high but considered „normal“ in the context of background Danube pollution levels.

In Bulgaria, border police have reported some surface oil and small fish kills but correlation of these events with upstream war-related events in Yugoslavia has yet to be established. Due to the conditions near the border, Bulgaria has had rather limited opportunities for data collection on the Danube but there has been no direct evidence to date of confirmed transboundary contamination due to war-related environmental impacts.

Yugoslavia has reported on the potential effects on the Danube and its tributaries due to the bombing of petrochemical, refineries and fertilizer plants, with spills of compounds such as potassium hydroxide, hydrochloric acid, chlorine, mercury and hydrofluoric acid. Specific sites of spills include the refineries in Novi Sad, a central boiler in Belgrade on the Sava River, an oil tank in Prahovo 16 km. from the Bulgarian border, and several transformer stations releasing pyroline oil adjacent to the Sava. Yugoslavian analysis of the in-country environmental situation, including the Danube basin, is underway and a report is expected soon. At this point of time neither any quantitative data concerning the accidental release of toxic pollutants nor any environmental effects (fish kills in the vicinity) have been reported. While Yugoslavia is not presently a party to the Danube Convention, bilateral arrangements for monitoring and emergency reporting exist between Yugoslavia and Romania which are in various states of effectiveness due to the present situation. Romania noted a need for only basic information on upstream incidents to coordinate its monitoring response, e.g. date/time of incident, sector impacted and general type of pollutant released (organic, heavy metal).

II. Public Information:

The Working Group agreed that the PCU and ICPDR should draft a press release by the end of the day. It was recommended that the press release mention the limited range of analyses carried out to date and highlight the need for a broad-based assessment and for international support to the downstream countries.

III. Recommendations:

The Working Group agreed that a rigorous assessment was urgently needed in order to prioritize remediation and long-term monitoring activities for possibly impacted areas in the Danube River basin. The Group agreed that the upcoming Yugoslavian report should be helpful in targeting short-term and future activities in this regard.

UNEP expressed its interest in facilitating and strengthening monitoring and assessment programmes for both short and long-term environmental and health impacts of the war on the Danube and the surrounding environment.

WWF proposed that a commission be established under the ICPDR to review the existing and on-going evidence for impacts of the war on the Danube environment.

IV. Next Steps:

A. Country Needs and ICPDR engagement:

The ICPDR has already taken the necessary steps in order to reinforce co-operation in the frame of the Accidental Emergency Prevention Warning System (AEPWS) to increase vigilance and provide the necessary data on water pollution and environmental effects.

Due to the exhaustion of reagents and certain equipment during the intensive Danube monitoring programme in late April, Romania cited a need for new equipment and reagents so that its labs may support a continued monitoring of possible transboundary impacts of the war. Bulgaria cited short-term needs for sampling and analysis equipment and has had preliminary bilateral contacts with Germany regarding the need for equipment to control oil spills.

Yugoslavia also cited an urgent need to establish a monitoring system to document environmental impacts within its borders so that appropriate remedial measures may be planned and implemented. Technical and other forms of assistance to remediate the polluted sites, including appropriate equipment, are also requested.

B. International Assistance

The ICPDR has proposed to coordinate all measures and to ensure efficient implementation of a regional programme for control and mitigation of possible war-related environmental damage.

In support of a humanitarian needs assessment mission to Yugoslavia announced by United Nations Secretary General Kofi Annan, the Executive Director of UNEP has announced the establishment of a broad-based UN Task Force on the Environment and Human Settlements in the Balkans. The Task Force will collect, collate and review the available information on the impacts on human settlements and actual and potential environmental impacts in the Federal Republic of Yugoslavia and the neighbouring countries. UNEP also reported that it expected to be able to bring financial support and technical expertise to the region in support of near and long-term monitoring and assessment of the impacts of the war on the Danube River Basin. A UNEP delegation is expected to visit the region shortly to explore modalities for support and co-operation.

According to UNEP the Green Cross International (Geneva) has announced plans for a special mission to Yugoslavia to evaluate the humanitarian and environmental impacts of the conflict.

Further, it has been mentioned that bilateral assistance can be expected. According to their information the Danish government has expressed an interest in supporting the programmes to identify and address the environmental impacts of the war.

The programme of international assistance to evaluate and mitigate the possible water pollution and environmental damage shall be coordinated by the appropriate bodies of the ICPDR at national and regional level.