THE DANUBE ENVIRONMENTAL PROGRAMME

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The waters of the Danube River and its tributaries combine to make up river-related ecosystems of high economic, social and environmental value. The River Basin includes numerous important natural areas, such as wetlands and floodplain forests, with a high number of endangered endemic plant and animal species. The river network supports drinking water supply, agriculture, industry, fishing, tourism and recreation, power generation and navigation, but it also receives the waste waters for a region with a population of about 85 million in thirteen different countries.

The Danube is a most complicated river from a political point of view. Thirteen countries have the whole or a substantial part of their territories within the Danube Basin: Germany, Austria, the Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Bosnia-Herzegovina, Yugoslavia, Bulgaria, Romania, Moldova and Ukraine. In addition, seven countries have small parts of their territories within the Basin: Poland, Switzerland, Italy, Albania and the Former Yugoslav Republic of Macedonia.

The cumulative inflow of nutrients to the Danube River system is causing eutrophication problems in the river itself as well as adding to the degradation of the unique Danube delta and the north-west shelf region of the Black Sea. Micropollutants and hazardous substances also create transboundary pollution problems, for which international co-operation is needed. Nutrient and pollution loads must be reduced if the vitality of the river ecosystems and that of the delta and Black Sea is to be restored. The situation can also be improved by strengthening the natural buffering and self-cleaning capacity of the Danube Basin, through better land use practices and wetland and floodplain management. Such initiatives will also contribute to the protection and improve-ment of biological diversity.

All countries in the Basin have taken measures to protect the environment and significant progress towards reducing pollution has been made in the economically most developed countries. However, during the period of central-ised planning, the main emphasis of the Central and Eastern European countries was on production. Policies did not respond properly to the degradation of the environment. The economic transition now going on, including industrial restructuring and agricultural reforms, has created an opportunity to change this situation and to reduce pollution and waste generation substantially. The breathing space provided by the transition can be used to ensure that environmental concerns are properly integrated into industrial, agricultural and other sector policies in the future.

Environmental problems

The problems are not so much in the Danube River itself, but in its tributaries and due to the Danube discharges into the Black Sea. The nitrogen concentration in the Danube is only half of that in the Elbe and Rhine. But due to the Danube's high discharge, the total loads to the Black Sea are considerably higher than those from the Elbe and Rhine into the North Sea.

Nutrients and micropollutants

The most authoritative information on the pollution problems in the Danube River Basin was provided to the Danube Environmental Programme through a series of national reports and workshops, and summarised in the Danube Environmental Study. Only scattered information on metals and micropollutants are available at present. Some of this information has unfortunately proved to be unreliable. However, the information on nutrient concentrations in surface water seems to be consistent with the reported nutrient load estimates, although impro-vement of the present existing nutrient balances is considered necessary.

The identified priority pollutants and their effects on water and sediment quality are summarised in Table 1. The total emission load of nitrogen is approximately 800-900,000 tons/year. The total emission load of phosphorous could be 100-110,000 tons/year. A considerable retention of phosphorous occurs in the Basin, probably by adsorption to sediments. As a result of inadequate data, the Danube Environmental Programme has initiated a study on the nitrogen balance in all Danube countries. The results of the study are expected to be reported in 1997. Other studies focus on nutrient removal from surface waters in wetlands, floodplains and reservoirs, on nutrient application in agriculture, and on the introduction of phosphate-free detergents.

A trend assessment indicates that the total number of nutrient discharges into the Danube and its tributaries may increase in the coming decade if present policies related to agriculture, sanitation, transport and energy are continued. This is an alarming indication as to the highly needed reduction of nutrients in the Black Sea.

Table 1. Identified priority pollutants and their effects on water and sediment quality

Effects on water qualitysevere				
Substances (pollutants)	Danube tributaries	Danube	Danube Delta	Black Sea (3)
Nutrients: nitrogen and phosphorus	locally severe (1)	severe	severe	
Metals (2)	locally	severe (4)	unknown (4)	unknown (4)
MicropollutantsPesticides (DDT, HCH, Lindane, Simazine, etc.)	locally	unknown (4)	unknown (4)	unknown (4)
Others (PCB's, pah's)	locally	unknown (4)	unknown (4)	unknown (4)
Bacteria and viruses	locally severe	severe	severe	severe
Oil	locally	locally	locally severe	moderate
Biologically degradablematter (BOD5)	locally severe	minor	minor	minor

Effects on sediment quality				
Metals (2)	locally severe	moderate	unknown	unknown
Micropollutants	locally severe	moderate	moderate	moderate

(1) Especially wetlands
(2) Metals: cadmium, mercury, copper, nickel, lead, zinc, chromium, arsenic
(3) Danube related
(4) Data too scarce to allow for proper assessment - might be a problem

No quantitative assessment of metals could be performed in the above study. However, the following observations were made:

- Industry and mining are the main sectors responsible for metal discharge into surface waters, particularly in the downstream countries.
- Copper and zinc originate from agricultural manure run-off.
- Cadmium is also due to agricultural activities.
- Agricultural contribution is closely related to the erosion of agricultural land, particularly in hilly areas.
- Industry and transport contribute to metal pollution, especially in downstream countries. Metals are also deposited through the atmosphere directly into surface water and soils. The load of metals may be reduced if industries would adopt Best Available Techniques Not Entailing Excessive Costs (BATNEEC).

A quantitative assessment of pesticide pollution from agriculture and industry was not possible either. The total number of active agents

presently used in the Basin is approximately 500. Unfortunately, the monitoring of active agents is restricted, especially in downstream countries. The load of pesticides is expected to increase in the coming decade, if farmers in the downstream countries are able to buy more pesticides. On the positive side, Austria and Germany have policies and practices that will further reduce their use of pesticides.

Erosion and sedimentation

Erosion and sedimentation are important aspects throughout the Danube River Basin. Erosion relates to loss of fertile topsoil, especially in agricultural land, which is considered a problem in a substantial part of the Basin. The seriousness, however, differs per country and region. Change in river bed erosion, in specific parts of the Danube, is caused by the establishment of a great number of dams and reservoirs, causing problems in the downstream river reaches. Inappropriate functioning of these reservoirs is worsening the problems in a number of downstream countries.

The major part of eroded material - more than 50 million tons/year - is filling up dams and reservoirs. The severe erosion along the seashore of the Danube Delta and the west coasts of the Black Sea may be attributed to the reduction of suspended solids entering the Delta. The annual load is, at present, only 12 million tons/year, and it is suspected that sediment quality has changed.

Public health

The World Health Organisation has recently completed a first assessment of the environmental health problems in the Danube River Basin, carried out for the purposes of the Danube Environmental Programme. The key diseases related to the water in the Danube Basin - surface water, shallow aquifers and rural wells - are infectious diseases and infant methemoglobinemia. There is also evidence of intoxication due to geogenic and industrial chemicals. Current health statistics are believed to reveal only a limited number of the actual incidents of water-borne diseases. Anecdotal information, however, suggests that there are a number of epidemics and that thousands of people in the Basin suffer each year from water-borne diseases.

Microbial contamination is evident throughout the river systems, with heavy pollution by faecal bacteria and viruses in most of its reaches. Numerous cases of dysentery, jaundice, hepatitis, enterocolitis and other infections are reported, some involving fatalities. Cholera has occurred. Several thousand cases and numerous fatalities are reported on infant methemoglobinemia. Diseases are also attributed to arsenic, fluoride and cyanobacteria. Toxicological evidence also suggests health impacts from heavy metals, oils, chlorinated and polycyclic hydrocarbons, PCB's and cyanobacteria. The key causes of diseases are the heavy pollution of surface- and groundwaters with sewage, lack of central public water supplies, excessive application of agrochemicals, and emissions and spillage of industrial chemicals and petroleum products. The most important pathway for water-mediated disease is drinking water. In rural settlements and industrialised agriculture, storage and use of manure considerably contributes to the contamination of shallow aquifers with pathogens as well as with nitrates.

Shortage of water is a problem in a number of areas along the Danube, and this supports communicable diseases. Contamination of food with pathogens transmitted by irrigation or processing water has been demonstrated. Pathogens may also be communicated though recreational waters. Acute intoxication with industrial chemicals in water is occasionally caused by accidents and spillage. Chronic exposures are caused by the continuous discharge of contaminants through industrial sewage and seepage from unregulated or badly managed waste disposals and landfills, or from mining discharges into the drinking water supply. Transportation, especially shipping, causes water pollution with oil and other petroleum products that are routinely discharged by uncontrolled ships, or spilled by accident into the river. Gross over-fertilisation is the major cause of elevated nitrate concentrations in drinking waters. Pesticide concentrations exceeding the EC standards were measured in tap water samples along a number of sites in the Danube Basin.

Black Sea pollution

The pollution in the Danube Basin is not only a threat to its own environment and people, but also to the Black Sea. The Black Sea Transboundary Diagnostic Analysis, carried out in Istanbul, in 1996, draws attention to the very large percentage of nutrient discharges which originate from the Danube River. The Danube's part of the nutrient discharges to the Black Sea are calculated to 88% of biologically degradable matter - 94% of the total nitrogen input and 82% of total phosphorous. The TDA states that considerable efforts will be required to negotiate reductions in inputs from international rivers, particularly the Danube. The current reductions in nutrient load, proposed in the Danube Strategic Action Plan, are clearly insufficient and a progressive series of stepwise reductions should be negotiated until agreed water quality objectives are met. A Basin Wide Strategy should be negotiated to provide the framework for such a reduction.

The values in Table 1 are estimates only. The calculation in the TDA does not take air pollution into account. Moreover, the effects of the pollution are not well known. The First Inter-Parliamentary Conference on the Environmental Protection of the Black Sea held in Istanbul in July 1996, recommends that efforts should be maintained and further enhanced to scientifically assess the nature of the problems affecting the Black Sea. Studies should be made on the causes of pollution, including land-based sources, rivers and shipping. Giving the alarming degree of pollution of the Black Sea, it is imperative that the Black Sea countries promote a programme of comprehensive scientific study of these factors using agreed upon common methodologies.

Moreover, the TDA does not comment on the significant reduction of sediment transport from the Danube into the Black Sea. This reduction

is due to the high number of reservoirs built on the Danube and its tributaries, and is most likely to cause erosion problems along the west coast of the Black Sea. How-ever, it is above any doubt and discussion that the Danube is a serious threat to the Black Sea environment, and that the Danube countries have a responsibility to reduce the pollution to the surface and groundwaters in their own countries.

Environmental Programme for the Danube River Basin

In 1991, the joint Environmental Programme for the Danube River Basin was established along with its governing Task Force, which consists of representa-tives from eleven Danube countries - Austria, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Moldova, Romania, Slovakia, Slovenia and Ukraine - NGOs and bilateral and international contributors. The Danube countries are represented by the Country Programme Co-ordinator (CPC) and one other person nominated by the Co-ordinator. The representative of the European Commission Directorate-General for Environment, Nuclear Safety and Civil Protection is Chairman. The Environmental Programme for the Danube River Basin (EPDRB) was launched at the first meeting of the Danube Task Force, in Brussels, February 14, 1992, but it owes its existence to a long sequence of events.

A work plan agreed upon at the first Task Force meeting set out a three-year programme comprising short-term, strategic, environmental and institutional development activities. The co-ordinating body is the Danube Programme Co-ordination Unit (PCU), based in Vienna. The short-term action plan covers an initial phase of pre-investment studies to identify "hot-spot" projects for urgent action, in particular regarding the heavily polluted tributaries of the Danube. The PCU organised workshops to exchange information and drew preliminary conclusions, which proved to be remarkably similar:

- The main environmental problems arise from industrial and municipal waste discharges, compounded by pour management or poor maintenance.
- Raising funds, even where they would have a major impact on pollution, is likely to be extremely difficult, in most cases.
- Technically feasible solutions cannot always be implemented because of factors like the uncertainties caused by restructuring, decentralisation, policy reforms and inadequate environmental management.
- Diffuse pollution sources, such as agricultural activities, are possibly a major cause of transboundary pollution.

Applied Research Programme

The Applied Research Programme (ARP) - an important part of the Phare funded EPDRB - consists of 14 projects in 15 countries. Nearly all of them were started in the period of April-June 1995, and are working well. A few have already delivered their final reports to the PCU.

The countries involved include the eleven Danube countries in the Danube Programme and four outside EU countries - Denmark, France, The Netherlands and Britain. Participation varies considerably from country to country. Clearly the degree of participation depends on the relative importance of the Danube - the function of the river stretch - in each country, as well as the number of institutions - 62 total - working on environmental aspects of the river basin. The programme is already fulfilling its main objectives, namely to:

- systematically evaluate the environmental problems throughout the Danube basin
- provide information to policymakers in a form that will enhance future management of the basin
- stimulate co-operation through networking between the various institutions and individual scientists of the whole basin

The Programme covers a wide range of topics. Emphasis is placed on pollutants, such as trace metals, organic micro-pollutants, radio tracers and nutrients. At first glance, there appears to be a large overlap, but in reality there is a comple-mentary element in the matrices investigated - sediment, water, biota - and in the reasons for studying them - ecology, risk assessment including the development of an alarm model, legal frameworks, modelling and management scenarios.

The results of the projects that are becoming available now are an illustration of our present knowledge of the quality and function of the Danube ecosystem. Several projects are designed to calculate the risks of, for example, adverse conditions to the ecosystem and to public health, both under present conditions and after projected future developments. A large amount of data and basic information have been collected already. For a proper understanding of the ecological functioning of the Danube basin, even more detailed information will be required. Harmonisation of monitoring strategies, of quality criteria development and of risk assessment, all supporting management of the river basin, needs further development.

The results of the programme will be unveiled at the first Danube ARP Conference, to be held in Romania next September. The event will be a meeting place for ARP scientists, policymakers and other interested groups, such as banks, NGOs and the Press. Apart from the direct reporting of the results, the conference aims to be the forum at which scientists and decision-makers are forced to discuss present developments and the future needs of ARP research.

The Task Force has established three Sub-Groups in order to establish a regional monitoring system, a system for reporting accidents and hazards, and a basin-wide system for exchanging textual information relevant for decision makers and the general public.

Monitoring, Laboratory and Information Management (MLIM)

The main objective of the Monitoring, Laboratory and Information Management Sub-Group (MLIM SG) is to strengthen institutional development measures and achieve the necessary degree of harmonisation in all the Danube countries, in order to set up an effective transnational monitoring network, vital for solving the major environmental problems of the Danube catchment and the Black Sea.

The Sub-Group work programme is funded by the EC Phare and Tacis programmes. Seven of the twelve countries involved are designated as Phare countries, two countries are funded by the Tacis programme, and Austria, Croatia and Germany do not receive financial aid. The working groups are made up of four to six experts from Danube countries, chosen to cover priority topics from the working group work programmes.

Accident Emergency Warning System (AEWS)

In the 1980s and 1990s, several thousand cases of accidental water pollution occurred in the Danube River Basin. A significant number were international, while others were unreported. In countries where bank-filtered drinking water is used, some of these accidents made it especially necessary to implement precautionary measures, such as closing drinking-water intakes. The need arose to devise an effective means of information about such accidents and communicate such information swiftly and effectively to all those involved.

Immediate priority was given by the Danube Programme, in 1992, to setting up an Accident Emergency Warning System. Financed under the EC Phare Programme, the AEWS aims to communicate immediate information about sudden changes in water characteristics, such as accidental pollution or unpre-dictable changes in water level, with special attention to transboundary impacts. An important aspect of the system is that the whole river basin should be covered including all tributaries, where most pollution occurs. Inevitably it is the countries that lie in the middle and lower part of the basin that are most at risk. The AEWS organisation is based on the principle of one main international alert centre (PIAC) for each country except Ukraine, which for geographical reasons, has two. Preparation has entailed institutional organisation, the development of operational procedures and tools for the PIAC units, and procuring equipment.

Each PIAC comprises three task-units covering communication about a reported sudden pollution of the river basin waters, expert advice to assess the effects or impact of the reported accidental pollution and decision-making on further action to be taken. These tasks do not have to be taken at the same location or by a single organisation. Because of the current political situation, there is a territorial gap in the system formed by parts of the former Yugoslavia. The AEWS has been designed to ensure that these areas could easily be incorporated into the system when conditions permit.

For the AEWS Sub-Group there is now a solid base from which to develop the warning system. The Danube countries, the International Commission and the Danube Environmental Programme are now planning a programme of action that will improve the PIAC operations, strengthen the process of initial detection and accidental pollution reporting and provide links with operational services - fire brigades, water police - responsible for combating pollution spills.

The Danube Strategic Action Plan

The principles underlying goals and actions of the Strategic Action Plan include: the precautionary principle; use of Best Available Technologies (BAT) and Best Environmental Practice (BEP) for control of pollution; control of pollution at source; the polluter pays principle; and a commitment to regional co-operation and shared information among partners implementing the Action Plan. The SAP lays out strategies for overcoming water-related environmental problems in the Danube River Basin. It sets targets to be met in the short- medium- and long-term, and defines a series of actions to reach the targets. The SAP strongly supports the process of co-operation and collaboration to address transboundary problems. It provides a framework for actions and policy changes to be implemented by relevant local and central authorities in the Danube countries, as well as a framework for prioritising environmental activities and investments. The process of preparing the SAP included a broad range of consultative meetings, in all countries, involving NGOs, representatives of industrial enterprises and municipal utilities, and central and local environmental and sector institutions and authorities.

The SAP is based on a number of national analyses and studies. The Danube countries spent three years from 1992 to 1994 to make the analyses available and to draft, discuss and agree on the SAP. The SAP was endorsed in Bucharest, on December 6, 1994, by Environmental Ministers from the Danube countries and the EU Commissioner responsible for the environment.

The actions will partly be implemented through the Strategic Action Plan Implementation Programme, and partly through National Action Plans that are drawn up by Danube countries. The NAPs are crucial in identifying and preparing projects that can be funded and implemented.

Implementation Programme

The Danube Strategic Action Plan Implementation Programme (SIP) has been designed to give effect to the Danube SAP. It will make a positive and concrete contribution to the rehabilitation of the Danube environment, up to and including the receiving waters of the Black Sea. The SIP will have a built-in pro-vision for societal participation, through NGOs, in the implementation process.

The proposals focus on eight of the main Danube tributaries, selected on the basis of their transboundary importance and their representative nature. This ensures that the results of the SIP will be replicable throughout the basin, and that all the Danube countries are involved in the Programme.

The proposals were allocated to one of five broad groups according to the particular priority issue that was addressed: Contaminants and Human Health; Sustainable Land Use; Wetlands and Nature Conservation; Sustainable Use of Water Resources; Institutional Capacity Building. The Programme reflects the transboundary nature of the problems facing the Danube countries. A sixth group, Basin Wide Projects, includes long-term approximation and co-operation actions, public awareness raising, general capacity-building activities, applied research and support to on-going basin projects.

The SIP will be managed so as to ensure that the Danube countries continue to lead the implementation process and that the donors' requirements are met. It will also ensure that the various activities are co-ordinated in a cost-effective way, in the context of the SAP, and that proper use is made of information available in other countries. It will make provision for communications within the clusters and for the rapid dissemination of results to other Danube countries.

Programme funding has been provided by the EC Phare Regional Programme, the Global Environment Facility (GEF) implemented by UNDP through the United Office for Project Services, The World Bank, UNEP, the Eu-ropean Bank for Reconstruction and Development, Austria, the Netherlands, the USA, and The Barbara Gauntlett Foundation. Danube countries have supported the Programme with provisions of national expertise, country information and, wherever possible, facilities for meetings and workshops. Organisations, such as WWF and other NGOs and others not represented on the Task Force, i.e. Equipe Cousteau, have made available the results of relevant studies.

The objectives of the GEF contribution were to develop adequate institutional and human resource capacity, management and analysis of data, related to the pollution situation in the Basin and the preparation of pre-investment studies for selected tributaries. The EC Phare Programme encourages economic develop-ment in Danube countries and assists in fulfilling terms of EU Association Agreements. Funding supports training, project planning for infrastructure development, institutional capacity-building and the protection and rehabilitation of wetlands and vulnerable ecosystems. In 1996, the EC Tacis Programme started to fund vital monitoring-related activities in Moldova and Ukraine.

Legal Framework

A number of Conventions and International Agreements are relevant to transboundary and international issues addressed in the present SIP proposal. The SAP and the SAP Implementation Programme aim, in particular, to support countries in fulfilling their commitment to the objectives of the Convention on Co-operation for the Protection and Sustainable Use of the River Danube (DRPC) which was signed by the Danube countries and the European Commis-sion in Sofia, in June 1994. The signatories have agreed on "conservation, improvement and the rational use of surface and groundwater in the catchment area," to "control the hazards originating from accidents involving substances hazardous to water floods and ice-hazards" and "to contribute to reducing the pollution loads of the Black Sea from sources in the catchment area." They agreed to co-operate on fundamental water management issues by taking "all appropriate legal, administrative and technical measures to at least maintain and improve the current environmental and water quality conditions of the Danube River and of the waters in its catchment area and to prevent and reduce as far as possible adverse impacts and changes occurring or likely to be caused."

An interim International Commission is established to start the provision for a framework for regional co-operation. By November 1996, six parties had ratified the Convention. It will turn into a permanent body when nine out of the twelve signatories have ratified, most likely by the beginning of 1997. An International Secretariat for the interim Commission, mostly funded by Austria, is set up at the Vienna International Centre working alongside the PCU.

Conclusion

The first phase of the Danube Programme has achieved as much as its most optimistic supporters hoped for and the SIP provides an ambitious programme for the next phase, to be implemented in the coming three to five years.

A key constraint on progress in dealing with the environmental problems of the Danube Basin is the difficulty in financing environmental investments. The SIP projects will specifically address this problem. Many projects will require substantial investments if the results are to be implemented, and acquiring the necessary funds will be an important challenge for all those involved.

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