ANNEX 11 Causes and Effects of Eutrophication in the Black Sea

DANUBE POLLUTION REDUCTION PROGRAMME

CAUSES AND EFFECTS OF EUTROPHICATION IN THE BLACK SEA

SUMMARY REPORT

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Programme Coordination Unit

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prepared by

Joint Ad-hoc Technical Working Group ICPDR - ICPBS

Preface

The Black Sea is regarded as a regional sea that has been most severely damaged as the result of human activity. Based upon comprehensive studies by scientists, in 1996, Ministers of the Environment from Black Sea countries recognised, amongst other things, that "*The Black Sea ecosystems continues to be threatened by inputs of certain pollutants, notably nutrients. Nutrients enter the Black Sea from land based sources, and in particular through rivers The Danube River accounts for well over half of the nutrient input of the Black Sea. Eutrophication is a phenomenon which occurs over wide areas of the Black Sea and should be a concern to the countries of the Black Sea Basin.*" Further more, the Ministers agreed that "*A Black Sea Basin Wide Strategy, negotiated wit all states located in the Black Sea Basin should be developed to address the eutrophication problem in the Black Sea. The objective of the Strategy should be to negotiate a progressive series of stepwise reductions of nutrient loads, until agreed Black Sea water quality objectives are met.*"

In order to facilitate the development of such a strategy, it is necessary to have a clear common understanding of the nature of the problem, its causes and the options available for solving it. The purpose of this report is to present, in a concise but accessible manner, evidence linking the development of eutrophication in the Black Sea to the human influenced changes in discharges of dissolved compounds of nitrogen, phosphorus and silicon entering the sea from land based sources.

The present report was prepared taking into account the results of the Joint ad-hoc Technical Working Group established between the International Commission for the Protection of the Black Sea and the international Commission for the Protection of the Danube River. It is a product of the excellent cooperation, which exists between specialists from Black Seas coastal countries and those who represented the Danube Basin in this Group.

A first draft Summary Report has been prepared by Laurence D. Mee, on behalf of UNDP/GEF. This Report was discussed in the 3rd meeting of the Joint as-hoc Technical Working Group on December 10/11, 1998. It has been finalised on the basis of these initial discussions and on additional amendments agreed upon.

The present report is based on the five national reports on additional scientific literature, on reports of the Black Sea Environmental Programme (BSEP) and the Environmental Programme for the Danube River Basin (EPDRB), and on the professional experience of the representatives to the 'Joint as-hoc Group' and additional participant in its Meetings. The above mentioned five natinal reports were commissioned by the UNDP/GEF Danube River Pollution Reduction Programme, each with a title"Report on the Ecological Indicators of Pollution in the Black Sea". The responsibilities for the coordination of the national reports is as follows:

(a) Bulgaria: Prof. B. Bojanovsky, Gaculty fo Biology, Sofia University;

(b) Romania: Dr. A Cociasu, Romanian Marine Research Institute, Constanta;

(c) Russian Federation: Ms. Liubov Stapanova, State Committee for Environmental Protection;

(d) Turkey: Dr. Ösden Başturk, Institute for Marine Sciences at the Middle East Technical University (METU);

(e) Ukraine: Dr. Oxana Tarasova, Ministry for Environmental protection and Nuclear Safety.

Overall coordination of the activity of the Joint ad-hoc Technical Working Group was assessed by Joachim Bendow, Project Manager of the Danube Pollution Reduction Programme and Laurence D. Mee from the Black Sea PIU. Chairman of the working sessions were Walter Rust from UNEP, Nairobi and Andrew Hudson from UNDP/GEF, New York. The report was edited by Michael Sokolnikov.

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Executive Summary

The Black Sea Strategic Action Plan, adopted at the Ministerial level in 1998, recognises the phenomenon of eutrophication as one of the principle causes of transboundary degradation of the Black Sea environment. Furthermore, it affirms the need for a coordination of actions across the entire Black Sea drainage basin in order to reduce eutrophication and restore key Black Sea ecosystems. The 'Danube River Protection Convention (DRPC)' is having a 'river basin approach'; it also stresses its responsibility for actions stemming from the River Danube Basin impacting on the Black Sea. Within the Environmental Programme for the Danube River Basin (EPDRB), the relevant Strategic Action Plan was adopted at Ministerial level in December 1994. This SAP makes also reference to the impacts from the River Danube Basin to the Black Sea. With the entry into force of the DRPC on October 22nd, 1998, the tasks and responsibilities of the EPDRB, including the Danube SAP, have been transferred from the former Task Force of the EPDRB to the decision making body charged to implement the DRPC, the ICPDR.

In response to the need to link all states impacting on the Black Sea and the states holding the Black Sea as 'a shoreline resource', a Joint ad-hoc Technical Working Group was established between the 'International Commission for the Protection of the Black Sea – ICPBS – i.e. the Istanbul Commission of the Bucharest Convention)' and the 'International Commission for the Protection of the Danube River – ICPDR – i.e. the Vienna Commission of the Sofia Convention)'. The 'Group' received its specific TOR, which did not only include eutrophication phenomena, but asked also for the clarifying of issues of hazardous wastes. This 'Group' examined the best available evidence for the problems and their causes and proposes remedial actions. Its findings are summarised in the present report.

Eutrophication is a phenomenon caused by the over-fertilisation of the sea by plant nutrients, usually compounds of nitrogen and phosphorus. The quality of water bodies affected by eutrophication gradually deteriorates and may result in the development of species with low nutritious value to larger animals including fish. It may also lead to severe oxygen depletion and the so-called "dead zones", where no animals can survive, and biological diversity is lost. It has a severe impact on the economy of human populations, amongst other things through fisheries and tourism loss. The Black Sea (i.e. the Black Sea proper plus the Sea of Azov) environment has been severely damaged by eutrophication since the 1970s. Evidence summarised in the present report shows how the structure of the ecosystem was damaged at every level, from plants to fish and mammals. Ukrainian colleagues estimate the losses of bottom animals between 1973 and 1990 as 60 million tons, among them 5 million tons of fish (i.e. 'on average 180.000 t per year'). To which extent this is due to the increased input of nutrients, and to which due to overfishing, is impossible to allocate now. The increased input of nutrients, with the subsequent changes along phototrophic growth, has had negative consequences throughout the Black Sea. It may also have contributed to the success of the comb-jelly *Mnemiopsis*, brought by accident to the Black Sea in the mid 1980s; it attained a biomass of some one billion tons in 1989, causing catastrophic damage to the ecosystem.

Results of extensive studies coordinated by the Black Sea Environmental Programme (BSEP) suggest that over 70% of nutrients entering the Black Sea are transported by major rivers, principally the Danube; however, the atmospheric input was not a part of the balance. A large share of the nutrients entering these rivers comes from Black Sea countries, which are having a shoreline. Because of the BSEP pollution source inventory, it has been possible to gather data on the inputs of dissolved nitrogen and phosphorus compounds to the Black Sea in 1995. However, the following data by Topping, Sarikaya and Mee do not reflect the inputs via the atmosphere. Some 14% of total nitrogen are from Bulgaria, 27% from Romania, 12% from Ukraine, 10% from the Russia Federation, less than 1% from Georgia, 6% from Turkey and about 30% from the non-coastal countries (Austria, Belarus, Bosnia and Herzegovina, Croatia, Czech Republic, Former Yugoslavia, Germany, Hungary, Moldova, Slovakia, Slovenia). In the case of phosphorus, the figures are

Bulgaria, 5%; Romania, 23%; Ukraine, 20%; Russia, 13%; Georgia 1%; Turkey 12% and 26%, for the remaining countries, a similar story to that of nitrogen. The importance of showing these numbers is to illustrate that nobody is "innocent", not even the Georgians whose low percentage input reflects the current collapse in the coastal economy, probably a temporary feature.

Studies undertaken in the framework of the Environmental Programme for the Danube River Basin suggest the following: (a) About half of the nutrients discharged 'internally in the Basin to the fine web of the river network' are from agriculture; (b) somewhat more than one quarter from domestic sources; (c) an additional larger share is from industry; (c) the remainder is from 'background sources'. The loads of nutrients entering the Black Sea from the Danube have fallen in recent years due to the collapse of the economies of many of the Danubian and former Soviet countries, the measures taken to reduce nutrient discharge in the upper Danube countries, and the implementation of a ban in polyphosphate detergents in some countries.

There is evidence of some recovery in Black Sea ecosystems, but the ecological status of the 1960s is for sure not yet reached. It is widely considered that nutrient discharges are – in line with the expected economic growth - likely to rise again, with consequent damage to the Black Sea, unless action is taken to implement nutrient discharge control measures as part of the economic development strategies.

Based on the reported positive signs (reduced input loads and improved ecological status in the Black Sea shelf), and also aware of the missing knowledge of the comparability of input loads (resolution both in time since the 1960s, and in space all over the Black Sea and the Sea of Azov), and aware that the load reductions are very likely linked with the decline of economic activity in the countries in transition, but that towards the future economic development is expected to take place in the overall Black Sea Basin, the 'Working Group' defined in its 2nd Meeting the possible strategies as follows:

- *The long-term goal for all States in the Black Sea Basin is to take measures to reduce the loads of nutrients and hazardous substances to such levels necessary to permit Black Sea ecosystems to recover to conditions similar to those observed in the 1960s.*
- *As an intermediate goal, urgent control measures should be taken by all States in the Black Sea Basin in order to avoid that the discharges of nutrients and hazardous substances into the Seas exceed those, which existed in 1997 [1]. The 'Group' recognised that these 1997 discharges are only incompletely known and that further work has to be undertaken to substantiate the size of the loads received by the Seas (Black Sea proper; Sea of Azov).*
- *The 'Group' concluded that the inputs of nutrients and hazardous substances into both receiving Seas have to be assessed in a comparable way, and that to this very end a common AQC system and a thorough discussion about the necessary monitoring, including the sampling procedures, has to be set up.*
- *The 'Group' also concluded that the ecological status of the Black Sea and the Sea of Azov has to be further assessed, and that the comparability of the data basis has to be further increased.*
- *Both the reported input loads as well as the assessed ecological status will have to be reported annually to both the ICPBS and the ICPDR.*

[1] Loads reported for 1997 to have been transported in River Danube were: orthophosphate, 16,000 tons (as P); total inorganic nitrogen, i.e. the sum of ammonia-N, nitrite-N and nitrate-N, 300,400 tons (as N) [A.Cociasu, 1998]. River scientists indicate that in order to 'level the impact of river hydrology on the transport of pollutants out', an averaging over e.g. a span of five years should be undertaken. This would yield for River Danube an 'averaged load for 1995' of 12,700 tons per year of orthophosphate-P and 456,000 tons of inorganic nitrogen per year. The corresponding value for 1997 can only be known as soon as the value for 1999 is known.

- *The States within the overall Black Sea Basin shall have to adopt strategies that will permit economic development, whilst ensuring appropriate practices and measures to limit the discharge of nutrients and hazardous substances, and to rehabilitate ecosystems which assimilate nutrients.*
- *Based on the annual reports and on the adopted strategies for the limitation of the discharge of nutrients and hazardous substances, a review shall be undertaken in 2007. It will focus on the further measures that may be required for meeting the long-term objective (reaching an ecological status similar to the conditions observed in the 1960s).*

The actions required to attain these goals need not be costly at this stage and may be achieved through a mechanism of basin-wide joint implementation including country commitments and external grants and loans. They should build on existing initiative where possible. Such actions fall within the following areas:

- Reform of agricultural policies.
- Improved wastewater treatment, where applicable also by alternative technologies.
- Rehabilitation of essential aquatic ecosystems.
- Changes in consumer practices (including use of phosphate-free detergents).
- Establishing of a legal frame.

Suggestions for implementing these actions are made in the report. It is recommended that follow-up activities should be at the policy development and practical project levels:

1. At the policy level. The TOR of the 'Joint *ad-hoc* Group' requires that the Group's Report will be made available to both the International Commission for the Protection of the Black Sea and the International Commission for the Protection of the Danube River, as well as GEF as donor. This Report will be an input to a Meeting between the Black Sea and the River Danube side, at the level of Heads of Delegations. The Heads of Delegations of both Commissions should in such a joint meeting, based on cooperation, consider endorsing the proposal to maintain nutrient levels at or below the loads recorded in 1997, subject to review in 2007. They should also approve a series of practical measures to achieve this goal including a total ban on polyphosphate detergents, clear targets for wetland restoration, an agreement on monitoring, and a mechanism for “joint implementation”.
2. At the project level. Donors should establish mechanism(s) to support the agreed policy objectives by funding a series of demonstration projects to share the costs of measures to reduce nutrient discharge following the approach outlined in 10 (above). The approach could use GEF funding to cover the incremental costs of specific projects. The support of donors other than the GEF will be necessary in order to meet the agreed policy objectives. For their part, the Contracting Parties to the Bucharest and Sofia Conventions should ensure that a 'Memorandum of Understanding' is in place for implementing and monitoring the agreed policies. Furthermore, funds should be made available for the important task of raising the awareness of the general public and supporting local initiatives for reducing nutrient discharge or protecting key (aquatic) ecosystems.

1. Introduction to the Problem of Eutrophication

Simply defined[1], the term ***eutrophication*** describes an enrichment in the sea of plant nutrients because of human activity. This enrichment most commonly results in the excessive stimulation of phytoplankton[2] growth but may also trigger the growth of larger plants (macrophytes) on the sea floor in shallow areas. "Plant nutrients" mainly refers to inorganic compounds of nitrogen and phosphorus, essential for the growth of photosynthetic organisms. They also include dissolved silica, essential for the growth of diatoms, a class mostly consisting of free floating phytoplankton with silica skeletons (almost like tiny glass boxes), as well as micronutrients such as iron and manganese. Though the definition is simple, the phenomenon however, is a complex one because natural variations in the nutrient supply to the aquatic environment are very large.

Nutrient limitation occurs when the presence of one of these substances is insufficient for the continued growth of a particular community or species. Marine systems are generally considered to be nitrogen limited whereas freshwater plankton systems are generally phosphorus limited. This is because several species of freshwater phytoplankton are capable of "fixing" atmospheric nitrogen but, with minor exceptions, this is impeded in marine water. The nutrient requirements of individual species varies however, and a disturbance in the ratio of nitrogen, phosphorus, silica and perhaps iron, will result in changes in the composition of a particular plankton community. In many respects, all four nutrients may be considered as limiting. Lack of silica limits diatoms, for example, a phenomenon first observed in natural blooms off Cape Mendocino in the USA and since observed in the NW Black Sea as a consequence of the construction of inland dams including the Iron Gates dam. Where there are very large supplies of nutrients, light for photosynthesis may be the only mechanism limiting the scale of phytoplankton blooms.

For a better understanding of eutrophication, it is worthwhile to consider the typical ***succession*** of events during the eutrophication process. Firstly, it is important to understand that phytoplankton is not evenly distributed in the sea, neither in space nor time. In the similar manner to plants in temperate woods or meadows, species bloom and fade with changing seasons and are sometimes grazed by animals - only that in the sea, if they are not attached to the sea floor, plants are also at the mercy of tides and currents. The distribution of phytoplankton is patchy and individual species have developed their own particular physiology in order to have a comparative advantage over their competitors. This favours their development under certain optimal conditions. Some have particularly extraordinary adaptations including flagella, which permit them to seek better conditions of light or nutrients, or poisons against those animals that feed on them. It is important to recognise that this "patchiness" makes it difficult to establish baseline (typical) conditions. A large set of observations is necessary in space and time. Furthermore, the examination of spatial and temporal variability of phytoplankton requires laborious work of microscopic identification and counting by dedicated highly trained specialists.

When nutrients are added to the marine environment because of human activities, there is a general increase in the density of phytoplankton communities. At the same time, more subtle changes occur as the species composition adjusts to the new ratio of nitrogen, phosphorus and silica. High nutrients and low light (the plants tend to shade one another) favour smaller species with large amounts of surface chlorophyll. Phytoplankton is relatively short-lived and dies or is grazed by zooplankton and quickly falls to below the depth at which sufficient light can penetrate to promote photosynthesis (the euphotic zone). These cells, together with faecal material from zooplankton are

[1] GESAMP (1990) Review of potentially harmful substances. Nutrients. IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Pollution. Rep. Stud. GESAMP, 34, 40 pp. (participant authors: J. Portmann, R. Elmgren, I. Koike, L.D. Mee, M.A. Saad, J. Stirn and A. McIntyre). An alternative wider definition has been proposed by Nixon (Ophelia 41:199-219, 1995): An increase in the rate of supply of organic matter to an ecosystem.

[2] Phytoplankton are microscopic free-floating aquatic plants.

subjected to bacterial decay, a process that consumes oxygen. In extreme cases, processes of diffusion and mixing are insufficient to replace the oxygen and this becomes depleted to the degree that no animals can survive in the water. This becomes a so-called "dead zone".

Eutrophication is widely considered a regional problem of global significance. ***Hypoxic*** or "***dead zones***" have been recognised in many estuaries and coastal waters. A case attracting much recent press attention has been the sea area adjacent to the Mississippi delta in the Gulf of Mexico. By 1997, 16,000 km^2 of the Gulf of Mexico's benthic northern shelf had become hypoxic because of nutrient discharges from the Mississippi River, a phenomenon that severely damages the $3 billion gulf fishing industry[3]. Much of the nutrient load is derived from the $98 billion Mississippi basin farm economy - the relative monetary value of these industries giving a clue as to the difficulty for implementing costly nutrient reduction policies. It is equivocal however, to consider that the profits of one sector cannot be achieved without losses in another. High agricultural yields may be obtained without discharging huge amounts of nitrogen and phosphorus to rivers if suitable practices are adopted in response to appropriate incentives.

The problem of eutrophication is not simply limited to extreme events characterised by the formation of "dead zones". The change in the composition of phytoplankton communities in the sea often affects the entire marine food chain. It may alter the composition of zooplankton, minute animals, which rely upon phytoplankton as food. Zooplankton include some fish larvae and these may be unable to feed on the tiny phytoplankton cells which are characteristic of eutrophication. A typical symptom of eutrophication is an increase in the abundance of jellyfish, which adapt more easily to the altered environmental conditions than other predators such as fish. It has also been associated with an increase in the frequency of blooms of toxic species, sometimes affecting human health. Eutrophication also has direct economic impacts: the aesthetic qualities of seawater are diminished and bathers see the green or brown eutrophic waters as "dirty" and unattractive. In some areas, phytoplankton species may bloom which produce foams in a similar manner to detergents. Beaches close to areas affected by "dead zones" may be strewn with dead animals.

[3] Malakoff, D. (1998) Death by suffocation in the Gulf of Mexico. Science 281: 190-192.

2. Scientific Information on the Black Sea: Sources, Quality and Techniques of Comparative Study

Scientists have been gathering useful information on the state of the Black Sea ecosystem since the beginning of the present century. This information has, unfortunately, often been very fragmentary and somewhat anecdotal. This is not surprising as marine science was in its "exploratory" phase where a small number of academic specialists dedicated their lives to discovering and classifying the plants and animals in the marine biosphere. There were few co-operative or systematic quantitative studies of how the discovered communities functioned and varied in their composition with time and space. Some specialists however, did conduct "time series" of measurements, in which they studied particular communities or individual species over a relatively long time-span, sometimes representing their entire working lives. These data sets are invaluable jig-saw puzzle pieces, which help to contribute to the overall picture. The sampling methods used do not generally correspond with those employed by modern quantitative biologists but are consistent within each data set and, as trends, are fully comparable. Care must be taken not to over-interpret some of the observations by comparing individual data sets taken using very different methodologies, a particularly important matter when, for example comparing the diversity of zooplankton using different types of net or bottom fauna using different dredging techniques.

Some of the chemical data must be treated with great caution. Prior to the 1960's, methods for measuring phosphate and nitrate suffered from many systematic errors and the methods were rather unreliable, particularly in seawater where chemical interferences from other sea-salts had not been fully recognised. The introduction of simple methods by the groups of Riley (UK) and Grasshoff (Germany) led to a rapid improvement in data quality and comparability. Even so, recent intercomparison exercises conducted in the framework of the CoMSBlack, Danube, and similar programme revealed unacceptable errors of as much as 30% (after the removal of "outliers" - data which is obviously wrong) between analysts. Since the beginning of these exercises however, the quality of the data sets has considerably improved.

So how do we employ older data sets for chemical analyses? The work of validation relies on two principles. The first is internal consistency of the measurements - we have acquired considerable knowledge of the way nutrients vary with space and time and, unless explained by an obvious external source or physical phenomenon, a very "noisy" data set may be treated with suspicion. Secondly, we look for consistency in measurements at deep "reference stations" since the concentration of most nutrients varies very little in the deep sea and the values are rather predictable.

Having said this, great care must be taken not to compare data from cruises with very different densities of measurement points or between years where the studies did not pay regard to seasonal trends. Even the time of day in which observations were made is important in eutrophication studies as vast masses of photosynthetic algae "breathe in and out" as they photosynthesise and respire during the course of a day and oxygen may be "supersaturated[1]" during the day and depleted at night. For this reason, comparative records of surface oxygen content are of dubious use unless all the observations were taken at the same time of day (rather unlikely during most oceanographic cruises). Measures of oxygen below the illuminated "euphotic zone" however, are somewhat more reliable as the daily changes due to plant activity are less strongly expressed.

[1] Supersaturation occurs when oxygen is introduced molecule by molecule by plants into water already physically saturated with air through mechanical mixing. Supersaturation of 130% is quite typical in productive coastal waters.

In conducting the present review, data that has not been validated or does not form part of a longer time series has been omitted. Under some circumstances, the information may be useful but for the purposes of the current review, it was decided to adhere to the criteria outlined above.

Some compromises have been made in analysing data. The data on river inputs of nutrients, for example, has often been gathered using an inadequate sampling intensity. The problem is that nutrient loads in rivers vary considerably with time and a "spate" of high discharge may last for just a few days. Such spates may transport large amounts of phosphorus, since this is often associated with sediment particles that are re-suspended more easily when flow rates are high. There is a higher statistical probability of underestimating loads than overestimating them when the sampling frequency is low. It has been suggested that at frequencies of sampling below 52 per year, the sampling error is generally more significant than that of random analytical measurements themselves. This is why river monitoring should be a continuous process at a small number of "key" points.

In the Black Sea, the current economic situation has resulted in the suspension of most programmes for systematic monitoring. The coasts of Russia, Georgia and Bulgaria, for example, have not been systematically monitored since the late 1980's. The monitoring programme in Romania has been maintained however, since the early 1960's and provides a record of the direct causes and effects of eutrophication at the discharge of the River Danube. In the case of Ukraine, there have been a series of research cruises, which though irregular, have occurred annually for several decades. Changes in the network of stations make some of this data difficult to interpret. In Turkish waters, there has never been a regular monitoring network but, since the early 1990s, Turkey has conducted excellent oceanographic research studies, often in co-operation with Ukrainian and US research institutions (with occasional participation of institutions from Bulgaria, Romania and Russia). These have paid considerable attention to data quality control and the application of modern technology, including remote sensing by satellite. Many of the co-operative oceanographic research studies were co-financed by NATO. From 1995-1997, a European Union Project, EROS-2000 (European River-Oceans Systems), worked together with research institutions from Bulgaria, Romania and Ukraine to examine the impact of the Danube River on the NW shelf of the Black Sea and published valuable information. Unfortunately, the study was discontinued owing to lack of EU funding.

Thanks to the earlier systematic studies in the former Soviet Union and Bulgaria, the continuous studies in Romania and the recent work co-ordinated from Turkey, it is possible to piece together evidence for cause and effects of eutrophication in the Black Sea. Regarding studies of the inputs to the Black Sea, the Danube Basin Environmental Programme has sponsored a number of research projects to bring together existing information and to improve the quality of monitoring programmes in the Danube. In the case of the Dnieper, Ukraine has regularly monitored the quality of its waters though the data has not been corroborated by independent quality checks. Direct (point source) inputs to the Black Sea have been studied using the WHO Rapid Assessment Method applied in each Black Sea country by the Black Sea Environmental Programme. There have been estimates of atmospheric inputs of nitrogen compounds by the World Meteorological Organisation (atmospheric phosphate inputs are usually negligible). If countries are to count on information necessary to make adequate management decisions, it will be necessary to maintain and hopefully improve the available monitoring systems.

3. Evidence of Long-term Changes in the Black Sea

We are fortunate that there is one set of measurements of indisputable quality, which allows us to examine the overall pattern of change in the Black Sea over the past seventy years. This is the measurement of water transparency using a device known as the Secchi disk. The Secchi disk is a weighted white disk of standard dimensions that is gradually lowered from the side of a ship by a piece of rope with depth markers. When observed from directly above, it disappears from sight at a depth proportional to the transparency of the water. Most of the changes in transparency in the open sea are due to fluctuations in the amount of phytoplankton present in the water. Almost all scientific expeditions to the Black Sea have routinely conducted these measurements and thousands of such data have been collected by scientists from the Marine Hydrophysical Institute in Sevastopol, Ukraine, covering a period from the 1920s to present[1]. The results are illustrated in Figure 1. Though there were inter-annual variations in the mean Secchi Depth (SD) of up to 5 m, depths of over 20 metres (very transparent water) were recorded on several occasions prior to 1972, from when transparency gradually decreased to a minimum of only 6 m in 1991. This was the result of huge blooms of phytoplankton following a major ecological disturbance of the entire Black Sea ecosystem. The transparency has since gradually recovered to values similar to those recorded in the early 1980s.

The reason for some of these changes to occur will be discussed in subsequent sections, the important point to recognise is that changes have been recorded in the entire Black Sea though it will be shown that the most heavily impacted areas are clearly adjacent to the river inputs.

[1] Vladimirov, V.L., V.I. Mankovsky, M.V. Solov'ev and A.V. Mishonov (1997) Seasonal and long-term variability of the Black Sea optical parameters. In: Sensitivity to Change: Black Sea, Baltic Sea and North Sea, E. Özsoy and A. Mikaelyan (eds.), Kluwer Academic Publishers, Netherlands

4. The Black Sea Eutrophication Problem in Perspective

The Black Sea is also one of Europe's newest seas. It was formed a mere seven or eight thousand years ago when sea level rise caused Mediterranean water to break through the Bosphorus valley refilling a vast freshwater lake tens of metres below the prevailing sea level. The salty water sank to the bottom of the lake, filling it from below and forming a strong density gradient (known as a pycnocline) between the Mediterranean water on the bottom and the freshwater mixed with some seawater near the surface. The depth of this natural density barrier depended (and still depends) upon the supply of fresh water from rivers and rain, and the energy available from the wind and the sun for mixing it with the underlying seawater. The oxygen in the incoming water was quickly exhausted by the demands of bacteria associated with decaying biota and terrestrial organic material falling through the density gradient into the bottom water. Within a few hundred years, the Sea, below some 100 - 200 metres depth, became depleted of oxygen. The bacterial population switched to organisms capable of obtaining their oxygen by reducing dissolved sulphate to toxic hydrogen sulphide and the resulting water body became the largest volume of anoxic water on our planet.

For several thousand years therefore, only the surface waters, down to the "liquid bottom" pycnocline, have been capable of supporting higher life forms. Though not very biologically diverse compared with open seas at similar latitudes, the Black Sea developed remarkable and unique ecosystems, particularly in its expansive north-western shelf where the sea is relatively shallow. The seabed in this part of the Black Sea was well oxygenated since it is well above the pycnocline. This area, and the adjacent shallow Sea of Azov, also receives the inflow of Europe's second, third and fourth largest river basins, the Danube, the Dnieper and the Don. These rivers transport nutrients and sediments from an area at least five times that of the sea itself. The areas adjacent to the river discharges (including the entire Sea of Azov) were comparatively productive. On the North-western shelf, a particularly unique ecosystem developed, based on the “keystone” benthic (bottom living) red algae, *Phyllophora* sp., which formed a vast bed with a total area equivalent to that of Belgium and The Netherlands. The term “keystone” is not used lightly: like the keystone in the middle of a stone bridge, its removal causes the entire structure to collapse in a precipitous manner. This particular keystone was also a place of great beauty, vast underwater fields of red algae, home to a myriad of dependent animals, linked together in a complex web of life.

Despite its uniquely fragile natural physical and chemical characteristics, the Black Sea ecosystem appears to have been relatively stable. During the first half of the twentieth century, perhaps until three decades ago, there was little evidence of human impact on the Sea or on its flora and fauna. Some changes had occurred however, and these were precursors of much worse events to come. Sensitive monk seal populations, for example, began to decline from the late nineteenth century, driven from their breeding grounds by human activities. Nowadays the rarely sighted minuscule population of these seals seems certainly doomed. Indeed, there is no certainty that any of these animals remain in the Black Sea. Another early change was through the introduction of a number of exotic animal species, introduced by accident from the hulls, bilge or ballast tanks of ships, and which flourished to the detriment of the Black Sea's characteristic fauna. The voracious predatory sea snail *Rapana thomasiana*, for example, arrived from waters around Japan in the mid-1940s and devastated beds of the Black Sea genotype of the common oyster, *Ostrea edulis*. It is one of a list of some twenty-six species introduced through human activity (accidentally or intentionally) since the beginning of the century and which have profoundly altered the Black Sea ecosystem[1].

[1] Zaitsev, Yu., 1992. Recent changes in the trophic structure of the Black Sea. Fish. Oceanogr., 1(2): 180-189

Another gradual change was taking place on the coastlands of the Black Sea. Urban construction occurred in an unplanned and haphazard manner. The Black Sea was an increasingly popular tourist venue, particularly for the peoples of the former Soviet Union and the other Eastern and Central European COMECON countries. This, together with competing demands for space from shipping, industry and coastal settlements (mostly with inadequate waste disposal), placed increasing demands on coastal landscapes. The damming of many rivers brought hydrological changes, particularly through the decrease in sediment flux to the coast, a phenomenon that led to major problems of coastal erosion[2]. This, in turn, was often ineffectively combated by the construction of a very large number of structures to protect beaches (groynes). These further degraded the landscape and exacerbated pollution problems. In the competition for coastal space, the natural environment was the seemingly inevitable loser. The human population has continuously encroached on the ecosystem that it is part of and upon which it depends.

From the late 1960s to the early 1990s, events occurred in the Black Sea that can objectively be considered as an environmental catastrophe[3]. The strongest single symptom of the catastrophe was the virtual elimination of the *Phyllophora* ecosystem of the Black Sea's north-western shelf in a matter of some ten years. The chain of events leading to the decline of this ecosystem started with an increase in nutrient flux down the major rivers, particularly in the late 1960's when fertiliser use increased markedly as a result of the “Green Revolution”. However, there were several issues which coincided. Enabled by the "Green Revolution", primary agricultural produce was converted with an increasing bigger share into meat. This 'meat production' was also undertaken in large-scale industrialised production units, where it became more and more difficult to re-utilise animal manure on fields. At about the same time, urban settlements were increasingly sewered, but nutrients were not removed from sewage concurrently with the expansion of the sewer systems. Furthermore, polyphosphates were introduced into detergent formulations, thus increasing the loads of phosphorus in the loads transported. This increase in the long-distance transport of nutrients brought about a decrease in light penetration in the sea due to the increased intensity of phytoplankton blooms (eutrophication). Deprived of light, the red algae and other photosynthetic bottom dwelling (benthic) species quickly died. Their function was lost as a source of oxygen to the bottom waters of the shelf seas and as a habitat for a wide variety of organisms. The bottom waters of the north-western shelf became seasonally hypoxic (very low oxygen) and even anoxic (no measurable oxygen). Thousands of tons of benthic plants and animals were washed up on the shores of Romania and Ukraine and the seabed became a barren area with a very low biological diversity.

The loss of the north-western shelf ecosystem had an impact on the entire Black Sea. It also coincided with a period of expansion in the fisheries industry and the application of high technology fish-finding hydro-acoustics and more efficient, though unregulated and destructive, purse seining and bottom trawling gear. The consequence was a decrease in the diversity of commercially exploitable fish species from some 26 to 6, in less than two decades. As eutrophication advanced in the Black Sea, the smaller fish species such as anchovies and sprat were favoured since they depend upon the phytoplankton-driven pelagic ecosystem, rather than the benthic one. Furthermore, their predators had often been removed by overfishing or habitat loss. As a consequence, fishing effort switched to these lower value species. Annual catches of anchovy for example, rose from 225,000 tons in 1975 to some 450,000 tons a decade later[4].

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[2] Kos’yan, R.D., & O.T. Magoon (eds) (1993). Coastlines of the Black Sea. Procedings of the 8th Symposium on Coastal and Ocean Management, Coastal Zone ’93. Coastlines of the World, American Society of Civil Engineers, 573pp.

[3] Mee, L.D. (1992) The Black Sea in crisis: The need for concerted international action. Ambio 21(4): 278-286.

[4] MacLennan, D.N., T. Yasuda and L.D.Mee, 1997. Analysis of the Black Sea Fishery Fleet and landings. Black Sea Environmental Programme, Istanbul, 25pp

In the mid-1980s, another exotic species arrived in ship's ballast waters, the ctenophore *Mnemiopsis leidyi*, sometimes known as the comb jelly[5]. This species was brought from the eastern seaboard of America and, without predators, flourished in the eutrophic Black Sea environment where it consumes zooplankton including fish larvae. Perhaps the word "flourished" is an understatement. At its peak in 1989-90, it is claimed to have reached a total biomass of about one billion tons (1,000,000,000 tons wet weight) in the Black Sea, more than the world annual fish harvest! This massive population explosion had an enormous impact on the Black Sea's ecosystems and commercial fish stocks. The loss of zooplankton allowed huge populations of phytoplankton to develop in a series of blooms that reduced the mean Secchi depth (the maximum depth to which a white disk lowered into the sea from a ship remains visible) from the normal average of twenty metres, to only five metres. Anchovy catches plummeted in 1990 to only 60,000 tons.

The situation in the Black Sea was mirrored by another environmental stress on its coasts. The economic decline of the Black Sea coastal countries and the political upheaval of transition to a market economy led to a lack of maintenance of waste treatment facilities for domestic sewage and industrial waste. Of course, many cities had never had effective sewage treatment but the general decline was evidenced by an increased frequency of outbreaks of waterborne diseases such as cholera and frequent beach closures due to unsanitary conditions. In Ukraine, for example, 44% of bathing water samples taken in 1995, did not meet the national microbiological standards[6]. This environmental problem, coupled with the decline in standards of tourism infrastructure and limited spending power of people in the region, also led to a sharp decline in tourist numbers and in the local economies[7].

The state of the environment in the Black Sea in the early 1990's gave little reason for optimism. The economic crisis did however give some respite for pollution. Farmers were often unable to apply the quantity of fertilisers used in the former centrally planned economies. Many large energy-inefficient and polluting industries were forced to close. By 1996 there was already some evidence of recovery of benthic ecosystems on the north-western shelf of the Black Sea, albeit small. Furthermore, *Mnemiopsis* populations started to decline and the anchovy fisheries recovered, almost to their mid-1980s level. Most local economists and ecologists agree however, the pressure on the environment will return as the economies recover, unless urgent measures are taken to limit the environmental impact of renewed growth. Furthermore, new environmental pressures are emerging as a result of the rapid increase in the use of the Black Sea as a maritime transport route, particularly for the shipment of oil en-route from the newly opened Caspian oil fields.

Recent data[8] has shown that the current nutrient loading to the Black Sea is much lower than in the period of the seventies and eighties but appears to remain higher than in the 1960s. Data for N and P, observed by the Romanian Marine Research Institute[9] on Black Sea shelf waters indicate that the phytoplankton growth in the Romanian shelf area seems to be limited by P; this 'observation area' is some 60 km east from Constanta. A cruise of the Turkish Research Vessel Bilim in March and April 1995 [10] showed along a transsect in this area, and also along two additional transsects vertical

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[5] GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), 1997. Opportunistic settlers and the problem of the ctenophore *Mnemiopsis leiydi* invasion in the Black Sea. Rep.Stud.GESAMP, (58):84p.

[6] BSEP (1997) Black Sea Transboundary Diagnostic Analysis, (Ed. L.D. Mee) United Nations Publications, New York. ISBN 92-1-126075-2, August 1997, 142pp.

[7] BSEP (1996) Black Sea Sustainable Tourism Initiative (Background report), Istanbul, Turkey, 322pp.

[8] see Annex I to the current report.

[9] For Orthophosphate-P, data are available since 1963, for the sum of inorganic N (ammonium-N, nitrite-N and nitrate-N) since 1980,i.e. the N to P ratio can be observed since 1980.

[10] See the Turkish National Report, coordinated by Dr. Ö. Bastürk.

to the Bulgarian coast, the same results. However, Turkish data [11] show that the Black Sea is in its 'open deep waters' nitrogen limited. These observations are here reported, albeit - as indicated before - marine ecosystems are generally felt to be nitrogen limited. For the decision making process, however, the situation in the Black Sea (Black Sea shelf area; deep waters of the Black Sea) is important.

There is strong evidence of partial recovery of coastal ecosystems, though the recovery does only partially extend to benthic systems or to predatory fish. The remarkable recent decrease in some loads is a result of economic failure of agriculture and industry in coastal countries and to the success of nutrient reduction programmes, particularly phosphate removal, in the upper Danube countries. It has to be assumed that the economic failure in coastal countries is a temporary situation and that it represents a “window of opportunity” for recovery of marine ecosystems and for taking management actions to avoid a return to the previous situation of chronic eutrophication.

There is in general agreement that eutrophication is the most serious medium/long term problem to be overcome in the Black Sea. This problem is certainly not exclusive to the Black Sea. Nitrate reduction policies have had limited success in the countries of the European Union despite new legislation. It is difficult to implement these policies where there are strong divisions between sectors involved in competitive agricultural production and environmental protection and where the public itself is generally unaware of the long-term dangers of a “business as usual” approach.

[11] See again the Turkish National Report, coordinated by Dr. Ö. Bastürk.

5. Evidence for the Decline of Black Sea Ecosystems

Annex I to this report is a set of tables which summarise many of the conclusions of the national reports commissioned by the Danube and Black Sea programmes. Care has been taken to review each statement and to qualify it where necessary. The information is presented in sequence of trophic levels, starting with nutrient fluxes and nutrient concentrations in the Sea, and ending with fish. Only very limited information has been presented on fish populations as this was not the main focus of the national reports. Information has been limited to the phenomenon of eutrophication and its biological consequences. No attempt has been made at this stage to examine the causes or to assess the socio-economic impacts.

The information in the tables constitutes a remarkable quantitative account of the collapse of a major ecosystem, largely as a result of eutrophication. The reader will note that the system became destabilised in the early 1970s. The collapse of benthic ecosystems was catastrophic, occurring in the space of less than three years (Romania). The entire ecosystem appears to have switched from one relatively stable state to one of great instability but with a shortening of trophic chains (food chains), particularly favouring the so-called “dead end” species of gelatinous organism. “Dead end” refers to the fact that these organisms have few predators. The consequence is that the system produces more biomass but this has a low food value for fish which are consequently impoverished.

A summary of the switch in the species composition of the ecosystem is given by Zaitsev (1992) and included as Figure 16 for ease of reference. Prior to the onset of eutrophication, the Black Sea included two major interacting ecosystems; a benthic (bottom living) system with “keystone” species of macro-algae (such as *Phyllophera* and *Cystoseira*) and including benthic animals and fish, and a pelagic (upper water column) system supporting a food chain extending to predatory fish and mammals. Eutrophication has virtually excluded the benthic system and severely altered the pelagic one.

The reader will appreciate that the study of eutrophication in the Black Sea is an extremely complex one and that there are a number of gaps to be filled in our current understanding. The current decline in monitoring programmes is a particular cause for concern since the continuity of measurements is essential for determining the effectiveness of future nutrient limitation strategies.

6. Implications of the Study

- The impacts of eutrophication are not limited to the coastal margins. The entire Black Sea ecosystem has been altered by the combination of eutrophication and the intruding of opportunistic alien species.
- There has been some recovery of the Black Sea ecosystem in the past five years but this does not imply that the degradation taken place is now fully reversed. The system has not yet returned to a state similar to the 1960s. It is currently unlikely to do so as some species have disappeared and others have arrived from outside.
- The presence of large biomasses of gelatinous organisms in the Black Sea is a cause for the decline in the health of higher trophic levels, including fish. This presence is made possible by eutrophication.
- Shelf waters south of the outfall of River Danube, and down to the Bulgarian coast, appear to be phosphorus limited from the extremely low concentrations of phosphate in surface waters, see the former quotations. This is not the case for the Central SW Black Sea[1] where surface N/P is below the Redfield ratio[2].
- Any nutrient reduction possible should be undertaken. The question 'where to put the money first' seems legitimate. However, the full recovery of the Black Sea ecosystems is not merely a matter of reducing phosphate loads (though such reductions may be achieved at a relatively low cost and with a comparatively bigger speed). The ratio of phosphate and nitrate (and in some cases silicate) in the sea should be maintained as close as possible to the natural level (the Redfield ratio) and strategies are necessary for decreasing both nitrate and phosphate inputs to the Sea. There seems currently to be a large excess of total dissolved nitrogen in river inputs.
- Protection of the remaining beds of benthic algae (*Phyllophera; Cystoseira barbata*) is important to aid eventual recovery of the benthic ecosystem.
- Increased effort is needed for comprehensive monitoring of the Black Sea and its tributaries if improved Environmental Quality Objectives are to be developed in the future.

[1] For the SW Black Sea, mean phosphate concentrations are 0.12 µM P and mean nitrate is 0.28 µM N (Turkish report).

[2] The molar algal requirement for N:P is 7:1, which corresponds to a mass ratio (= 'weight ratio') of 15.5:1. It seems that marine scientists use molar ratios, whereas limnologists are used to mass ratios. It is important to be aware of the differences between 'molar ratio' and 'mass ratio'.

7. Sources of Nutrients to the Black Sea and Nutrient Control Programmes

The problem of eutrophication cannot be resolved without integrating the nutrient management strategies of all the States within the Black Sea basin. From a load allocation perspective, this is not an easy matter as the assimilation and conversion processes along the paths of flow are only incompletely known. Th Group also recognises that in the case of the Danube Basin, the ICPDR is in charge of the load allocation.

As a result of the pollution source inventory conducted during the preparatory work for the Black Sea Strategic Action Plan, it has been possible to gather data on the inputs of dissolved nitrogen and phosphorus compounds to the Black Sea in 1995. However, the atmospheric input of nitrogen was not taken into account in this inventory. Based on this pollution source inventory and some additional data, [Topping, Sarikaya and Mee][1] conclude the following:

For total nitrogen, 14% are from Bulgaria, 27% from Romania, 12% from Ukraine, 10% from the Russian Federation, less than 1% from Georgia, 6% from Turkey and about 30% from the non-coastal countries[2] (Austria, Belarus, Bosnia and Herzegovina, Croatia, Czech Republic, former Yugoslavia, Germany, Hungary, Moldova, Slovakia, Slovenia).

For phosphorus, the figures are Bulgaria, 5%; Romania, 23%; Ukraine, 20%; Russia, 13%; Georgia 1%; Turkey 12% and 26%, for the remaining countries, a similar story to that of nitrogen.

The importance of showing these numbers here is simply to illustrate that nobody is “innocent”, not even the Georgians whose low percentage input reflects the current collapse in the coastal economy, probably a temporary feature.

Romania plays a particularly important role in the discharge of nutrients to the Black Sea. Its entire territory drains into the Black Sea, mostly through the Danube. The industrial and agricultural practices adopted during the former political regime paid little regard to environmental protection, especially in the “green revolution”. Now that the economy of Romania is market-based, many subsidies on fertilisers have been removed and large animal production complexes are closing. The decrease in fertiliser use is beneficial to the environment but unless alternative and cost-effective agricultural practices are adopted, there will be enormous social problems of unemployed farm workers unable to compete with cheap food exports from places where cheaper production techniques are applied and/or fertilizer subsidies still exist. A similar situation prevails in neighbouring Moldova where large animal complexes have also closed but where smallholders now have excessive numbers of animals literally in their back gardens, in very unsanitary conditions. Human health is already declining in these places and shallow wells, the main local water supplies, are polluted. A complete solution to these problems would require a change in consumption patterns themselves - and how can countries with rampant over-consumption in the west demand changes of their poorer neighbours in the east?

Though the biggest single contributor of nutrients to the Black Sea seems to be Romania it contributes less than one third of the total waterborne load. All the States in the Black Sea basin share the responsibility to reduce nutrient loads to the Sea. The Danube river basin has its own management regime, which includes the Danube River Protection Convention (which has entered into force on October 22nd, 1998) and the ‘International Commission for the Protection of the Danube River

[1] Topping, G., H. Sarikaya and L.D. Mee (1998) Sources of pollution to the Black Sea. In: Mee, L.D. and G. Topping (Eds) (*in press*) Black Sea Pollution Assessment. UN Publications, New York, 280pp

[2] The loads of nutrients discharged into the 'fine drainage web' of the river network in a regional drainage area and the ones reaching the receiving Seas will always differ. For the Danube Basin, it will be one of the tasks of the ICPDR to come up with good estimates for the reasons of these differences.

(ICPDR)' charged to implement it, plus a Strategic Action Plan[3] developed under the EPDRB, the implementation of which with the DRPC's entry into force is now under the responsibility of the ICPDR. The current 'GEF River Danube Pollution Reduction Programme (GEF-RDPRP)' will help to define new strategies for reducing pollution, including nutrients, in the entire Danube Basin. Similarly, in the Dnieper River (shared by Ukraine, Belarus and Russia), a GEF-supported programme is developing a new Action Plan. Parallel projects have been developed for the Prut river (Tacis funding), the lower Don river (World Bank funding), the Sea of Azov (primarily Dutch government funding) and the Dniester river (various donors).

[3] EPDRB (1994) Strategic Action Plan for the Danube River Basin, 1995-2005, Environmental Programme for the Danube River Basin, Vienna, 109pp.

8. Policy Perspectives for Controlling Eutrophication

It is not possible at this stage, and with the limited historical data available on nutrient inputs, to set clear ultimate targets for nutrient reduction. The data set tells us about the historical state of the environment but eutrophication does not follow a linear cause-effect relationship. The collapse of ecosystems seems to have occurred rather abruptly as the system "flipped" from one state to another. However, the partial recovery of parts of the Black Sea ecosystem is encouraging.

The Black Sea Strategic Action Plans takes a pragmatic approach to the issue of pollution control which follows the "paradigm of iterative management[1]". The basic approach is rather simple. Firstly, there has to be a recognition that the integrity of marine and coastal ecosystems and/or human health is threatened by pollution. The complete removal of the threat would be desirable but is often impracticable in the short/medium term for social and economic reasons and an interim strategy is necessary for pollution control. It also requires that there are measurable indicators of ecosystem health. The coastal states (or those of the entire basin in the case of nutrients) as the cooperating partners involved then agree on a short term target for reduction. In the first iteration, the reduction is agreed on the basis of what can reasonably be achieved within a given time frame. The agreement is made on the basis of common but differentiated responsibilities, in this case each partner finds the most economically convenient approach for reaching the agreed target. It is understood from the outset that the first reduction is modest and somewhat empirical. The partners involved also agree on a programme of research and monitoring to refine the estimates of optimal reductions so that - at the end of the first period - new targets may be set with lower uncertainty regarding the outcome. The iterations should continue until all partners agree that the environment is adequately protected. At the same time, public understanding of the issues will also gradually improve, as will the public's demands for tighter criteria for protection and, hopefully, their willingness to pay. This is an open-ended process with a moving target, driven by continuity of observation and reasoning and the full involvement of all stakeholders. Such an approach avoids creating a stark division between "the public" and "the polluters" and seeks a consensus that addresses pollution at its root causes.

This general approach was applied by the "Group" in the following manner:

- by recognising and thus proposing to both Commissions concerned that the ecological status to be aimed at should be similar to the one of the 1960s but that it is not practicable to achieve this in a short time frame;
- by considering that in order to start with, an agreement is needed on the limits of the inputs of nutrients (and in fact also hazardous substances) into the Black Sea (and the Sea of Azov) and on the ecological status related with these inputs;
- to propose to both Commissions to limit the discharges to the Black Sea to the (only partially known) 1997 level, in order to learn to know how the Black Sea ecosystem(s) respond in regard to the already observed improvements.

The purpose of this approach is that there has to be agreement on improving the 'knowledge base' for optimal reductions such that at the end of this period, new targets can be set with a better certainty regarding the social and economic implications of the decisions to be taken.

[1] See, for example, Costanza, R., F. Andrade, P. Antunes, M. van den Belt, D. Boersma, D. F. Boesch, F. Catarino, S. Hanna, K. Limburg, B. Low, M. Molitor, J.G.Pereira, S.Rayner, R.Santos, J.Wilson and M. Young (1998). Principles for Sustainable Governance of the Oceans. Science 281:198-199

In order to arrive at the goal to further maintain and hopefully improve the ecological status of the Black Sea, the following principles for nutrient management measures and strategies will be necessary:

- Nutrients have to be 'kept on land' where they are needed for phototrophic productivity, and
- they have to be kept away from any waterborne transport.

The latter aim is to limit the phototrophic productivity in the receiving waters to adequate conditions, including the receiving area of the overall Black Sea.

The public understanding of the basic issues involved will hopefully increase in the overall Black Sea Basin over time, as hopefully will the willingness of this public to pay for actions required. In order to arrive there, all 'inlanders' will have to be made aware of what has happened with the ecological status of the overall Black Sea over time, and what – after the signs of improvement since 1992 – has to be avoided towards the future. The public should also know that 'exact values for the permitted discharges to the Black Sea' for the needed good ecological status are not yet known, and that in order to arrive there, solid observations, good scientific reasoning and a full co-operation are needed.

Based on the reported positive signs (reduced input loads and improved ecological status in the Black Sea shelf), and also aware of the missing knowledge of the comparability of input loads (resolution both in time since the 1960s, and in space all over the Black Sea and the Sea of Azov), and aware that the load reductions are very likely linked with the decline of economic activity in the countries in transition, but that towards the future economic development is expected to take place in the overall Black Sea Basin, the 'Working Group' defined in its 2nd Meeting the possible strategies as follows:

- *The long-term goal for all States in the Black Sea Basin is to take measures to reduce the loads of anthropogenically applied nutrients and hazardous substances to such levels necessary to permit Black Sea ecosystems to recover to conditions similar to those observed in the 1960s.*
- *As an intermediate goal, urgent control measures should be taken by all States in the Black Sea Basin in order to avoid that the discharges of nutrients and hazardous substances into the Seas exceed those that existed in 1997 [2]. The 'Group' recognised that these 1997 discharges are only incompletely known and that further work has to be undertaken to substantiate the size of the loads received by the Seas (Black Sea proper; Sea of Azov).*
- *The 'Group' concluded that the inputs of nutrients and hazardous substances into both receiving Seas have to be assessed in a comparable way, and that to this very end a common AQC (Analytical Quality Control) system and a thorough discussion about the necessary monitoring, including the sampling procedures, has to be set up.*
- *The 'Group' also concluded that the ecological status of the Black Sea and the Sea of Azov has to be further assessed, and that the comparability of the data basis has to be further increased.*

[2] Loads reported for 1997 to have been transported in River Danube were: orthophosphate, 16,000 tons (as P); total inorganic nitrogen, i.e. the sum of ammonia-N, nitrite-N and nitrate-N, 300,400 tons (as N) [A.Cociasu, 1998]. River scientists indicate that in order to 'level the impact of river hydrology on the transport of pollutants out', an averaging over e.g. a span of five years should be undertaken. This would yield for River Danube an 'averaged load for 1995' of 12,700 tons per year of orthophosphate-P and 456,000 tons of inorganic nitrogen per year. The corresponding value for 1997 can only be known as soon as the value for 1999 is known.

- *Both the reported input loads as well as the assessed ecological status will have to be reported annually to both the ICPBS and the ICPDR.*
- *The States within the overall Black Sea Basin shall have to adopt strategies that will permit economic development, whilst ensuring appropriate practices and measures to limit the discharge of nutrients and hazardous substances, and to rehabilitate ecosystems which assimilate nutrients.*
- *Based on the annual reports and on the adopted strategies for the limitation of the discharge of nutrients and hazardous substances, a review shall be undertaken in 2007. It will focus on the further measures that may be required for meeting the long-term objective (reaching an ecological status similar to the conditions observed in the 1960s).*

It is clear that placing such a "cap" on nutrient discharges would be a bold step towards restoration of the Black Sea ecosystem. It would give the Black Sea ecosystem a chance to recover and would offer economic benefits for the coastal countries in terms of improved fisheries and tourism. It would also offer global and regional benefits, measured in terms of biological diversity. By contributing to this process, the non-coastal areas within the overall Black Sea's hydrographic catchment – including those within the River Danube Basin – would also contribute to these non-tangible global benefits.

9. The Danger of Doing Nothing

Holding nutrient inputs at their 1997 levels does not imply “doing nothing”. There is an urgent need to develop agriculture and industry in Black Sea and Danube Basin countries as the present economic and food supply situation is unsustainable. These sectors should be developed in a manner which will afford greater protection to the environment and decreased economic loss from wastage. However, such development will require the commitment and engagement of all concerned and the support of international donors. As will be discussed in a later section, many of the necessary national policies and regulations are already in place but require activation.

Clearly, if nothing is done and the economies wil start again to be active by a strong 'principle of materials flow-through', nutrient loads reaching the Black Sea and the Sea of Azov will soon begin to rise again. The weakened ecosystems would degrade again and phenomena such as “dead zones” would return. This could eventually lead again to a loss of biological diversity. It would also inflict economic damage on the renascent tourist industry and affect fisheries in an unpredictable manner.

10. Practical Short-term Measures

How can low-cost practical measures be developed for implementing the agreed goals? In a developing or transition economy, there are many opportunities for implementing nutrient reduction policies without huge capital costs. This is because many of the contaminating industries and practices are already highly inefficient and in need of modernisation as part of a suite of measures for economic reform. The removal of subsidies for fertilisers for example, provides an incentive to reduce wastage and exploit animal manure currently discharged into rivers. In some cases however, new technologies fall short of nutrient removal because they address problems of short-term national interest. Many new municipal wastewater treatment plants (WWTPs) are being planned for example by oxydizing the biodegradable carbon in sewage, but these generally lack provisions for nutrient removal and, despite solving important domestic problems of human health, further exacerbate nutrient discharges. Such WWTPs are a good example of domestic baselines; the cost of adding a nutrient reduction stage would be the incremental cost to address regional and global environmental problems[1]. Similarly, a wetlands rehabilitation project, of immense value for biodiversity conservation, may have true additional incremental benefits in the maintenance or enhancement of a capacity for nutrient removal. This "ecosystem service" is rarely taken into account when planning biodiversity projects: the cost of wetlands protection and restoration is an incremental one and maybe a meaningful investment.

The "Group" has discussed some of the low-cost measures that could be taken to prevent increases in nutrient discharge to the Black Sea. Some of these measures will have to be set in the context of a new or revised legal frame, but the "Group" did not discuss this issue in any detail. The recommendations for measures fall into four general categories:

1. ***Reform of agricultural policies***. The use of market fertiliser has strongly declined in many Danube Basin and NIS[2] countries due to the current economic crisis. Agricultural production has slumped to unprecedented levels. The sector is currently being restructured in many countries in order to improve its productivity in several cases via assistance from the World Bank. If a return to large increases in nutrient run-off is to be avoided, it is important to include relatively simple policy provisions in the restructuring process. These include such things as leaving strips of unploughed land ('buffer strips') near streams, rivers and lakes; provision of storage clamps for overwinter storage of manure; erosion control through practical demonstration projects, and incentives for "biofarming[3]". Regulations concerning buffer zones for streams and rivers are already in place in some countries (eg. Ukraine), but enforcement is still rather poor. Another area requiring attention is freshwater fish farming: extensive (low feeding) aquaculture should be encouraged rather than intensive rearing which has very large nutrient discharges. Intensive farms should be subjected to discharge permits and levies as an incentive for proper treatment of waste. Effective levies should also be imposed on intensive animal rearing facilities that do not treat or recycle their waste.
2. ***Improved waste-water treatment, where applicable through the use of alternative technologies***. As mentioned earlier, conventional primary and secondary domestic wastewater treatment does not prevent large nutrient discharges. Tertiary treatment

[1] In practice, the matter is more complex. Even if funding can be raised to cover the capital cost of technological removal of phosphorus and nitrogen, the operation and maintenance cost may be virtually unaffordable for many countries in transition or in development. Funds from the GEF might theoretically cover the capital costs but not the operations and maintenance. These issues of sustainability must be carefully considered when prioritizing GEF interventions.

[2] The term NIS, Newly Independent States, refers to the countries of the former USSR.

[3] The term "organic farming" is commonly employed in some countries. In the UK, for example, standards for this practice are set by the Soil Association.

(including nutrient removal) implies high operation and maintenance charges which may be unaffordable under current economic conditions. For small communities, an example of low-cost alternative technology is the use of reed-bed techniques for sewage treatment following screening. This is now also employed for small towns in western countries. This technique has not been successfully applied for larger towns or cities, and it cannot be recommended without adequate feasibility studies. One option that should be properly evaluated for towns in Russia, Georgia and Turkey, is the use of deep discharge diffusers. They can carry wastewater to depths well below the pycnocline (the density gradient at about 100m depth in the Black Sea). With careful design, diffusers can be effective in keeping the nutrients away from the phototrophic zone. With industrial wastewater, nutrient removal should also be a statutory requirement.

3. ***Rehabilitation of key basin (aquatic) ecosystems***. The creation of protected areas, particularly in the case of wetlands, encourages the natural assimilation of plant nutrients. The reflooding of wetlands results in nutrient removal in two stages - a fast initial removal as aquatic plants grow and then a slower continuous removal as phosphorus is bound into sediments and nitrogen returned to the atmosphere by denitrification. What is presently only partially known is the long-term effectiveness of wetlands for nutrient removal (respectively the 'backholding' of nutrients). The protected or reflooded wetlands serve as biodiversity reserves and productive areas for fisheries. It was also felt that the areas needed for such ecosystem rehabilitation should not only be along the main rivers, but in the overall drainage web. The creation of terrestrial protected areas is also very important as it allows buffer zones to enhance carbon and nitrogen removal. An urgent priority is to afford protection to the remaining areas of marine macro-algae such as the *Cystoseira* beds in Russia or the *Phyllophera* beds in Ukraine in order to seed recovery of the Black Sea's ecosystems. These beds are currently under threat as a result of development of the oil industry (Russia), tourism development (all areas) and trawling (all areas).
4. ***Changes in consumer practices (including use of phosphate-free detergents)***. The prohibition of polyphosphate-based detergents leads to a major reduction in phosphate discharge to aquatic systems. These detergents seem to be already banned in most Danubian countries and the ban should be extended to all Black Sea countries as soon as possible (such a ban should be part of an agreement for cooperation). Public awareness of the eutrophication issue should be raised and clear information provided on modifying the consumer practices that lead to higher nutrient discharges. Awareness should also be raised of the need for protected areas and the consequence of their loss to developers.

11. Follow-up

The work of consolidating the information on eutrophication in the Black Sea, including the Sea of Azov, is still incomplete. There are many gaps to be filled in, and research to be continued. This report integrates a consistent record of change from which the impact of the phenomenon of eutrophication of the Black Sea and the Sea of Azov can be clearly highlighted and practical measures developed for controlling it. There is a broad consensus between specialists from Black Sea and Danubian countries regarding the validity of the observations and deductions.

There are two follow-up actions necessary at this point:

1. At the policy level. The TOR of the 'Joint *ad-hoc* Group' requires that the Group's Report will be made available to both the International Commission for the Protection of the Black Sea and the International Commission for the Protection of the Danube River, as well as GEF as donor. This Report will be an input to a Meeting between the Black Sea and the River Danube side, at the level of Heads of Delegations. The Heads of Delegations of both Commissions should in such a joint meeting, based on cooperation, consider endorsing the proposal to maintain nutrient levels at or below the loads recorded in 1997, subject to review in 2007. They should also approve a series of practical measures to achieve this goal including a total ban on polyphosphate detergents, clear targets for wetland restoration, an agreement on monitoring, and a mechanism for “joint implementation”.
2. At the project level. Donors should establish mechanism(s) to support the agreed policy objectives by funding a series of demonstration projects to share the costs of measures to reduce nutrient discharge following the approach outlined in 10 (above). The approach could use GEF funding to cover the incremental costs of specific projects. The support of donors other than the GEF will be necessary in order to meet the agreed policy objectives. For their part, the Contracting Parties to the Bucharest and Sofia Conventions should ensure that a 'Memorandum of Understanding' is in place for implementing and monitoring the agreed policies. Furthermore, funds should be made available for the important task of raising the awareness of the general public and supporting local initiatives for reducing nutrient discharge or protecting key (aquatic) ecosystems.

Annexes

Annex I

Summary of Data Sets Showing Evidence for Eutrophication and Its Effects

Location	Observation period	Change observed	Fig. Ref.	Report/ orig. Ref	Comments
		Nutrients			
Estimated values of outflow	1988/92	Estimated values calculated on the basis of the Bucharest Declaration monitoring data. Loads into surface water re-calculated from Danube country reports, with modelled retention. See note regarding assumptions: Annual emissions into surface water (1988/89) 990kt N; 130kt P in 10 out of 13 Danubian States: (1992) 820kt N; 105kt P Flow into Black Sea: (1988/89) 447kt N; 46kt P (1992) 345kt N; 25kt P		EPDRB (1997), Nutrient Balances for Danube Countries - Project EU/AR/102A/91, Final Report	These are estimated values which make assumptions regarding total/inorganic ratios. Quoted errors are typically +/-20%. Data demonstrates effectiveness of river system in decreasing loads to the sea.
Danube outflow, measured in the Sulina channel	1959-1960 and 1980-97	The values presented are yearly ones and thus do not reflect the existing hydrological variations. **Inorganic Phosphate** load **increased**[1] from 12 kt P/yr (1959/60) to a maximum of 30.7 kt P/yr in 1991. **Inorganic nitrogen increased** from 140 kt N/yr (1959/60) to a maximum of 813 kt N/yr in 1989. **Silicate decreased** from 790 kt Si/yr (1959/60) to 154 kt Si/yr (1990).		[Rom., Table 1]	These data are calculated from concentration in one branch of the delta times total river flow. This is an estimate of load for the whole river. See footnote on accuracy and source of data.
Danube outflow, as above	1980-97	All mass fluxes presented here are gliding averages over 5 years, with the 'middle year' being representative for the point in time. This 'gliding averaging' is levelling out yearly fluctuations. **Increase in inorganic phosphate** between 1980-89 from 12.1 kt/yr to 27.8 kt/yr, **then decrease** to 12.7 kt/yr for 1995. Gradual **decrease in total nitrogen** discharge from 730 kt N/yr in 1990 to 456 kt N/yr in 1995. **Decrease of silicate** from 417 kt Si/yr for 1982 down to a range of 234 - 265 kt Si/yr for the years between 1991 to 1995. **Mass N/P ratios** varied from 50-70 in 1988-92, rising to over 100 in 1993-94 and gradually falling to current values of about 40 **Mass Si/P** about 40 from 1988-94, then steadily rising to over 110 in 1997	Fig.2	[Rom]	These data are computed from values using very consistent sampling and measurement methodologies. They represent the most up-to-date set of data on the discharge of the Danube (though they are taken from a single **site)**.
Danube (Vilkovo)	1994 - 96	Doubling of nitrate to 1.9 mg/L 65% decrease in inorganic phosphate to 0.27 mg/L	Table 1	[Ukr.]	This is a small data set, changes do not represent a statistically valid trend
Kerch Straits (from Azov Sea)	1952-81	Increase of total nitrogen from 31.5kt/yr in 1952-56, to 62.5kt/yr in 1977-81 Irregular trend in phosphorus showing no net increase.		[Rus]	Systematic data sets were kept until 1981 and for rivers until 1986. The input from the Kerch straits was usually about 10% that of the Danube
NW. Shelf (Romanian Sector)	1959-1997 for P and Si; 1980-97 for N	**Onshore:** Pre 1970 surface PO_4 values below 0.5 µM then spectacular increase in period from 1971 to 1991 with values from 4-9 µM. Current levels have since **declined** to about 1µM. Almost no decline in total inorganic nitrogen over period from 1980. Silicates have declined to about 30% of 1960s levels.	Fig. 3 (based on Figs 4 and 5b of	[Rom]	Information from one of the best data sets in the Black Sea region. Full accounts of seasonal variations are found in the Romanian report. Note that onshore P levels were heavily

[1] This change (phosphates) is not statistically significant with this limited data set. Note that the 1959-60 data of Almazov has been questioned by the 'Group' in regard to its 'statistical meaning', as the method of arriving at the loads and as the sampling and analytical procedures involved are not adequately known.

Location	Observation period	Change observed	Fig. Ref.	Report/ orig. Ref	Comments
		N/P ratios have increased from 2-3 (1982-88) to over 15 (1997) **Offshore:** Pre 1970 surface PO_4 values below 0.5 µM then spectacular increase in period from 1971 to 1991 with values of up to 2.6 µM. Current levels have since **declined** to below 0.4µM. Gradual decline in total inorganic nitrogen over period from 1980, currently reaching about 5µM. N/P ratios have decreased from values over 100 (1982-88) to below 50 (1997)	[Rom]		influenced by a fertilizer factory now closed. Offshore changes mirror those of the Danube.
NW Shelf (Ukrainian Sector)	1950-1997	Very similar pattern observed to that of the study in the Romanian sector	Table 2	[Ukr.]	No sampling locations provided - clarification requested from authors of report.
W Shelf (Bulgarian sector, Sozopol station), neritic zone	1987-1996	Sharp **decline** in phosphate since 1990 (except for single high value in 1996) No clear trend for Nitrate or ammonia		[Bulg]	The frequency of sampling for obtaining this data set is unclear as are the relative errors and the units employed. The similarity with patterns observed in other countries is striking however.
Sea of Azov, Taganrog Bay	1985-89, 1990-95	Inorganic nitrogen halved between the two periods due to reduction in economic production. Total phosphorus and silicates remain approximately the same (nitrates + ammonium averaged 335 µg/L in 1985-89; total phosphorus, 57 µg/L).		[Rus]	No information is given on the sampling network and measurement frequency. The data is included as a contrast to the NW Shelf.
		Hypoxia			
Open Black Sea	1970-1998	Suboxic zone enlarging towards the surface by about 0.3-0.4 density units (some 10 metres)		[Tur] [Bastürk]	Data from various cruises by US and Black Sea scientists
NW Shelf	1950s - 1995	Hypoxic bottom waters often present on NW Shelf in summer after 1960 and covered up to 15,000 km2 from 7-8 to 35-40m depth in 1980s. They have recently receded to 1960s levels.		Zaitsev, 1992; EROS-2000 cruise data, 1996]	More research needed on historical data sets to document this phenomenon accurately.
		Phytoplankton and chlorophyll			
NW Shelf near Constanta	1983-1997	**Chlorophyll** - the **range of variation** for offshore and inshore stations has generally exceeded 50 µg Chl_a/L (some very large values), lower since 1994 with a high in 1997.	Table 3	[Rom]	Unfortunately there are no pre-1983 reference figures. Also median values need to be computed.
Western Black Sea (rim current and central gyre)	1986-1997	**Chlorophyll** - Large fluctuations but increasing concentrations to 1992, particularly in the rim current. Decrease in both areas after 1994 (slightly higher concentrations in 1996). This is evidence of eutrophication as a basin-wide phenomenon	Figs 4 & 5	[Tur] Yilmaz	Important study based upon the results of ocean-ographic cruises and satellite observations

Location	Observation period	Change observed	Fig. Ref.	Report/ orig. Ref	Comments
NW Shelf near Constanta	1962-1994	As eutrophication has progressed, blooms of microplankton and nannoplankton have become increasingly important. Species of Cyanobacteria (blue-green algae) and coccolithophorads which were rare before 1970 have become frequent or even dominant.	Table 4	[Rom]	The table illustrates the change in species dominance, the Romanian data set is extremely extensive.
Bulgarian Black Sea region (Cape Galata)	1961-97	Huge increase (about 40x) in phytoplankton biomass between period 1961-63 and 1983-90 then 30% decrease to present.	Fig. 6	[Bulg]	This data is based on over 30 years of systematic research. The sampling frequency may mean that some blooms were unsampled.
Bulgarian Black Sea region (Varna Bay)	1954-95	Until 1971, by far the dominant species belonged to the bacillariophyta (diatoms). From 1972 to 1989 dinophyta often dominated as eutrophication advanced. Some recovery of diatoms was noted from 1990 - 93 (the flora is more diverse than previously however) The transition from a stable diatom dominated system to an unstable one was a remarkably sharp one.	Fig. 7	[Bulg] Petrova-Karadjova	An extraordinary time series of seasonal measurements has been made which illustrates the apparent association between eutrophication and changed species composition.
Bulgarian Black Sea region (Varna Bay)	1981-96	Incidence of unusually intense blooms seems to have diminished since 1992. The diversity has also increased (some of the blooms in the mid-1980s were virtually monospecific)	Fig 8	[Bulg]	Author of the report (Moncheva) considers it too early to assert that the system has significantly recovered.
Ukrainian Black Sea region (NW Shelf)	1950-95	Overall decrease in species diversity as a result of eutrophication. Diatoms have decreased in diversity, dinoflagellates have increased (similar observation to Bulgarian colleagues)	Table 5	[Ukr]	Work based upon extensive data set covering over 40 years
Novorossiisk Bay (Russia)	1930s-40s, 1980s-90s	Change from diatom dominated blooms to increasing incidence of dinoflagellate blooms		[Rus]	Report does not include sufficient information to assess the representativity of the data set
		Marine macrophytes			
NW Shelf	1960s-80s	Zernov's phyllophora field occupied 11,800 . sq. km in 60s with total biomass of these alga 9 million t. By the end of 70s, the phyllophora biomass was 1.4 million t, but by the end of 80s it did not exceed 0.3 million t and occupied only 500 sq. km. No trace of the field was found in 1998 cruises by Ukrainian scientists.		[Ukr]	Data based upon extensive field observations but requires further updating and revision.
NW Shelf (Romanian and Ukrainian sectors)	1971-79	Disappearance of the "keystone species" *Cytoseira barbata* (150m wide belt). 5,400 t (fresh weight), 1971; 755t, 1973; 123t, 1979. Similar reports in Ukrainian sector. Cytoseira was replaced with opportunistic species of short life cycle.		[Rom] [Ukr]	Supports notion of sudden collapse of the ecosystem in the early 1970s.

Location	Observation period	Change observed	Fig. Ref.	Report/ orig. Ref	Comments
		Zooplankton			
NW Shelf (Romanian sector)	1970 -86	Increase in copepods between decade of the 70s and the 80s. The summer biomass increased by six times. These are food species for *inter-alia*, sprats, the production of which also increased.	Table 6	[Rom]	This illustrates how the NW shelf ecosystem started to shift from a system dominated by benthic production to a pelagic one as eutrophication advanced.
NW Shelf (Romanian sector)	1980-91	Development of huge blooms, especially in the summer of *Noctiluca scintillans*, a gelatinous zooplankton which is not considered to contribute to the trophic chain (ie. act as food for larger species). The species has contributed up to 99.8% of the summer biomass.	Tables 7 & 8	[Rom]	As eutrophication advanced further the "dead end" gelatinous organisms were increasingly favoured.
NW Shelf (Romanian sector)	1983-94	Change in seasonality and the decline of zooplankton communities. The arrival of the gelatinous ctenophore, *Mnemiopsis* seems to have led to the collapse of summer blooms of "fodder zooplankton" (those species which, unlike *Noctiluca*, can contribute to the marine food chain). This has severe implications for fish populations. Some recovery was noted in 1996-97.	Fig 9	[Rom]	This illustrates how eutrophication can eventually impoverish the food chain.
Bulgarian Black Sea coast	1967-95	Summer biomass of non-gelatinous "fodder"species declined to about 20% of late 1960s values. Noctiluca densities doubled in the same period.	Fig. 10	[Bulg]	Observations in the Bulgarian sector are very similar to those in Romania.
Ukrainian NW Shelf	1950-95	Similar situation to that described for Romanian sector. The "fodder species" in 1992-95 were the lowest since observations first began, the zooplankton communities had become dominated by Noctiluca.	Table 9	[Ukr]	The longest continuous record available highlights the clear pattern shown in other study areas.
Novorossiisk Bay (Russia)	1950-90	Copepods declined from constituting 44% of the biomass in the 50s-60s, to 8.8% at the beginning of the 90s. A sharp four fold increase in the amount of Noctiluca was reported between the 70s and 80s.		[Rus]	The report is sketchy on details but it is clear that profound changes occurred in the eastern Black Sea at the same time as those in the west.
Overall offshore Black Sea	1955-96	Analysis of time series by Turkish scientists together with their own data from recent cruises, illustrates decline of fodder species in the NW Shelf region of the Black Sea, particularly since the late 1980s when Mnemiopsis emerged. This region was the richest in fodder zooplankton in the 1960s but from the 1970s the NE region was equally important. The Turkish data gives evidence of some recovery during the 1990s in the W and SE region. In 1976, 11 of 13 common species of Black Sea copepod were present in Sevastopol Bay; by the 1990 only 6 species remained and only one was present in the summer months.	Fig. 11	[Tur]	This is a useful compilation of offshore data which illustrates the disturbance of the entire Black Sea ecosystem and the reduced availability of fodder for higher trophic levels.

Location	Observation period	Change observed	Fig. Ref.	Report/ orig. Ref	Comments
		Gelatinous predators (other than Noctiluca)			
Overall Black Sea	1949 - 1990	In the Black Sea the average biomass of the jellyfish *Aurelia aurita* increased from 670 th.t in 1949-1962 [28] up to 222 ml.t in 1976-1981 [11] and up to 300 - 500 ml.t by the end of 80s. The opportunistic invader *Mnemiopsis*, arrived in the mid-1980s and developed quickly, by 1989 attaining a total biomass of some one billion tons (wet weight), or 2 kg/m^2! The eutrophic conditions of the Black Sea favoured the development of this species.	Fig 12	[Ukr} [Tur]	Jellyfish and other gelatinous species are often characteristic of eutrophic ecosystems. The invasion of Mnemiopsis is probably the most devastating case of accidental introduction this century.
Offshore Black Sea	1991-97	*Mnemiopsis* is still present in large quantities in both E and W parts of the Black Sea. 1997 cruise data reports biomasses of some 600 g/m^2 in the E and 300g/m^2 in the W. Similar biomasses of the jellyfish Aurelia were also recorded	Fig. 13	[Tur]	These data are for individual cruises and should not be interpreted as annual or seasonal averages. Nevertheless they provide extremely important evidence of the continuation of the Mnemiopsis infestation.
Bulgarian Black Sea region	1997	The ctenophore[2] *Beroe ovata*, which can predate on Mnemiopsis, was first identified in the Black Sea in October 1997. Bulgarian scientists are concerned that this will herald a new invasion.		[Bulg]	The arrival of *Beroe* has unpredicatable consequences. It may act as a control to Mnemiopsis but it may also pose an even greater threat to the existing ecosystem.
		Zoobenthos			
NW Shelf (Romanian sector)	1965-1982	Changes in **sandy sublittoral**: 14 species of polychaete in 1965, 2 in 1982 17 species of amphipod in 1965, 2 in 1982 density of species in 1965 = 100,000 individuals/m^2 , 4,000 -60,000 in 1982		[Rom]	These figures are consequences of the changes from benthic dominant ecosystems to pelagic ones as a consequence of eutrophication
NW Shelf (Romanian sector)	pre 1980s-1993	Changes in **rocky bottoms**: 28 crustacean species before 1980 at 3m depth, 14 in 1993		[Rom]	Report not very strong on benthic studies. Most significant changes noted here.
NW Shelf (Romanian sector)	1977-1980	Catastrophic collapse of communities in **muddy bottom** habitat: 15 species of crustacean in 1977, 2 in 1980 20 species of mollusc in 1977, 4 in 1980 Biomass reduced proportionally: 30 (1977), 10 (1978), 1 (1980)		[Rom]	Massive loss of species in a three year period
NW Shelf (Romanian sector)	1994-1997	Apparent **recovery** of species diversity in prodeltaic sector: 1994, 14 species; 1995, 23 species, 1996, 25 species; 1997, 30 species		[Rom]	Gradual recovery confirms the value of nutrient reduction.

[2] A ctenophore is a tube-like gelatinous organism, sometimes known as a comb-jelly. This organism is a predator of zooplankton including copepods, fish-larvae etc. Both Mnemiopsis and Beroe are ctenophores, neither of which are native species of the Black Sea. Mnemiopsis is believed to have been transported to the Black Sea in the ballast water of a ship, presumably from the eastern seaboard of America.

Location	Observation period	Change observed	Fig. Ref.	Report/ orig. Ref	Comments
NW Shelf (Ukrainian sector)	1973-1990	Mortalities due to hypoxia were estimated as 100-200 t/km^2 , including 10% young and adunt fishes. Between 1973 and 1990 losses were estimated as 60 million t bottom animals including 5 million.t of fish.	Table 10	[Ukr]	These estimates, coupled with the areas given in the table give a sense of the magnitude of loss of the benthic ecosystem
Coastal area near Novorissijsk, Russia	1960s-1980s	In living *Cystoseira* beds[3], there is a relative stability in zoobenthos, especially as compared with the NW shelf.		[Rus]	The importance of keystone species is highlighted with this example.
		Fish[4]			
Anchovy populations in the Black Sea	1968-1997	Anchovy stocks and fisheries increased rapidly from the late 1960s to 1988, attaining over 500,000 tons annual catch. With the arrival of *Mnemiopsis*, the catch plunged to less than 100,000 tons in one year. Since then it has gradually recovered and is currently over 400,000 tons. The recovery is entirely on the S side of the Black Sea (mostly the coast of Turkey) and there is evidence that spawning grounds have switched from the N to the S. Most fish stocks in the NW Black Sea are still depleted.	Figs. 14 & 15	[Tur]	Figures show catch statistics and larval distribution. The larval distribution studies conducted from Turkey have been very extensive, enabling a clear picture of the recent developments.
Western Black Sea	1965-97	Following the mid-1970s, benthic fish populations (eg. turbot) collapsed and pelagic fish populations (small pelagic fish such as anchovy and sprat) started to increase. This may have resulted from habitat loss as the benthic algal beds were lost. The commercial fisheries diversity declined from some 25 fished species to about five in twenty years (60s to 80s).			There are two reasons for the collapse of benthic species: eutrohication and overexploitation. Scientific evidence points to eutrophication as the most significant factor.

Information contained in the Annexes I to III is - not for all quotations, but for a large share - based on the reports undertaken for the National Studies furnished by the teams of the shoreline Riparian States (Bulgaria; Romania; Russian Federation; Turkey; Ukraine), see also Annex V.

[3] The coast of Russia has intact beds of *Cystoseira*. These have been reduced in size, possibly through oil pollution, but are living remnants of the earlier Black Sea coastal benthic ecosystem.

[4] The analysis of fish populations has not been attempted in most of the country reports. The reader is referred to the studies of Prodanov et al. (1996) and McLennan et al (1997) for further information.

Annex II

The Supporting Tables 1 to 10

Table 1 **Content of Nutrients in the Danube Water, in micrograms of N or P/l, as indicated, for the station Vylkovo, at Kilia arm, 1994-1996 (from the Ukrainian National Report)**

Compound	1994	1995	1996
N inorganic			
Average	890	1960	1920
Max	1500	2400	2800
Min	260	130	120
P inorganic			
Average	430	190	270
Max	1000	580	90
Min	180	70	100

Table2 **The changes of content of major nutrients(% of measured in the 50-60s.) in the north-western shelf of the Black Sea (from the Ukrainian National Report, original data by Garkavaia G.P., 1998)**

Compounds	1950-1960	1950-1960	1977-1988	1989-1991	1994-1997
	µg per l	%	%	%	%
NH_4	25,0	100	1780	262	133
NO_2	2,5	100	216	196	126
NO_3	10,0	100	424	454	587
$N_{organic}$	230,0	100	192	237	517
PO_4	13,5	100	214	248	118
$P_{organic}$	16,0	100	159	166	77
SiO_3	1262,0	100	106	73	48

Table 3 **Chlorophyll-a concentrations along the Romanian marine area, in µg/l, and where the highest concentrations are reported for the part just in front of the (now abolished) fertiliser plant discharging phosphates to Sea. (From the Romanian National Report). The control area on the shelf (10 to 30 miles off the coast reported values between 0.04 - 1 µg/l).**

Year	Range of Variation	
	Minimum	Maximum
1983	0.031	85.32
1984	0.1	49.68
1985	0-1.09	62.50
1986	0.12	59.34
1987	0.09	86.91
1990	0.06	35
1991	0.01	96.80
1992	0.13	25.62-292.44
1993	0.06	36.48- 44.64--406.90-427
1994	0.14	3.66
1995	0.18	46.86
1996	0.08	31.58
1997	0.16	58.12

Table 4 Maximum density (in millions of cells/l) produced by dominant species during 1980-1994 (from the Romanian National Report).

Years	62-65	75-77	80	81	82	83	84	85	86	87	90	91	92	93	94
Species															
Skeletonema costatum	0.01 - 82.6	0.01 - 97	40		87.6	3.68	1074016	41.2	50.4	16.5	21.9	0.45	15.0	52.1	53
Cerataulina bergonii				0.80		0.95		0.10	0.56	7.09	11.1	2.73	9.38	9.46	2.13
Detonula confervacea										33.7					
Chaetoceros socialis										53.6				4.13	
Chaetoceros similis					1.38					0.25				0.57	
Cyclotella Caspia	0.032 -12	0.009 - 9			1.63		0.25	1.29	2.40	0.53	0.65				
Prorocentrum cordatum	1- 4	10 - 100		421	47.8	6.89	13.5		30.9	164	3.27	115	204		
Heterocapsa triquetra		1.85- 40.5	65.2		3.12		5.35	0.30	7.73					29.5	3.49
Apedinella spinifera		0.014	1.7			21.5						0.40		21.3	2.52
Mantoniella squamata													5.97	1.36	12.5

Table 5 Changes of Phytoplankton Diversity (total number of species) in the north-western shelf of the Black Sea before and after large scale eutrophication (from the Ukrainian National Report; data by Zaitsev, Yu.p. and B.G. Alexandrov, 1998)

Type of Phytoplankton	1954-1960 before eutrophication	1973-1994 after eutrophication
Bacillariophyta	180	116
Pyrrophyta	76	104
Chlorophyta	62	52
Cyanophyta	24	30
Chrysophyta	17	20
Euglenophyta	12	2
Xanthophyta	1	2
Total	372	326

Table 6 Mean values of the densities (D=individuals per m^3) and biomass (B=mg per m^3) of the pelagic copepods in the Romanian waters of the Black Sea during 1970-1979 and 1980-1986 (from the Romanian National Report, data by PORUMB, 1989).

Period	Winter		Spring		Summer		Autumn		Annual mean	
	D	B	D	B	D	B	D	B	D	B
1970-1979	2502	10.37	1340	7.10	6075	19.90	4742	5.38	4337	14.37
1980-1986	463	14.58	2131	21.67	8267	127.47	9840	81.41	7184	61.59

Table 7 **Seasonal mean densities (D = individuals per m^3) and biomasses (B = mg per m^3) of *Noctiluca scintillans* in Romanian continental shelf waters (from the Romanian National Report)**

Period	Winter		Spring		Summer		Autumn	
	D	B	D	B	D	B	D	B
1980-1986	16296	1300.86	17086	1367.33	62439	5022.43	40232	3258.77

Table 8 **The dominance (share in %) of *Noctiluca scintillans* in the total quantities of summer zooplankton in the Constantza area (from the Romanian National Report)**

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total density	91.5	94.7	95.6	41.0	91.5	92.3	91.5	97.9	97.5	99.2
Total biomass	95.8	96.7	99.1	34.3	98.3	98.5	98.5	99.9	99.3	99.8

Table 9 **Abundance (D = individuals per m^3) and biomass of zooplankton (B = g per m^3) in the period 1950 - 1995 in the north-western part of the Black Sea (from the Ukrainian National Report; data by Zaitsev Yu.P., and B.G. Alexandrov, 1998)**

Years	Noctiluca		Copepoda		Cladocera		Total	
	N	B	N	B	N	B	N	B
1950-60	2806	0.16	9897	0.08	1511	0.03	16606	0.37
1961-70	2930	0.17	7177	0.02	727	0.02	19662	0.25
1971-80	43772	2.53	11955	0.06	2657	0.03	63254	2.71
1981-90	60996	4.33	8999	1.09	2670	0.41	111104	6.59
1992-95	14276	0.37	741	0.06	898	0.56	23636	0.93

Table 10 **The change over time of the area where hypoxic conditions and bottom animal deaths were observed during the years 1973-1990 (from the Ukrainian National Report; data by Yu.P. Zaitsev, 1992)**

Year	Area, th.sq.km	Year	Area, th.sq.km	Year	Area, th.sq.km
1973	3.5	1979	15.0	1985	5.0
1974	12.0	1980	30.0	1986	8.0
1975	10.0	1981	17.0	1987	9.0
1976	3.0	1982	12.0	1988	12.0
1977	11.0	1983	35.0	1989	20.0
1978	30.0	1984	10.0	1990	40.0

(It should be noted that the improvements with the eutrophication process in the Black Sea started after 1990!)

Annex III

The Supporting Figures 1 to 16

Annex IV

The Terms of Reference of the Ad Hoc Joint Technical Working Group

Terms of Reference

Ad Hoc Joint Technical Working Group established between Bucharest[1] and Sofia[2] Conventions on issues in the Transboundary Waters in the Wider Black Sea Basin

1. Scope of the Working Group

The wide mandate of this 'Joint Technical Working Group' between countries in the Black Sea Basin is to reinforce the cooperation of the States of the Bucharest and Sofia Conventions in relation to taking practical actions to protect the transboundary waters in the wider Black Sea Basin.

2. Objective of the Working Group

To create a common base of understanding and agreement on the changes over time of the Black Sea ecosystem and the reasons for these changes, and to propose practical goals and objectives for remedial actions to address them.

3. Primary Activities of the Working Group

The following tasks are to be achieved by screening existing informations:

a. Assessment of the nutrient loads to the Black Sea from all sources in the Black Sea Basin, and their impacts on the Black Sea ecosystem;
b. Assessment of the nutrient loads to the Black Sea from the Danube River Basin, and their impacts on the Black Sea ecosystem, with emphasis on the Black Sea shelf;
c. Analysis of other types/sources of pollution to the Black Sea, and their impacts on the Black Sea ecosystem, with emphasis on the input from the Danube river;
d. Assembling and assessing the available information on the likely response of the Black Sea ecosystem to specified reduction in nutrient loads; and
e. Recommendation of a joint mechanism to evaluate progress over time and t report to both Commissions.

The assessment of the nutrient loads to the Black Sea will include:

- analysis of available water quality data (changes over time of the Black Sea and its ecosystems, including the marine system (including the shelf area) and coastal systems (including the Danube Delta; point and nonpoint discharges to surface waters, with emphasis on the input to the Black Sea;
- analysis of available water quantity data (as a means of determining nutrient loads).

[1] Convention on the Protection of the Black Sea Against Pollution

[2] Convention on Cooperation for the Protection and Sustainable Use of the Danube River

4. Determination of possible strategies

For the nutrient loads and analysis of other types/sources of pollution, as noted in step (3) above, strategies and approaches for implementation of pollutant reductions must be determined. This will comprise:

a. Definition of common pollutant reduction goals (particularly nutrients) in the Black Sea Basin;
b. Assessment of whether or not the implementation plans of Strategic Action Programmes (SAPs) undertaken in the Black Sea Basin are sufficient to achieve the common pollutant reduction goals identified in step(a) above; and
c. Proposal of recommendations for implrovements or amendments to the implementation plans of the SAPs undertaken in the Black Sea Basin to facilitate achievements of the common pollutant reduction goals.

5. Definition of the Working Group and its Reporting Obligations

This 'Joint Technical Working Group' will be constituted upon agreement of both the Black Sea and River Danube Protection Commissions. The opinions expressed in the Group activities are informal and will serve to provide guidance for later decision-making at the level of Heads of Delegations in a proposed Black Sea - River Danube Joint Meeting. The results of the Working Group activities will be taken into consideration in developing the River Danube Pollution Reduction Programme. Every representative in the Working Group has one position in regard to the issues being addressed (i.e., States that participate in both the Danube River and the Black Sea Commissions can only have one position). The findings of the Working Group are not for public release, and upon completion of its work, the Working Group is to report its findings to the Black Sea and River Danube Protection Commissions, and the Sponsoring donors.

6. Composition of the Working Group

The composition of the ten-person Working Group is as follows:

- For all the Danube States - comprising the chairman of the MLIM (Monitoring, Laboratory and Information Management), the chairman of the EMIS (Emission) Expert Groups, and representative of the Interim Secretariat (to be supplanted by the Permanent Secretariat) with expertise in technical and scientific issues;
- For the downstream Danube States - comprising representatives from Bulgaria, Romania and Ukraine (who are also contracting parties to the Black Sea Convention), to be selected on the basis of their technical and scientific merits by the national heads of delegations of the two Commissions;
- For all the other Black Sea States - comprising three representatives with technical and scientific expertise, to be selected by the respective Black Sea Commissioners;
- The representative of UNEP will serve as Chairman of this Technical Working Group.

The Working Group may consult other groups and individuals as it deems necessary to carry out its tasks.

7. Time Frame of the Working Group

- The Group will begin its work immediately after its recognition by both Commissions, to take place as soon as possible, and no later than 30 January 1998;
- To facilitate completion of its work in time for the proposed joint Black Sea - River Danube Meeting at the level of Heads of Delegations, the Group will meet at least every three months;
- In order to ensure sufficient lead time for discussions in the administrative systems of all involved parties, the Technical Working Group must finalize its work no later than the end of October 1998;
- The finding of the Working Group will provide background material and guidance for the proposed Black Sea - River Danube Meeting at the level of Head of Delegations, anticipated for January/February 1999;
- The Working Group will organize its work in such a manner as to also produce technical inputs for the preparation of new GEF projects for the region, for submission to the November 1998 meeting of the GEF Council.

GEF Black Sea Environmental Programme	List of participants	Environmental Programme for the Danube River Basin

First joint consultation, Danube River Basin Programme Task Force/Black Sea Environmental Programme Steering Committee, Constanta, Romania, 8-9 December 1997

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Annex V

The Composition of the 'Group' in Its Three Meetings

The TOR specifies in its para (6) the composition of the 'Group'. Based on this para (6) and additional participation in the three Meetings, the following representatives and additional participants took part in these Meetings:

1st Meeting, Baden/Austria, March 26, 1998

Representatives.

Chairman: Dr. W. Rast, UNEP; MLIM Expert Group: Mr. L. N. Popescu; EMIS Expert Group: Mr. B. Mehlhorn; ICPDR Secretariat: Dr. H. Fleckseder; Bulgaria: Dr. B. Boyanovsky; Georgia: Not present; Romania: Dr. A. Cociasu; Russian Federation: Mrs. L. Stepanova; Turkey: Dr. S. Beşiktepe; Ukraine: Dr. O. Tarasova.

Additional participants.

Dr. A. Hudson, UNDP/GEF; Dr. L. Mee, Programme Manager, Black Sea Env. Programme; Dr. R. Mihnea, Black Sea Env. Programme; Mr. J. Bendow, Manager, UNDP/GEF River Danube Pollution Reduction Programme; Mr. A. Garner, UNDP/GEF River Danube Pollution Reduction Programme.

2nd Meeting, Istanbul/Turkey, August 31st / September 1st, 1998

Representatives.

Chairman: Dr. W. Rast, UNEP; MLIM Expert Group: Mr. L. N. Popescu; EMIS Expert Group: Mr. B. Mehlhorn; ICPDR Secretariat: Dr. H. Fleckseder; Bulgaria: Dr. B. Boyanovsky; Georgia: Not present; Romania: Dr. A. Cociasu; Russian Federation: Mrs. L. Stepanova; Turkey: Dr. Ö. Baştürk; Ukraine: Dr. O. Tarasova.

Additional participants.

Dr. A. Hudson, UNDP/GEF; Dr. R. Mihnea, Manager, Black Sea Env. Programme; Mr. J. Bendow, Manager, UNDP/GEF River Danube Pollution Reduction Programme; Dr. L. Mee, consultant to UNDP/GEF.

3rd Meeting, Baden/Austria, December 10 / 11, 1998

Representatives.

Chairman: Dr. A. Hudson, UNDP/GEF; MLIM Expert Group: Mr. L. N. Popescu; EMIS Expert Group: Mr. F. Überwimmer (as substitute for Mr. Mehlhorn); ICPDR Secretariat: Dr. H. Fleckseder; Bulgaria: Dr. B. Boyanovsky; Georgia: Not present; Romania: Dr. A. Cociasu; Russian Federation: Mrs. L. Stepanova; Turkey: Dr. Ö. Baştürk; Ukraine: Dr. O. Tarasova.

Additional participants.

Dr. A. Hudson, UNDP/GEF; Dr. R. Mihnea, Programme Manager, Black Sea Env. Programme; Mr. J. Bendow, Manager, UNDP/GEF River Danube Pollution Reduction Programme; Dr. L. Mee, consultant to UNDP/GEF; Mr. T. Botterweg, Manager for Phare and Team Leader, Danube PCU; Dr. I. Natchkov, Manager for Phare in the Danube PCU.

All the National Studies hold the same title, i.e. 'Report on the Ecological Indicators of Pollution in the Black Sea'. All these reports have been undertaken in the frame of the Danube River Pollution Reduction Programme and the Black Sea Environmental Programme, and the have been financially assisted by UNDP/GEF.

Bulgarian National Study.

The report holds a total of 104 pages containing print.

The report has been compiled and the work has been coordinated by Dr. B. Boyanovsky, Prof., Faculty of Biology, Sofia University.

The study team consisted of B. Boyanovsky, G. Hiebaum, A. Konsulov; M. Mollov and V. Vassiliev, with contributions by K. Dencheva, L. Kamburska, Tz. Konsulova, V. Kujumdjiev and S. Moncheva.

Romanian National Study.

The report holds a total of 59 pages containing print.

The report has been compiled and the work has been coordinated by Dr. A. Cociasu, Researcher at the Romanian Marine Research Institute, Constanta.

The study team consisted of colleagues of A. Cociasu from the Romanian Marine Research Institute and has not been expressly mentioned in this report.

National Study, Russian Federation.

The report holds a total of 30 pages containing print.

The report has been compiled and the work has been coordinated by Dr. A. A. Shekhvotsov, Director General of the State Center for Environmental Programmes. He had been appointedto this position by the State Committee on Environmental Protection.

The members of the study team have not been expressly mentioned in the report.

Turkish National Study.

The report holds a total of 112 pages containing print.

The report has been compiled and the work has been coordinated by the team of Turkish Scientists from the Middle East Technical University (METU), Institute for Marine Sciences, at Erdemli.

The study team consisted of Ö. Baştürk, S. Tuğrul, A. Yilmaz, A. E. Kideyş and Z. Uysal..

Ukrainian National Study.

The report holds a total of 49 pages containing print.

The report has been compiled and coordinated by the Institute of Biology of the Southern Seas, Odessa Branch.

The study team consisted of B.G. Alexandrov, V.A. Briantsev, G.P. Garkavaya, G.G. Minicheva, D.A. Nesterova, I.G. Orlova, L.O. Sebakh, O.G. Tarasova and Yu.P. Zaitsev. Most of these scientists work at the Institute of Biology of the Southern Seas, Odessa Branch.

Annex VI

The Final Minutes of the 1st Meeting of the “Group”, March 26, 1998, Baden/NÖ, Austria

1st Meeting of the *Ad hoc* Joint Technical Working Group established between the International Commission for the Protection of the Black Sea (Bucharest Convention) and
the International Commission for the Protection of the Danube River (Sofia Convention), which took place at Baden/Lower Austria, March 26, 1998

1. The participants present encompassed (without titles and written as close as possible to the spelling in English) the members of the *Ad-hoc* Group, Mr. W. Rast (UNEP; Chairman), Mr. S. Beshiktepe (Turkey), Mr. B. Boyanovsky (Bulgaria), Mrs. A. Cociasu (Romania), Mr. H. Fleckseder (Interim Secretariat, ICPDR), Mr. B. Mehlhorn (EMIS Expert Group, ICPDR), Mr. L. Popescu (MLIM Expert Group, ICPDR), Mrs. L. Stepanova (Russian Federation) and Mrs. O. Tarasova (Ukraine). Georgia was not represented. In addition to the members of the *Ad hoc* - Group, Mr. J. Bendow (GEF Representative in the Danube PCU), Mr. A. Garner (GEF Technical Adviser in the Danube PCU), Mr. L. Mee (Team Leader, Black Sea PCU) and Mr. R. Mihnea (Black Sea PCU) also participated in the Meeting. A handwritten list of participants was circulated in the Baden Meeting. For this very reason, these draft minutes do not contain a list of participants.

2. The Terms of Reference discussed December 8/9, 1997, at Mamaia, which form the base for the work of this *Ad-hoc* Group (later only called '*Group*'), were handed out again; they are attached. The Agenda to agree upon was to follow these TOR and to screen what actual work has to be undertaken. At the end of the Meeting at Baden, additional two meetings were scheduled (August 17/18 at Istanbul; October 2/3, place to be decided), and it was understood that in order to arrive at a draft report by early December 1998, at least one additional meeting by mid-November 1998 will be required.

   The Chairman highlighted the objective of the work of the *Group* by repeating it and making it understood by every participant. It reads:

   To create a common base of understanding and agreement on the changes over time of the Black Sea ecosystem and the reasons for these changes, and to propose practical goals and objectives for remedial actions to address them.

   The Chairman also stated that the individuals participating in this *Group* are scientific and technical experts and that the primary goal of their work is to fulfil the aims of the TOR as good as possible.

3. Discussion to the Agenda:

   One main issue initiated by Mrs. Tarasova, Mr. Bendow and Mr. Fleckseder was whether the Sea of Asov and its catchment area is / are part of the 'system' to be considered in this work or whether not. The *Group* was aware of the fact that the 'Convention for the Protection of the Black Sea against Pollution' is a shoreline convention, whereas the 'Convention on Co-operation for the Protection and Sustainable Use of the Danube River' is structured by the catchment area of River Danube. Both Programmes, the 'Black Sea Environmental Programme' as well as the 'Environmental Programme for the Protection of the Danube River' are - at least from their conceptual point of view - related to the hydrographic catchments. Based on the 'catchment approach' common with UNEP work, the *Group* concluded that the Sea of Asov and its catchment area are within the system to be studied.

   Additional comments by Mr. Mee to the Agenda were as follows:

- There is an exciting point in time - both Conventions will be implemented at the latest starting by the end of 1998. The DRPC will then have entered into force, the ICPBS will hold its Secretariat.

- Thus, the political reality is speeding up. The two International Commissions charged to fulfil the respective Conventions should not fail to talk to one another.
- In order to support the contact between these two International Commissions, GEF would like to entertain a new implementation phase on nutrient reduction (for nutrient reduction, an incremental cost funding could take place). For this very reason, concrete proposals of this study should go into the next meeting of the GEF Council in January 1999. The remark by Mr. Duda, Leader of the GEF Secretariat on International Waters to both Mr. Mee and Mr. Mihnea was that if the report is not ready by January 1999, the GEF money will go to other projects, and not to the Black Sea and River Danube
- Mr. Mee also reported that at present, the GEF Secretariat would like to bring around 30 - 35 Mio. US$ each for incremental cost funding to both sides, the Danube and the Black Sea side. This money should go preferably into projects in agriculture and for wastewater treatment. In addition, some of the bilaterally available money will be used to do some international GEF work in both the Danube and the Black Sea.
- The World Bank will also make ~ 500 Mio US$ available as bank loans for ~ 10 projects in the Black Sea countries over the next 3 years, and something similar may happen in the Danube countries too.

  Mr. Bendow reported about the GEF RDPRP (River Danube Pollution Reduction Programme) and the fact that this was started finally be end-of-November 1997 with the Inception Workshop at Krems, and that this holds a duration of at least 18 months. From his point of view and as contained in the report of the Krems November 1997 Inception Workshop, the work output of this *Group* is part of the GEF RDPRP, and this work output must fit into the time frame of the GEF RDPRP. For this very reason, the deadline reported by Mr. Mee to be January 1999 is from his point of view ***not*** binding, since the RDPRP can only be finalised in mid-1999. However, single projects coming out of the national planning processes can be taken into account. Within the GEF RDPRP, the 'Danube Water Quality Model (DWQM)' is under development. This model is also relating to the work of the *Group*, providing information to support the analysis.

  The position of the *Group's* Chairman was that in order not to endanger any GEF support, the time frame reported on by Mr. Mee (that the report of this *Group* should be ready for the next meeting of the GEF Council in January 1999) should be followed.

  In retrospect, however, it has to be noted that the output of the *Group* is not only to serve the GEF Council (this is only slightly contained in its TOR, see the last part of para (5)), but the more essential reporting by the *Group* contained in the TOR is to both International Commissions for their decision making at their respective political levels - be it domestic or also in the Commissions' Meetings.

4. The discussion then centred around the assessment of nutrients reaching the Black Sea from all sources and also from the Danube, and the impact of these inputs on the Black Sea ecosystem(s), including also the Black Sea shelf.

   In order to make existing published information available, Mr. Fleckseder distributed copies of the two papers 'Long-Term Ecological Changes in Romanian Coastal Waters of the Black Sea' (A.Cociasu, L.Dorogan, Ch.Humborg and L.Popa, 1996) and 'Effect of Danube River Dam on Black Sea Biogeochemistry and Ecosystem Structure' (Ch.Humborg, V.Ittekkott, A.Cociasu and B.v.Bodungen, 1997), and the PhD-Thesis by Ch.Humborg ('Untersuchungen zum Verbleib der Nährstofffrachten der Donau'. *Ber.Inst.Meereskunde, Kiel,* **264**, 1995). The Black Sea PCU made a pre-publication paper available entitled 'Land-based Sources of Contaminants to the Black Sea' (authors: G.Topping, L.Mee and H.Sarikaya).

Mr. Mee presented the contents of the last paper mentioned, of which he is co-author and which is of importance for the work of the *Group*. The authors based their estimate on the data available as of end-of-1997, and where when has to take into account that a common system of quality assurance is not yet in overall use. Further, the inputs of totN and totP (TN and TP as used in the enclosed figure) were structured as follows: All 'shoreline' countries of the Black Sea (Bulgaria; Romania; Ukraine; Russian Federation; Georgia; Turkey), which are also Contracting Parties to the 'Convention for the Protection of the Black Sea', plus another column indicated as 'other countries'. The allocation is according to 'countries' (i.e. national entities), and not according to catchment areas or direct inputs. The biggest share for 'other countries' is for all the non-Black-Sea-shore-riparians of the Danube, and only a minor share can be allocated to Bjelorussia.

The values presented assume for the Danube the following: Based on work undertaken in the 'Applied Research Programme (ARP) of the Environmental Programme for the Danube River Basin (EPDRB), the Project EU/AR/102A/91 ('Nutrient Balances for Danube Countries') contains on p. 54 a comparison between the output of the regional materials budgeting principle underlying this report, and the data obtained as an input into the Black Sea from the Project EU/AR/203/91 (and in which Delft Hydraulics participated). From p. 54 of Project EU/AR/102A/91, the following has to be quoted in this context: '*On the basis of data available, the TN and TP loads reaching the Black Sea can be estimated as 447 and 46 kt/a in 1988/89, and 345 and 25 kt/a in 1992 (Delft Hydraulics, 1997). These immission based loads are about 45 and 35% of the TN and TP emissions estimates (Section 3.1) clearly demonstrating the significant role of "self-purification", retention and losses in the river system (settling, denitrification, ...).*' The passage quoted, however, seems not to have been intended for quantifying purposes, but only for indicative ones.

The percentages mentioned 'compare' in fact the average input of totN and totP into the internal drainage network of the hydrographic catchment of River Danube due to the amount of work undertaken (i.e. **not** in the **overall** Danube catchment) on the one hand with the immission loads assessed by simple means according to the principles of sampling and analysing in the respective years (1998/89 and 1992) on the other hand. This also means that all the 'noise' (errors etc.) contained on both sides of the methods enter such comparison.

Mr. Mee indicated that the authors of the study cited ('Land-based sources of contaminants to the Black Sea') had, based on their interpretation of the Report of Project EU/AR/102A/91 that 42% of the inputs of tot N and 24% of the inputs of totP into the 'internal Danube water web' reach the Black Sea. (The preceding estimates (in Arial Narrow) show that the value for totP seems to be 'correct', whereas the value for totN seems to be only ~ 35%). With the values in this study, the authors further assumed that the same 'reduction' is applicable to the national indirect inputs by Bulgaria, Romania and Ukraine to the a 'total sum' can be arrived at for these three countries, and that the remainder of the immission load reaching the Black Sea has to be attributed to the more upstream Danube countries, see the enclosed figure (and in a similar way also for the

N.B. Going beyond the mere reporting of this meeting at Baden, it has to be indicated that the work input to Project EU/AR/102A/91 was not possible for Bosnia-Hercegovina, Croa-tia and the Federal Republic of Yugo-slavia for funding reasons. This also means that it was impossible to in-clude the emissions of ~ 14.8 Mio. people (~18% of the overall population) and ~ 163.000 km2 (~ 21% of the drainage area). If one assumes that these are 'on aver-age' of the same size as with all the other Danubian Riparians, the loads of totN and totP were in 198/89 ~1.240 kt/a and ~ 161 kt/a, and in 1992 ~ 1.030 kt/a and ~ 133 kt/a. When these estimates for 'overall emis-sions into the internal drainage web of River Danube' are compared with the previously cited immission loads, these 'on aver-age' can only explain in 1988/89 ~ 36% of the totN and ~ 29% of totP, and in 1992 ~ 34% of totN and 19% of totP.

Dnjepr catchment area, reflecting the situation of Bjelorussia). The validity of this approach will have to be discussed in the next meeting of the *Group*.

An additional presentation on nutrient inputs and also the 'status in nutrients' in the Romanian shelf of the Black Sea was given by Mrs. Cociasu. She highlighted that for daily samples taken at Sulina 5km upstream from entering of the Sulina branch into the the Black Sea, silica and PO4-P are analysed since 1980 and Σinorganic N species since 1988, and that modern analytical methods (see the paper handed out, of which Mrs. Cociasu is the 1st author) are in use. She showed graphs which - when these Sulina data are extrapolated for the overall Danube - indicate a steady decline over time, e.g. for Σinorganic N species from ~ 1.000 kt/a in 1988 to ~ 400 kt/a in 1996. She also indicated that the flow in River Danube in front of the three branches also declined in the same period. Some historical data exist, but they are limited, their reliability is unknown and thus their interpretation as yearly immission loads should not be undertaken. The data Mrs. Cociasu showed for the Romanian shelf indicate that since 1992/93 a slight improvement in the occurrence of algal blooms has taken place, and a phosphorus limitation in the Romanian shelf exists.

Mr. Beshiktepe, an expert on the link between satellite imagery and the overall monitoring of the situation of the Black Sea, presented 1997 images from algal blooms in the Black Sea. The unfortunate situation is that (1) the Sea of Azov is holding a 'more or less permanent' algal bloom of 50 mg/l or more during the warmer season (spring till fall), whereas (2) the Black Sea is having such high concentrations at higher frequency in areas of the Black Sea shelf area, stretching from the Romanian to the Bulgarian part. There are, however, also some algal blooms in limited areas at lower concentrations along the Turkish coast.

The discussion centred around the following issues: (a) The atmospheric input of totN into the Black Sea; the estimate given was 1/3 of the land-based discharges. (b) The question of the importance of silica: Mrs. Cociasu and Mr. Mihnea, supported by Mr. Boyanovsky, mentioned that from their point of view the idea expressed by Mr. Humborg is correct and that silica seems to play a role in the shift of organisms which are blooming, whereas Mr. Mee was of the opinion that the impact of the relative change of silica is of lesser importance. (c) Any other polluting input from land-based sources of importance into the Black Sea; here the main issue mentioned was mineral oil via River Danube. (d) It was agreed that existing information, assembled by the Turkish Black Sea Center at Middle East Technical University, Institute of Marine Sciences, at Erdemli/IGEL, Turkey via Nato funded Workshops and undertakings, will be made available as soon as this is in a form to be agreed on by the authors to be published.

5. The assembling and assessing of the available information on the likely response of the Black Sea ecosystem to specified reductions in nutrient loads was only indirectly accessible by reasoning. Mr. Mee remarked that the response of ecosystems to stresses and their recovery is never a linear relationship. Ecosystems can have over a long period in time only minor changes, due to their resilience, but as soon as a certain level of stress is surpassed over a too long period, they collapse. In addition, and because of the shifts in time, the likelihood that ecosystems reach the starting level is quite slim. The Black Sea seems to have been in good shape still in the late 1960s and early 1970s. Starting from then, the conditions in the shelf declined and got worst between 1990 and 1992. As already mentioned, since then a slight improvement (decrease in the frequency and intensity of algal blooms; improvement in oxic conditions, in order to name a few) has taken place. The decrease of the input of N and P as reported by Mrs. Cociasu has been comparatively bigger. Thus the only way to meaningfully advance in formulating a policy for the protection of the Black Sea will be the need to reformulate it in intervals. It will be possible to come up with a suggestion for the 1st period in sight, but the quantification in absolute terms (load reduction values) is not very safe.

The discussion afterwards centred (1) around the fulfilment of the requirement of load reductions in absolute terms and (2) around the P - limitation. The Bulgarian and Romanian participants were of the view that a further reduction of the input of - especially dissolved, but also easily bound total - P into the Black Sea is beyond doubt of benefit for the frequency and intensity of algal blooms, whereas Mr. Mee held up his position that due to internal cycling of P, a reduction of totN is equally needed. Mr. Fleckseder indicated, in order to bridge to the issue of 'strategies', that a reduction of P is on the time scale more easily obtainable, whereas due to the large pools of N in groundwater aquifers, it will take decades until a longer-lasting reduction will be achieved; this, however, does not mean that in regard to nitrogen no strategies should be developed.

6. In regard to strategies, the *Group* took note of the information received that by the summer of 1998, 6 NAPs for Black Sea countries should be available, and that within the GEF RDPRP, National Reviews are in progress and will also by available by summer of 1998. Based on these and some other work, it should be possible to come up with proposals for strategies.

7. Allocation of work to be accomplished until the next meeting of the *Group*, see para (2):

   Mr. Bendow focused the attention and discussion to the point that the main objective is not necessarily to reduce the nutrients discharged to the Black Sea, but to reestablish the resilience of the ecosystems of the Black Sea. In order to arrive there, he raised the question of suitable indicators to observe the development of ecosystems over time, to record such changes, and also to analyse possibilities to safeguard or reestablish the resilience of the ecosystems. Surprisingly, there were no precise indicators available to demonstrate the change over time of ecosystems in various parts of the Black Sea. The following discussion centered around the identification of suitable parameters available as data, in order to arrive at a clear link between the input of nutrients (or other pollution) and the change over time of Black Sea ecosystems. The 'state of the Black Sea ecosystem over time' (e.g. 1960 - 1985/90 - 1997/98) was to be examined considering the following: ❶ the secchi-depth; ❷ chlorophyll-a (phytoplankton biomass); ❸ N/P/Si (total / available); ❹ macroalgae (phyllophera) - areal extent; ❺ oxygen concentration at shelf (spatial and temporal extent); ❻ phytoplankton (# of species, density); ❼ zooplankton (biomass, composition); ❽ micro-zoobenthos (biomass, composition); and finally ❾ 'Other pollutants'.

   The participants from the Black Sea countries agreed on this proposal; however, they requested additional financial support (10.000 US$ per country) to elaborate on the ecological indicators. Mr. Bendow agreed to provide for financial support, but he requested precise ToRs (including the indicating of available information, and the data and expertise necessary to elaborate an assessment in change of the Black Sea ecosystems). The participants from the Black Sea countries have been asked to submit their respective proposals as soon as possible to the Black Sea PCU's Coordinator, in order to liease with the Danube GEF Programme.

   In the discussion, Mr. Beshiktepe held up the view that with the Nato funded work, most of the information available has been put together, and that one has thus for the type of work the *Group* has to deal with only wait until the reports of the Nato Workshops are agreed upon by scientific panels and by the authors. This should be the case by late June or early July at the latest, and that from this point of view the next meeting of the *Group* should take place in mid-August 1998.

Pollution Input into the Black Sea: There is work available by the Black Sea PCU; it will - for review by the members of the *Group* - be made available either by the BSPCU or Mr. Mee by early May 1998.

The members of the *Group* are asked to critically screen the material to both points (pollution input as well as the ecological state of the Black Sea) mentioned; they were told to receive this material before the next meeting (August 17/18, 1998, at Istanbul), for futher discussion in this upcoming meeting.

These draft Minutes have been conceived by H.Fleckseder, IS/ICPDR. The delay in time relative to the Meeting is due to a having been moved from one part in VIC to another, to the Easter Week, as well as to other obligations of the rapporteur, and the fact that this was 'counter-read' by others.

Initially the draft had been finalised at Vienna on May 11, 1998

The final status has been indicated at Vienna on September 3, 1998

Annex VII

The Draft Minutes of the 3rd Meeting of the ‘Group’, December 10/11, 1998, Baden/NÖ, Austria

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Draft Minutes of the 3rd Meeting, Joint Ad-hoc Technical Working Group, established between the ICPBS and the ICPDR.

Meeting dates: December 10 / 11, 1998.
Meeting venue: Schloßhotel Weikersdorf, Baden, Lower Austria

The participants in this 3rd meeting were the **representatives to the Group** and **additional participants**.

The **representatives to the Group** (or as their substitute in this meeting) were

Mr. A. Hudson (AH; UNDP-GEF, as Chairman, replacing the former Chairman, W. Rast, UNEP);
Mr. B. Boyanovsky (BB; BG);
Mrs. A. Cociasu (AC; RO);
Mrs. L. Stepanova (LS; RUS Fed.);
Mr. Ö. Baştürk (ÖB; TR);
Mrs. O. Tarasova (OT; UA);
Mr. F. Überwimmer (FÜ; substituting B. Mehlhorn, EMIS EG of ICPDR);
Mr. L.N. Popescu (LNP; MLIM EG of ICPDR; only participating December 11);
Mr. H. Fleckseder (HF; Permanent Secretariat, ICPDR).

Additional participants encompassed:

Mr. J. Bendow (JB; Project Manager, GEF River Danube Pollution Reduction Programme);
Mr. R. Mihnea (RM; Programme Manager, Black Sea PCU);
Mr. L. Mee (LM; former Manager of the Black Sea PCU and consultant to UNDP/GEF; December 10 and December 11 till ~ 1 1/2 hours before the end of the meeting);
Mr. T. Botterweg (TB; Programme Coordinator, Danube PCU) and I. Natchkov (IN; Phare / Tacis Programme Manager, Danube PCU), both only on December 11, 1998.

1. The opening of the Meeting and the introduction to the 'Draft Summary Report' by L. Mee.

Mr. A. Hudson opened the Meeting on December 10, 1999, at 9h30. He welcomed the participants present. He hinted at - as no agenda had been prepared by the Chairman of the two preceding meetings - that the 'Group' should screen the reports which had (with the exception of Ukraine) been presented already at Istanbul and which are now finalised. The Group should also go through the draft summary report by LM (which was stated to be based on the contributions from the Black Sea shoreline riparian States). It should also discuss and come to an agreement as far as possible relating to measures to be taken to limit the discharges into the Black Sea, as agreed upon in the preceding 2nd meeting at Istanbul.

The draft minutes of the Istanbul Meeting, agreed upon there to be available at the end of the 1st full week in October 1998, were not available. The draft summary report by LM was neither available before this 3rd Meeting, but printed out in this Meeting at Baden. Already during the print-out and the following copying, LM informed the 'Group' about the contents of this draft summary report, which he had entitled "Eutrophication in the Black Sea: Establishing the causes and effects." This initial draft summary report is annexed to these draft minutes (Annex 1). LM told the 'Group' also that the 'Black Sea side' will 'have to produce something productive for the net GEF Meeting in May if GEF funding for investment should be further available'.

As this draft summary report is late and as it merits careful reading, it is understood that no decision on its contents can be taken in this Meeting. However, in order to fulfil his commitments, LM stated to be in need of amendments, in written at the latest in front of Christmas 1998, such that he can finalise this draft summary report by the end of the year 1998.

LM communicated also the following report to the Danube PCU: 'An input-output study on nutrient loads in the Danube River Basin'. 68 p. plus ~ 30 pages Annex. This report has been written by V.J.P. van't Riet, and supervised by drs P.H.L. Bujis (from 'International Center for Water Studies B.V.') and ir R.H. Aalderink (Landbouwuniversiteit Wageningen, Department of Env. Sciences, Aquatic Ecology and Water Quality Management Group).

The main remarks by LM to the contents of the draft summary report were:

- In going through the national contributions, the main question arriving was: Are the data made available really reliable? Where are the sampling stations located, and for which time span are monitored data available?
- If one group of researchers stuck to specific methods over a specified time period, it seems meaningful to assume that this data set can be compared in itself (but not automatically with data monitored by other researchers).
- The methodological problems seem to be bigger with biological data than with chemical data.
- The load assessment (and the 'comparing' of reported loads and where the way in which these loads were assessed is not known) must be an issue of specific concern. Loads for soluble parameters can be assessed with much less sampling effort than loads of parameters, which are transported, sediment-bound.

LM repeated how the eutrophication problem of the Black Sea evolved over time:

- The phytoplankton outcompeted the macrophytes, due to its ability to grow.
- With an increase in nutrients available - and which is documented by measurements in the Sea only in later phases, when the eutrophication process was already relatively advanced - the growth and decay was such that (over time) not only the macrophytes were outcompeted, but also they died off to a large extent. Conditions with low oxygen concentrations (or even free of oxygen) evolved also ('hypoxia').
- This led to an ecological status where there was very low biological diversity with both phytoplankton and zooplankton, and based on this also with very low diversity of fishlife.
- In the 1980s, alien "jellyfish" intruded, found very good growth conditions, and no species utilising them.
- The good news is that benthic algal beds (*cystoseira barbata*) are still present along the coast of the Russian Federation, in other places in patches. Small patches of *phyllophera*-fields also exist. If the conditions improve, these patches can be the stock from which conditions similar to the pre-1960 conditions can develop over time.

- There is a recovery in fisheries (e.g. anchovis).

  (In the discussion to this, the colleagues from the Black Sea shoreline states indicated that due to the zooplankton, the sprats and the anchovis, bonitos have intruded this year from the Sea of Marmara into the Black Sea. The survival of bonitos in the Black Sea will also depend on the respecting of their reproductive cycles).
- The big 'eutrophication problem' of the Black Sea is, according to LM, the dominance in the food chain of gelatinous organisms ("jellyfish"). These jellyfish - originally alien to the Black Sea- are a 'dead end' in the foodchain, i.e. they cannot serve as food for higher carnivores leading to diversity in fishlife. There is the only hope that with a further decline in phytoplankton growth, the predominance of jellyfish will fade out.
- Presently, the Black Sea is on the way of improving, but it has not yet reached the situation of the 1960s.
- According to LM, the main problem and the driving force for the planktonic growth is the extreme surplus of nitrate. This, however, is in contradiction with the P-limitation in the shelf area, to be discussed later.
- Decisions taken in the last Meeting (i.e. the 2nd meeting of the Group at Istanbul, and where no draft minutes of this meeting were made available) are in the opinion of LM meaningful.
- LM stressed in the discussion to the report the use of ‘inexpensive means’ of removing nutrients from wastewater, and BB supported him. For both these colleagues, the technology describing the term 'inexpensive' is constructed wetlands. HF contributed in the discussion to this point that the actual and long-lasting removal of nutrients via constructed wetlands can primarily only be due to the harvesting of plants; if this is not done properly, the treatment will ultimately fail. HF cited a study undertaken at the relatively large and shallow ‘Lake Neusiedl’. This study revealed that the harvesting of reed, such that the rhizoma are not destroyed and that the harvest is actually taken away at the end of the growth period, is such expensive that the application of this method was there discarded. RM reported about similar experience gained in the Romanian Delta of River Danube, and OT claimed the same to have been arrived at in Ukraine. HF concluded that such 'inexpensive technology' must have its limits in plant size.

2. Discussion to the ‘Draft Summary Report’

Asking for proposed amendments:

As the ‘Draft Summary Report’ written by LM was not known before, no full discussion was possible in this Meeting. The agreement to respond to this draft not later than around Christmas 1998 has already been highlighted.

Remarks to individual aspects of the draft summary report:

There was some time to go through the report in reading, and afterwards, some amendments were proposed. LM took note of them. One important aspect is with the nutrient data from Romania: They are given in phosphates and silicates, but their actual dimension (not shown in the tables) is phosphate-P and silicate-Si, and nitrogen is correctly shown as the 'nitrogen species' or 'sum of inorganic nitrogen'.

Such proposed changes related to the text of the draft report, to the summarising table, but also to the tables and figures annexed.

Under debate: The limiting 'chemical species' for phytoplankton growth:

HF distributed a paper called ‘Sweden’s nitrogen debate’ (Water Quality International (WQI), September / October 1998, the ‘popular’ news media by IAWQ) (Annex 2). In this paper, reference is made to an ongoing debate in Sweden whether nitrogen is actually limiting for the eutrophication process in the Baltic – as claimed for long – or whether at a systems level, this is actually falling to phosphorus. In this debate in Sweden, the final conclusion is not yet reached. The interesting point, however, is that nitrogen fixers (i.e. blue-green algae) are occurring in certain parts of the Baltic, thus indicating that not nitrogen, but phosphorus is limiting.

The question by HF to the representatives of the shoreline States in the Joint Ad-hoc Group was whether such blue-green algae occur, and there was a positive reply. The quantification of this positive reply was split: LM claimed that these covered not more than 2% of the phytoplankton occurring, whereas others felt that this value is higher.

AC indicated again - as she had done in both preceding Meetings of the 'Group' - that the phytoplankton growth in the Romanian shelf is limited by phosphorus. ÖB agreed also that the data obtained in the cruise of R/V Bilim in March and April 1995 allow the same statement for the northwestern shelf area. This is the area in the Black Sea with the most intensive phytoplankton growth, with the biggest spread. The currents then transport the phytoplankton into the direction of the Bosporus.

HF indicated – as he had already done in the previous Meetings of the ‘Group’ – that in regard to actually achieving load reductions within a short span of time, reducing phosphates and phosphorus is potentially much more easy and less costly than a quick 'curbing' of nitrogen. HF therefore suggested discussing how the limitation of phosphorus can be achieved by legal and technical means. The 'curbing' of nitrogen should be also undertaken from the beginning where possible (e.g. by forbidding liquid discharges from large animal raising units, and thus curbing the discharge of both nitrogen and phosphorus). With urban wastewater, the removal of nitrogen is much more costly than the removal of phosphorus. In the Danube Basin, a large fraction of nitrogen is from diffuse sources. From the point of view of HF, the 'curbing' of nitrogen has primarily to be discussed at a strategic level, and maybe even not only at the scale of the hydrographic catchment area of the Black Sea, but on a worldwide scale. LM responded that seas are nitrogen limited, and that therefore - in line with the 'Redfield ratio of 7 to 1 (for N to P) - nitrogen has also to be strongly limited from the start.

The view within the representatives to the ‘Group’ was that the limiting of phosphorus must have an impact, and that therefore some of the stress of the GEF incremental cost funding should be with the curbing of phosphorus. This was i.a. stated by ÖB.

What load of nutrients in River Danube could be a ‘basis’ for a comparison?

Reference is made in the Romanian national report, in which data by ALMAZOV are cited for the years 1959 and 1960. The full-length paper by ALMAZOV was not available; OT stated that this paper is written in Russian, and that she would send a copy to LM. The aim of this sending is to gain better knowledge about how ALMAZOV arrived at the loads he presented. HF indicated again that aside from the question of how many data sets were used by ALMAZOV care should be given to the fact that the yearly loads vary also from hydrologic year to hydrologic year. An 'average load estimate' should be based on at least data from 5 years.

3. Where would the representatives of the States participating put GEF funding for incremental cost?

Possible 'fields of action' for improving the ecological status of the Black Sea options highlighted were:

- The A reform of agricultural practices (influenced by the legal frame and the type of policy)
- Use of wastewater treatment (including alternative methods)
- Rehabilitation of key basin ecosystems
- Changing of consumer practices (including the use of poly-P-free detergents)
- Definition of the legal frame (including also the use of chemicals and import regulations).

Answers received

Suggestions by BB for Bulgaria:

- Monitoring and control should be strengthened, incl. the import ban on poly-P-containing detergents.
- The nutrients should as much as possible be kept in / on the soil. This also relates to the appropriate use of animal manure, to 'biofarming', to the necessary fighting against soil erosion, to the setting-up of riverine buffer zones and to decrease intensive fish farming. Sludge from WWT (= wastewater treatment) should as much as possible be used agriculturally.
- Wastewater treatment should be used, and for reasons of investment and where possible, this should encompass low-cost removal of N and P. In order to better utilise N and P, municipal and industrial wastewater should be treated in a combined way.
- Measures in the Black Sea should also be considered, i.a. the creation of artificial reefs, including the increased harvest of mussels, and fishing practices in such a way that the carnivorous fish stock can grow.

Suggestions by AC, supported by LNP and RM, for Romania:

- The loads via River Danube have decreased, and the application of fertilisers on agricultural land is now for some time very low. A reform of the Act governing agriculture still has to pass legislature.
- WWTP have to be improved and to be built inland, along the Romanian coast, mainly improvement is necessary, as there is no discharge of untreated wastewater into the Sea. The main question here is in regard to the investment and ho this can be converted into a 'continuous series of payments'. Industry is - where possible - treated in a combined way.
- Romania would like to utilise river-related ecosystems to minimise the nutrient transport.
- Romania is holding a law demanding the use of poly-P-free detergents.

Suggestions by LS for the Russian Federation:

- Agriculture is vital in RUS, but the input of mineral fertiliser has been drastically been reduced. There is only small-scale raising of animals.
- Both with the Sea of Azov as well as the Black Sea untreated or not sufficiently treated wastewater is discharged, and thus the stress must be with wastewater treatment. This relates to both municipalities and industries. Along the coast of the Black Sea, there are also outfalls under the pycnocline, with only mechanically treated wastewater. Around Novorossisk, there is also some oil pollution, due to the handling of oil. Methods of wastewater treatment should be reliable, and the investment should life as long as possible.

- Wetland areas are along the Kuban, and also along the Don. If this works, RUS would like to utilise the potential.
- Detergents are imported, i.a. by Procter and Gamble.

Suggestions by ÖB for Turkey:

- Agriculture is also important in TR, but even more important is the fighting of soil erosion. Farming in the Black Sea catchment of TR is on small lots - e.g. some animal raising, some garden-like agriculture, and also the growing of tea.
- There are only a few large cities along the Turkish Black Sea coast, with the possibility like in RUS to discharge below the pycnocline. The population is otherwise living in very scattered settlements. It is relatively easy to force industry to do something, but its tremendously more difficult to convince municipalities.
- Wetlands play in TR - due to the character of the landscape - a minor role.
- ÖB is not familiar with the legislation in TR covering poly-P in detergents.

Suggestions by OT for Ukraine:

- In agriculture in UA, like in other States, the application of market fertilisers declined, and there is no longer any type of industrialised animal raising. Nevertheless, there should be a further stress with improving nutrient discharge from agriculture, assuming that it will hopefully recover over time.
- There is a huge demand for treatment of untreated or improvement of not adequately treated wastewater, be it from municipalities or industries (e.g. mining, with acid mine drainage and where mines are also no longer in operation; metallurgical enterprises; etc.). The Seas impacted are both the Black Sea proper and the Sea of Azov. River Dnjepr, dammed from upstream from Kiev and with large man-made lakes, is strongly eutrophied.
- There are many wetland areas in Ukraine, and UA would like to utilise the potential.
- OT is not familiar with the legislation in UA covering poly-P in detergents.

During the presentation of these answers, HF highlighted that the EU is running a research programme dealing with the assessment of buffer areas ('European river margins project'). This joint research indicates that a potential for the reduction of nitrogen in groundwater exists primarily in the 'transition zones' from groundwater to river water. He also indicated that this 'denitrification potential' is only having a larger impact if as much river length as possible is utilised in this way.

HF also indicated that certain interests in chemical industry favour the use of poly-P in detergents, by claiming that by precipitation, phosphates will be removed from wastewater anyhow. By proposing this, there is an economic gain involved in both selling poly-P as well as additional precipitants.

The need to establish (or to improve) a "transboundary assessment of indicators of the Black Sea"

To this item, mainly RM contributed.

- A Monitoring Programme for the Black Sea was fixed both in the Convention and the Declaration.
- Control stations have been proposed in 1994, a long list of parameters to be determined exists also. The suggestion is to start with nutrients and with bathing water quality.
- However, no station has been implemented. The stations are foreseen to be erected up to 10 ÷ 15 nautical miles from the shore, located at transboundary positions.

Discussion to this:

OT reported that UA would be undertaking for a period of two years a detection of oil pollution by remote sensing. LNP and ÖB asked both to remind the politicians that the jointly agreed upon monitoring programmes (e.g. the proposed monitoring programme for the Black Sea by the shoreline riparians; TNMN in the Danube Basin) and the 'support structures' (e.g. the Expert Groups under the ICPDR) should be funded, and where things are missing, this should actually be implemented. Otherwise the work developed will collapse. HF asked whether GEF funding is possible for monitoring stations. The reply by AH and LM was that this task is a 'national baseline contribution'.

Legal and Political Issues

TB asked for the function of the existing Conventions and the Commissions charged to implement them. ÖB, JB and HF stressed that any 'true acting' is only at the respective national level, and the function of the Commissions is to have an 'umbrella' via the 'principle of cooperation'. JB hinted at that an outcome could be e.g. ① a 'Memorandum of understanding between both the ICPBS and the ICPDR', and that this memorandum should contain principles, whereas in step ②, the measures to implement these principles should be clarified. OT stressed also the need for harmonisation and cooperation between both Commissions.

LM indicated that he wanted to have a Ministerial Meeting among the Black Sea shoreline riparians. This should i.a. deal with the banning of poly-P in detergents and an agreement on certain areas of land to be utilised for aquatic ecosystems, including a joint implementation principle.

JB suggested: Based on the reports (Minutes of the Meetings; the report drafted by L.Mee, after its revision by the 'Group') a restricted group of persons (e.g. JB; RM; HF; LM) should be charged to come up with a paper of 2 ÷ 3 pages and propose it to the 'Group'. This paper should contain the essential elements to be communicated.

Vienna, February 2nd, 1999 Hellmut Fleckseder

Annex VIII

Draft Memorandum of Understanding

DRAFT

Memorandum of Understanding between

the International Commission for the Protection of the Black Sea (ICPBS) and the International Commission for the Protection of the Danube River (ICPDR) on common Strategic Goals

- The 'International Commission for the Protection of the Black Sea (ICPBS)' holds the power to implement the 'Convention on the Protection of the Black Sea against Pollution'. This Convention is a 'shoreline convention', i.e. it itself holds no power over the inland activities of the States within the hydrographic drainage area discharging to the overall Black Sea (Black Sea proper; Sea of Azov).
- The 'International Commission for the Protection of the Danube River (ICPDR)' holds the power to implement the 'Convention on Cooperation for the Protection and Sustainable Use of the Danube River'. This Convention is a 'hydrographic basin convention', i.e. it itself holds power over the transboundary impact via the drainage network of the River Danube Basin (valid only for Contracting Parties to this Convention).
- This Memorandum of Understanding becomes effective as soon as it has been agreed upon in the respective Meetings of both Commissions mentioned and an exchange of letters has taken place. It looses its effectiveness as soon as one of both the International Commissions mentioned notifies the other.
- This Memorandum of Understanding constitutes by no means a legal document for the joint implementation of issues of importance for the protection of the Black Sea against pollution by its Transboundary Waters in its wider basin.

Representatives of the ICPBS and the ICPDR with the assistance of UNDP/GEF and UNEP set up on December 8 and 9, 1997, a Joint *Ad-hoc* Technical Working Group ('the Group') in a Meeting at Constanta, Romania. The following elements of this Memorandum of Understanding correspond with the results of 'the Group':

- The term 'overall Black Sea' encompasses the Black Sea proper and the Sea of Azov as water bodies receiving inputs via inland waters. Both the Black Sea proper and the Sea of Azov are in regard to their ecology and their response to discharged pollution completely different water bodies.
- The term 'Black Sea ecosystems' refers to ecosystems in both these Seas.
- The term 'wider Black Sea Basin' refers to the basin determined by the hydrographic boundary of all inland waters discharging to the overall Black Sea and the surface area of the overall Black Sea. For the sake of convenience and until decided otherwise between both Commissions the outer border of this basin is looked upon to be the Straight of Bosporus.
- The results of studies on the 'Ecological Indicators of Pollution in the Black Sea', carried out in the frame of the activities of the Joint *Ad-hoc* Working Group, have given evidence of recovery in Black Sea ecosystems. However, the ecological status of the 1960s – which is deemed to be the goal to aim for – is not yet reached.

- There is in general agreement that the status of Black Sea ecosystems is largely affected by nutrients discharged within the wider Black Sea Basin, and to a large extent by the riverine input into the overall Black Sea. Information of a possible role of other sources of pollution and their impact on Black Sea ecosystems was not yet available.
- The size of the pollution loads reaching the overall Black Sea (resolution both in time and in space for the Black Sea proper and the Sea of Azov) are either not known, or information is missing on the comparability of the data available.
- 'The Group' was aware of the decline of the economic activities in the countries in transition, the possible impact of them on the discharge of pollution, and the reversal of such a trend in case of future economic development (concerning in particular agricultural and industrial activities).
- The data available to 'the Group' to undertake its assessment ended at best with values for the year 1997.

In order to saveguard the Black Sea from a further deterioriation of the status of its ecosystems the Contracting Parties to the 'Convention on the Protection of the Black Sea against Pollution' and the Contracting Parties to the 'Convention on Cooperation for the Protection and Sustainable Use of the Danube River' individually and in mutual contact with all States within the wider Black Sea Basin strive to achieve the following strategic goals:

- *The long-term goal for all States in the wider Black Sea Basin is to take measures to reduce the loads of nutrients and hazardous substances discharged to such levels necessary to permit Black Sea ecosystems to recover to conditions similar to those observed in the 1960s.*
- *As an intermediate goal, urgent control measures should be taken by all States in the wider Black Sea Basin in order to avoid that the discharges of nutrients and hazardous substances into the Seas exceed those that existed in 1997. (These 1997 discharges are only incompletely known.)*
- *The inputs of nutrients and hazardous substances into both receiving Seas (Black Sea proper and Sea of Azov) have to be assessed in a comparable way. To this very end a common AQC system and a thorough discussion about the necessary monitoring approach, including the sampling procedures, has to be set up and agreed upon between the ICPBS and the ICPDR.*
- *The ecological status of the Black Sea and the Sea of Azov has to be further assessed, and the comparability of the data basis has to be further increased.*
- *Both the reported input loads as well as the assessed ecological status will have to be reported annually to both the ICPBS and the ICPDR.*
- *The States within the wider Black Sea Basin shall have to adopt strategies that will permit economic development, whilst ensuring appropriate practices and measures to limit the discharge of nutrients and hazardous substances, and to rehabilitate ecosystems which assimilate nutrients.*
- *Based on the annual reports and on the adopted strategies for the limitation of the discharge of nutrients and hazardous substances, a review shall be undertaken in 2007. It will have to focus on the further measures that may be required for meeting the long-term objective.*

This Memorandum of Understanding becomes effective by an exchange of letters between the ICPBS and the ICPDR in which each of them mutually agrees on the contents of this Draft Memorandum of Understanding. As soon as this is reached, a final version (with the omission of the word 'Draft') will be circulated between both the ICPBS and the ICPDR.

ANNEX 12 Evaluation of the UNDP/GEF Pollution Reduction Programme

Annex 12.1 Terminal Evaluation

Annex 12.2 Terminal Report

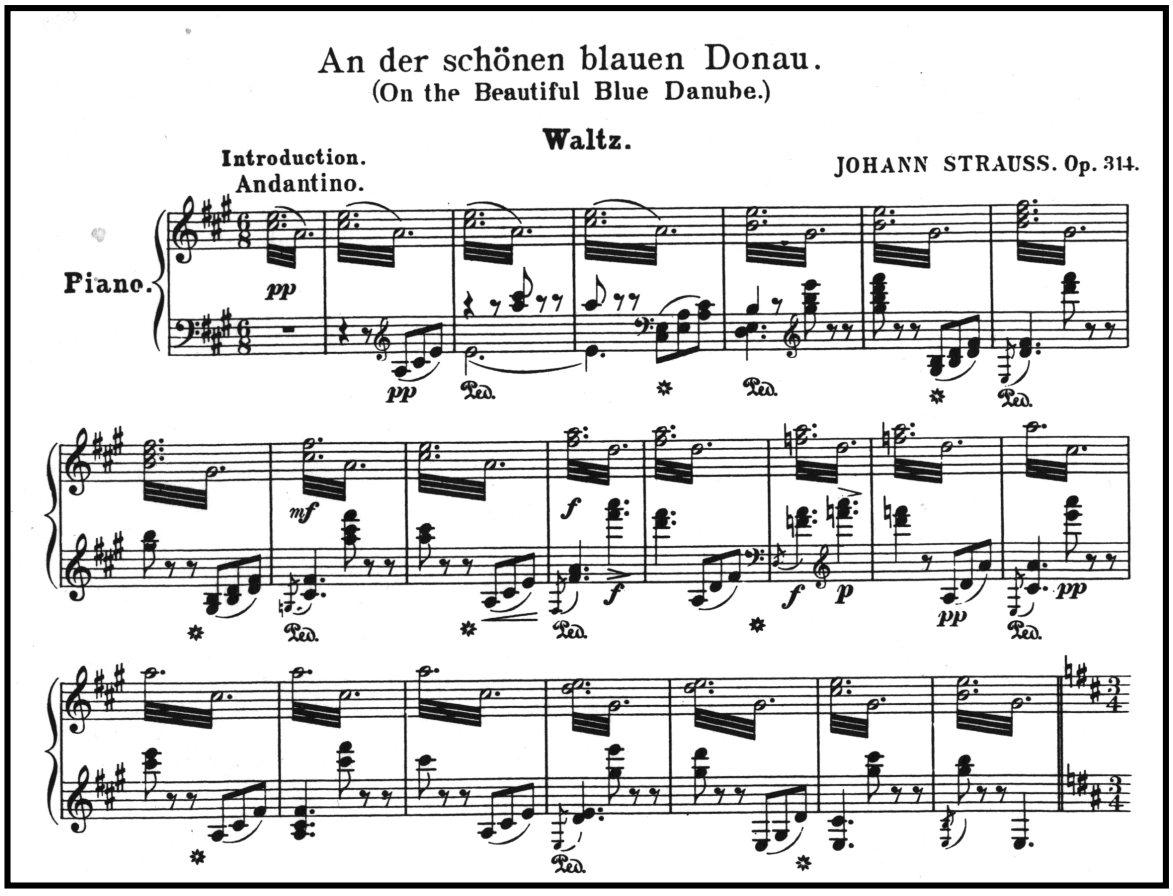
United Nations Development Program - Global Environment Facility

United Nation Office for Project Services

Developing the Danube River Basin Pollution Reduction Program

RER/96/G31

Terminal Evaluation



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JUNE 1999

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ABBREVIATIONS AND ACRONYMS

BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
DANIS	Danube Information System
DANUBIS	ICPDR Information System
DEF	Danube Environmental Forum
DEFF	Danube Environmental Financing Facility
DPRP	Danube Pollution Reduction Program
DRPC	Danube River Protection Convention
DWQM	Danube Water Quality Model
EC	European Commission
EMIS	Emission Expert Group
ENVP	Division for Environmental Programmes
EPDRB	Environmental Program for the Danube River Basin
EU	European Union
FGG	Finanzierungs Garantie Gesellshaft
GEF	Global Environment Facility
Hot Spot	A local land or water area, which is subject to excessive pollution, and which requires specific actions to prevent or reduce degradation caused by pollutants
ICPBS	International Commission for Protection of the Black Sea
ICPDR	International Commission for the Protection of the Danube River
IFI	International Financing Institution
ISEP	International Society for Environmental Protection
KfW	Kreditanstalt für Wiederaufbau
N	Nitrogen
NGO	Non Governmental Organization
P	Phosphorus
PAG	Project Appraisal Group
PCU	Danube Program Co-ordination Unit
Phare	Poland, Hungary: Aid for Reconstruction and Economy; Program of assistance for economic restructuring in the countries of central and Eastern Europe
PIF	Project Implementation Facility
PMTF	Project Management Task Force
PPC	Project Preparation Committee
PRP	Pollution Reduction Program
RBEC	Regional Bureau for Europe and CIS
REC	Regional Environmental Center for Central and Eastern Europe
SAP	Strategic Action Plan
TA	Transboundary Analysis
TACIS	Technical Assistance to the Commonwealth of Independent States
TDA	Transboundary Diagnostic Analysis
TF	Task Force
TOPP	Target Oriented Program Planning
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNOPS	United Nations Office for Project Services
WWF	World Wide Fund for Nature

SUMMARY

The "Developing the Danube River Basin Pollution Reduction Programme" project RER/96/G31 represents the Global Environment Facility (GEF)'s contribution to the second phase of an Environmental Programme for the Danube River Basin (EPDRB), created in 1992. The project was a continuation of two previous GEF projects that assisted the EPDRB. All three projects helped the EPDRB to prepare a Strategic Action Plan (SAP), and develop a Danube Water Quality Model (DWQM). They helped, as well, in creating public awareness, and contributed to several other areas, including knowledge base building, information exchange and transboundary water pollution understanding. Beyond these actions, they also showed preoccupation with Black Sea marine ecosystem degradation.

There were eleven countries (Bosnia-Herzegovina, Bulgaria, Croatia, The Czech Republic, Hungary, Moldova, Romania, Slovenia, Ukraine, and the Federal Yugoslav Republic) that benefited directly from the present project activities while two others (Austria and Germany) collaborated closely. The International Commission for the Protection of Danube River (ICPDR) was a regional partner of the project. The project came in at a cost of $3.9 million with its activities implemented between December 1996 and June 1999. (Four minor activities will continue until December 1999).

The project's overall long-term objective was to stimulate sustainable, institutional and financial arrangements for effective environmental management of the Danube River Basin. The immediate goal was to prepare for funding pollution prevention and reduction activities required to both restore the Danube River basin and protect the Black Sea environment. This immediate goal was composed of four objectives:

1. Complete the knowledge base for priority pollution loads and priority environmental issues in the Danube River basin;
2. Review policy for protection (especially nature protection) of the Danube basin and Black Sea;
3. Increase public awareness and participation;
4. Develop financing for the pollution reduction programme under the Danube Strategic Action Plan.

The project fits into regional and national plans of the Danube River basin countries, into the GEF priorities, and the United Nations Development Programme (UNDP) areas of concentration. The Project Document clearly designs beneficiaries, contains implementation plan, and corresponding financial provision. Under the project dynamic leadership, and strong support of the backstopping agencies: the UNDP/GEF and the United Nations Office for Project Services (UNOPS), the project successfully implemented and realized all activities, and delivered all outputs. The data needed to the output production were collected and provided by national teams. The project prepared framework and methodology for data collection. The methods were discussed in more than 35 meetings and workshops.

There was, however, great differences among the countries of the region in levels of their economical, technological and knowledge skills. Because of that, the data national teams provides were not all of the same quality and precision.

The project successfully completed the knowledge base for priority-settings. It updated national reviews of Danube pollution, and prepared a list of 421 priority pollution reduction projects. It improved the DWQM model and used it to simulate the nitrogen and phosphorus pollution of the Danube with and without the projects. However, since the data used in description of the regional priorities and in modeling were of unequal quality, the regional results have to be taken with precaution. To overcome the data inaccuracies and approximations, the project developed a database that will in the future allow for more accurate diagnoses of pollution sources as well as more efficient cost evaluation.

The reviews by national teams that contributed to formulation of the regional Danube basin and Black Sea protection policies, and updating the SAP did not yet produced a global political or strategic approach to a regional pollution reduction. The updated SAP gives to the policy and strategies too narrow a meaning.

The project successfully planned and organized the public awareness programme of pollution reduction activities. However, the project's tight schedule and the NGO's ineffectiveness in promoting the programme, hampered the public awareness campaign. The impact of this campaign is yet unknown.

On the basis of the national reports, the project developed a portfolio of 421 priority pollution reduction investments. For each investment the project proposed a baseline and the incremental costs. For some of these investments, the costs were estimated according to the best available information.

The project proposed to ICPDR the establishment of a Project Appraisal Group (PAG) that would advise the ICPDR, the country, and the donors about conformity of the project with ICPDR standards. It also proposed the creation of a Project Implementation Facility (PIF) that would support the ICPDR in regional investment programme, assist member countries in project preparation, and monitor the results. The ICPDR endorsed the project results, in particular, the updated SAP, the PAG, and the PIF. By the end of this year, the ICPDR will present the proposals of SAP, PAG, and PIF to the ministries of the member countries for approval.

All project activities were deeply imbedded in the GEF priorities, however, To fully satisfy the GEF requirements, some outputs need to be improved; the SAP will require further developments. Nonetheless, the project fully justifies the GEF support.

The project's achievements were highly praised by the ICPDR. Especially appreciated were the following participation methods the project employed: participating planning, logical approach, and consultative and iterative planning process of the SAP revision. The project management paid close attention to strengthening cooperation among various sectors – the government decision makers, the administrative delegates, and the private-sector representatives.

The project final results will likely remain sustainable. In particular, the principal objective will probably be pursued well after the end of the project. Moreover, the method used to gather data as well as the regional standardization of the collection procedure contributed to growth in national capacity and reinforcement of regional cooperation.

To increase the impact of the current project, the mission recommends:

1.1 **To the project management and the UNDP/GEF** to finance a critical review of the project's documentation. It is recommended they should also finance an evaluation of each country's progress in water pollution reduction, including public participation and policy issues as they were outlined in the previous Project Documents. This review should be organized and completed before the next phase of financing. This critical review should be professionally edited, published, and widely distributed.

1.2 **To the project management**, to edit the existent technical materials according to the UNDP standards. The project should pay close attention to rhetoric (clarity, organization, consistent and critical arguments) and to the internal coherence of the documents

1.3 **To the project management**, to include, in the final report, an exhaustive evaluation of all achievements and difficulties.

1.4 **To ICPDR**, to collect and disseminate information produced by the project and the national teams; organize training, demonstrations, and transfer knowledge and technologies to the countries; this would include the DWQM, standardized data collection methods and analytical procedures. Continue to edit and distribute the Danube Watch, and to update regularly the DANUBIS web site.

To implement regional assistance for future water pollution reduction plans in the Danube River basin, and in addition to the activities and objectives specified in the past GEF projects, the mission recommends to the **UNDP/GEF** to include into the project programme the following issues:

Supply management:

2.1 The regional organizations and the regional assistance projects should develop consistent criteria for evaluating and monitoring water development investments. These criteria should take into account all direct and indirect costs, as well as the potential risks and impacts.

Municipal and industrial programmes:

2.2 The efforts to control pollution should be both site-specific and consistent with water basin requirements.

Agricultural practices:

2.3 The regional projects should support tests and dissemination of sound agricultural practices, and support national awareness campaigns.

Safety of abandoned industry and mine wastes:

2.4 The regional project should investigate the pollution from abandoned industry and mine wastes, and help countries to find funding to ensure the environmental safety of this waste.

Toxic and persistent contaminants:

2.5 The regional project should promote a sense of cooperation among the affected countries to research the best control measures and control policy.

Atmospheric pollution:

2.6 The regional project should collaborate with the other regional organizations involved in monitoring and reduction of air pollution. It should support national efforts toward atmospheric pollution.

Regional policy instruments:

2.7 A mandate should be given to regional project to support the regional and international organizations evaluating and applying regional policy tools. This support could cover such areas as evaluating future projects priorities (according to GEF standards), establishing baseline and incermental costs, or investing in a country that is complying with regional standards.

Integrate technical, economic, political, and social dimensions:

2.8 A holistic approach needs to be adopted to get to the bottom of the problem. The regional projects should consider a long list of activities: data collection and dissemination, training and demonstrations, research, norms and legislation standardization, and public participation promotion. These elements need to be looked at in the context of supply and demand of each country's water and macroeconomic policy.

Country's contribution to regional efforts:

2.9 The regional project should prepare periodically a ledger of regional expenses and gains and inform the countries about advantages of adhering to a specific cooperative programme. This balance will help to mobilize national efforts for a particular programme, and decide on the amount a country may contribute to the regional effort.

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ANNEXES

INTRODUCTION

Project evaluation aims to assess its relevance, performance, and success (Annex I). In principle, every significant UNDP-sponsored project is subject to evaluation. The evaluation of the important UNDP/GEF project "Developing the Danube River Basin Pollution Reduction Programme (RER/96/G31) took place between June 8th and June 21st, 1999 (Annex II). Four consultants contributed to the evaluation. They were:

- Team leader, Stanislaw Manikowski;
- Public awareness specialist, Ester Park;
- Financial specialist, Friedrich Schwaiger; and
- Transboundary pollution assessment specialist, François Van Hoof.

During the evaluation process, the mission met with several stakeholders (Annex III). It encountered the UNOPS and GEF officers who provided technical backstopping and administrative support for the project, the ICPDR officials, the beneficiary country representatives, and the project team. The mission visited Vienna project management headquarters, and offices of major technical contributors in Frankfurt, Munich, Delft and Budapest. Briefing and debriefing of the mission took place in UN offices in New York.

The evaluation referred to the procedures described in the Terms of Reference provided by the UNOPS (Annex I), and the guidelines for project evaluation by the UNDP Central Evaluation Office. The present report describes findings, conclusions, and recommendations of the mission. The report is organized so as to reflect UNOPS' concerns in regard to the Terms of Reference.

1 PROJECT DESIGN

The design of the present project RER/96/G31 (the Project) follows guidelines of the Global Environment Facility (GEF) sponsored projects. It represents the GEF's contribution to phase two of an Environmental Programme for the Danube River Basin (EPDRB)[1], created in 1992. The Project was a continuation of two previous GEF projects (RER/91/G/31 and RER/95/G45) that assisted the EPDRB in building a framework for a long-term solution of pollution problem in the Danube River.

During the first phase of the framework building, between 1992 and 1996, both the EPDRB and the GEF assistance projects concentrated their efforts on such priorities as:

- Building regional cooperation for water management;
- Evaluating and defining environmental problems;
- Establishing a basin-wide water quality monitoring strategy; and
- Establishing a warning system for accidental pollution.

The first-phase GEF assistance projects contributed to:

- Strengthening of national and regional institutions;
- Increasing awareness that agriculture be integrated into environmental policies;
- Addressing human health issues related to cross-border (transboundary) pollution;
- Improving the knowledge base and exchange of information;
- Promoting investment;
- Supporting public participation;
- Developing the Danube Water Quality Model (DWQM); and
- Drafting the Strategic Action Plan (SAP).

The Project Document of September 1997, stated the objectives of the present project (Project Document [15], 11 and 12):

> The overall long-term goal of the new GEF project is to stimulate sustainable, institutional and financial arrangements for effective environmental management of the Danube River basin, in accordance with the International Strategy of GEF Operational Strategy and the International Water Operational Programme No 8.

The immediate goal of the Project was (ibid., 12): "… to prepare for funding pollution prevention and reduction activities required to both restore Danube River basin and to protect the Black Sea environment." Four intermediate objectives should help to achieve this goal:

1. Complete the knowledge base for priority pollution loads and priority environmental issues in the Danube River basin;
2. Review policy for protection (especially nature protection) of the Danube basin and Black Sea;
3. Increase public awareness and participation; and
4. Develop financing of the pollution reduction programme under the Danube Strategic Action Plan.

[1] The EPDRB aimed at establishing an operational basis for the integrated management of Danube River Basin environment.

The Project's objectives were approved by senior officials of eleven Danube River basin countries (Bosnia-Herzegovina, Bulgaria, Croatia, The Czech Republic, Hungary, Moldova, Romania, Slovakia, Slovenia, Ukraine, and The Federal Yugoslav Republic) who, in July 1996, attended the EPDRB Task Force and International Commission meeting in Vienna.

The United Nations Development Programme and the GEF (UNDP/GEF) contributed $3.9 million to the Project. The Danube basin countries provided national personnel, salaries and appropriate allowances, offices, and training facilities.

The United Nations Office for Project Services (UNOPS) was designated as the Executing Agency.

The Project was to be implemented over a period of 16 months, beginning August 1997.

The Project fits well into the GEF priorities (the eight International Water Operational Programme and important transboundary concerns), and UNDP area of concentration (environmental problems and natural resources management). The Project Document clearly set out the problems that needed to be solved, and it correctly outlined the Project execution strategy. The intended regional and national users were properly identified. Capacity building within the countries was part of the Project design. The Project Document contained a clearly laid out logical framework, stated the outputs in verifiable terms, and included a work plan.

In summary, the Project Document analysis shows that the Project fits into regional and national plans, and into the GEF and UNDP areas of concentration. The objectives, outputs and activities are clear. The Project Document contains an implementation plan and specifies adequate financial provisions. The beneficiaries are correctly identified.

2 PROJECT IMPLEMENTATION

The present section assesses the Project's general implementation, its management, monitoring, and backstopping, all with regard to the quality and timeliness of activities and outputs. The section contains, as well, an evaluation of how adequately management arrangements were made. Finally, some light will be shed on what environmental changes were brought on by the Project. The elements discussed in this section constitute the rationale for the GEF support, particularly in the areas of regional cooperation, policy development, and public participation.

2.1 General Implementation

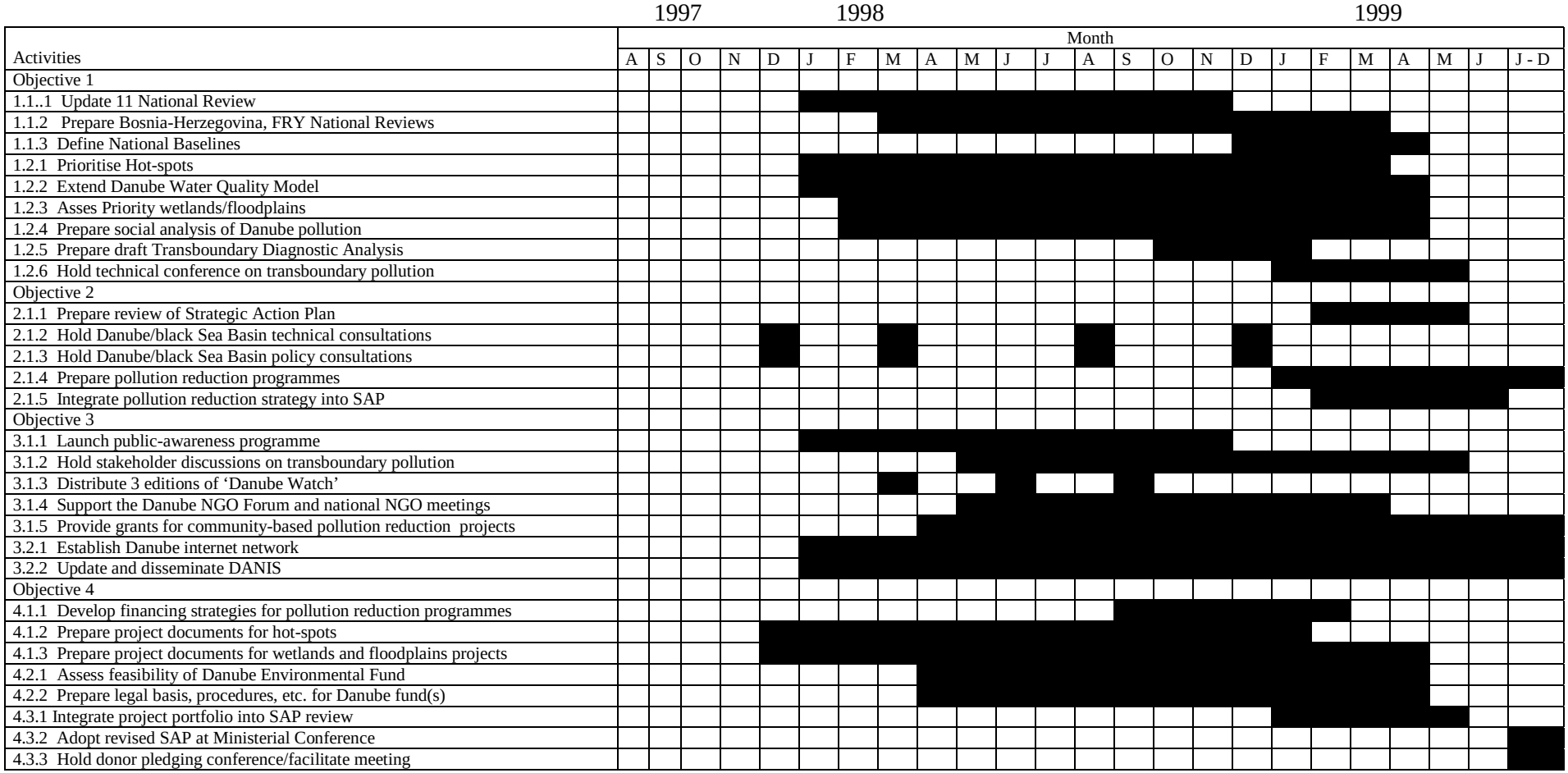
The Project was scheduled to start its activities in August 1997. However, since the document was signed in September 1997 and the personnel recruited in autumn 1997, the Project's implementation was delayed until December of the same year. Most of the Project's 29 activities ended in May and early June, 1999 (Figure 1). The Project was operational for 19 months instead of the 16 originally scheduled by the Project Document. It completed almost all intended activities and delivered all important outputs. Four activities are yet to be completed:

- The community-based projects will last until September;
- The Danube Internet network will be established by December;
- The ministerial conference to revise and probably adopt the Strategic Action Plan (SAP) is scheduled for the end of this year; and
- The fund-raising conference will take place by the end of 1999 or the beginning of 2000.

The allocated budget covered adequately all Project expenses.

The Project management efficiently and dynamically mobilized the region's 13 countries (11 signatory countries plus Austria and Germany). This task was arduous since the countries are at the beginning of their environmental cooperation. Moreover, language barriers, economic differences, and open hostilities in one part of the region sometimes hampered collaboration. Nevertheless, the skill and persistence of the Project team did mobilize the countries toward closer and more effective collaboration.

Figure 1. Implementation of project activities



The ICPDR (International Commission for the Protection of the Danube River), was the Project's regional counterpart. The Project closely collaborated with the ICPDR: all the Project staff, national collaborators, and national experts regularly participated in the ICPDR meetings.

Overall, the Project was very well implemented on a regional level and in the countries themselves. While experience from the previous regional projects helps, it is still quite a challenge to successfully complete a Project of such a dimension in so short time. It all requires good managerial skill from the staff as well as unwavering support from the Executing Agency.

2.2 Management, Monitoring, and Backstopping

The Project management was located in the UNDP Vienna Office and benefited from the Vienna Office administrative support. According to the management, the Office support was helpful because it freed up the Project from the every-day administrative work and allowed staff to focus on technical issues. The monitoring of the Project's progress and the additional administrative support was in the hands of the UNOPS. The UNDP/GEF Office in New York took care of technical back-stopping. *All administrative supports, monitoring, and technical back-stopping were judged by the Project management as not only sufficient but very helpful in implementing Project activities.*

2.3 Changes in the Project's Environment

The Project activities spanned a period of less than two years. This is a relatively short time for detecting any noticeable changes of attitude on a national or regional scale. However, that period coincided with emerging of a strong, general, political and ethical trend in the region, and a collective set of goals: improvement of the environment, pollution reduction and Danube basin and Black Sea protection. The Project itself helped to reinforce this trend, by organizing more than 35 meetings and workshops, and making the regional and transboundary issues of Danube protection more specific and easier to visualize. Thanks to the Project, the most important river polluters were identified [3] and the river's pollution become something more than just an impersonal and vague problem.

The Project has benefited from this impetus as well. According to comments of country representatives the mission met (see Annex II for a list), the national collaborators were enthusiastic about the Project and devoted themselves to realizing their assigned tasks. The results were considered "essential" by the countries' representatives.

In conclusion, the Project worked in a climate favorable to realization of its assignments. The presence of the Project contributed even further to the creation, among the Danube basin countries, of positive attitudes towards pollution reduction. The Project implementation fully justifies the GEF support.

3 PROJECT IMPACT

This section reviews the Project's achievements measured against its goals, outputs, and activities. It will be arranged according to the following outline: (1) Complete priority-setting; (2) Review policy for nature protection of the Danube Basin and Black Sea; (3) increase public awareness and participation; (4) Develop financing for a pollution reduction programme within the Danube Strategic Action Plan.

3.1 Complete the Knowledge Base for the Priority-Settings

The Project Document allocated 42% of the Project's budget toward the completion of the knowledge base for priority-settings.

To complete the knowledge base for the priority-settings, the Project should have updated national reviews, and analyzed the national action plans. This should have been achieved by using a common format. The national reviews should be completed with the transboundary diagnostic analysis.

3.1.1 Update National Reviews and Analyze National Actions Plans Using a Common Format

In 11 of the 13 Danube basin countries (all but Austria and Germany), the Project, effectively using national expertise, organized and updated national reviews2. The national reviews teams received from the Project a thorough training in data collection and reporting. As a result, the reviews were based on common sampling methodology and common reporting procedures. Despite of this, the data included in the national reviews were of unequal quality, due to the differences in laboratory capacity and national staff training among member countries3.

The updated reviews focused on priority pollutants and on sectors that contributed to Danube pollution. The reviews have helped the pollution impact analysis, and the cost analysis of pollution reduction projects.

3.1.2 Transboundary Diagnostic Analysis

The Project improved on an existing Danube Water Quality Model (DWQM), and used it to forecast the nitrogen and phosphorus pollution of the Danube[4]. The Project also financed a study of wetlands and floodplain areas of the river[5]. The results of national updated reviews, the model, and the studies were used for transboundary analysis. As in the national reviews, the transboundary analysis, which represents for the moment the best global image of pollution in the Danube basin, also suffered the burden of an uneven quality of data. It should be mentioned, however, that this shortage could not have been corrected within the short life of the Project[6].

The updated national reviews, the analysis of national plans and the transboundary SWQM are outstanding and lasting achievements of the project. To fully exploit the potential created by the Project, the member countries should well appropriate the model and agree on a timetable for input data improvement. To facilitate assimilation by those who have benefited from the Project's achievements, the reports describing the DWQM, transboundary analysis [4 and 20] and other main Project's reports [1, 3 to 8, 16, and 17] dealing with the transboundary problems should be edited in such a way that the users can easily see the progress from the data collecting to the fully developed transboundary diagnosic.

[2] Annex V, 1.1.1; VI, 1.1.1, and 1.1.2; VII, 6.1.
[3] Annex VII, 6.1.
[4] Annex V, 1.2.2; VI, 1.2.1, 1.2.2., and 1.2.3, page 3; and VIII, 6.2.
[5] Annex V, 1.2.3; VI, 1.2.3, and 1.2.5, page 3; and VIII, 6.3.
[6] Annex VII, 6.2, and 6.3.

3.2 Review Policy for Protection of the Danube Basin and the Black Sea

The policy review received 5% of the Project's budget. As in previous activities, the policy review was organized entirely by national experts, in consultation with national authorities. The Project's regional experts collated that information and integrated it into the main document, the updated Strategic Action Plan (SAP)7.

It should be noted that the national environment policy has some specific mandates. It is concerned with achieving the most cost-effective pollution reduction; an equitable distribution of the pollution reduction burden; and an acceptable and just distribution of charges for pollution emission. It attempts to enforce the policy at the lowest cost. It takes into account the ethical, moral, and traditional issues. The national strategy (the actual implementing of the policy) describes the standards set down and the incentives employed to achieve the policy. The regional policy is distinct from the national one. The regional policy is a sum of sovereign national policies that specifically concern the region. A regional organization or a regional project may reinforce the will of the countries for adherence to a given regional treaty.

The analysis of the policy description contained in the SAP, as well as in the meeting records and technical documents produced by the Project [1 and 16], shows that the country delegates are still at the initial stages of defining regional policies with respect to the Danube basin and the Black Sea protection[8].

It is important to analyze exhaustively the pollution reduction approaches when embarking upon the regional pollution reduction project. Analyzing national and regional policies, national policy instruments, and possible international pressures could best indicate to project management and to donors how to allocate regional resources, and how to help countries stick to their regional agreements.

3.3 Increase Public Awareness and Participation

According to the Project Document [16, page 24], "Wide public participation in the Project is an essential requirement for development of sustainable policies in Danube Basin." Through the activities and outputs developed under the objective " increase public awareness and participation", the Project would have to increase the importance of pollution reduction in the public's mind. It would also have to reinforce public participation in designing of regional and national policies and to improve coordination and exchange of information.

The Project invested about 23% of its budget to make this all possible.

3.3.1 Raise the Public Awareness of Pollution Reduction Activities

Early on, the Project saw that through training, workshops, discussions and consultations, it will set up ways for the public to be involved, and it will raise public awareness. The public involvement activities were held with the participation of technicians, national government administrators, public, and NGOs. The NGOs9, and one of their regional bodies, the Danube Environmental Forum (DEF), become the Project's principal proponents in raising public awareness. The Project efforts were well planned, well organized and worked well with the Project Document programme. However, the tight schedule and the NGO's10 ineffectiveness in promoting the Project, hampered public awareness campaigns.

The Project was also responsible for financing five community-based project grants that totaled $200,000. At this point, it is yet to measure the impact the investment had on the awareness of Danube basin citizens.

[7] Annex V, 2.1.1 to 2.1.5; VI. 2.1.1. to 2.1.5.
[8] Annex VI, pages 5 to 11.
[9] Annex V, 3.1.1 to 3.1.5; VI, 3.1.1 to 3.1.5; and VIII.
[10] Annex V, 3.2.1 and 3.2.2; VI 3.2.1 and 3.2.2, page 14; and VIII.

3.3.2 Improve Coordination and Information Exchange

The Project financed three editions of a periodical called Danube Watch, devoted to Danube pollution issues, and it plans to finance two more editions. The Project also developed and improved an information web site, called DANIS (transformed into DANUBIS).

In a final analysis of section 3.3 we can observe that the weakness of DEF was a major obstacle in efficient implementation of the public awareness programme. While weak, NGOs for now are convenient partners for many UNDP projects, even though, they may not, in the context of Central European traditions, be the best intermediaries for a project and a group of citizens. These countries' traditional institutions such as the church, older universities, mainstream media, and high-profile individuals may be better at influencing public opinion. The NGOs are still new on the scene, and their position may be looked upon in the public eye with some trepidation. In consequence, replacing the NGOs with another structure may give better results in public awareness raising.

A well targeted public awareness campaign is vital for any environmental programme. It helps decision makers appraise the breadth and strength of public attitudes. It may provide information that otherwise would be unavailable and also can generate a dialog for the project. Open debate is the first step to improving mutual understanding, promoting compromise, enhancing credibility, and making better final decisions.

Increase in public awareness should be carefully monitored through the appropriate tools. Such monitoring can demonstrate the changes in public opinion over environmental matters more objectively than the progress reports. It may also help the Project evaluate how well the message is being transmitted and then adjust it's own working programme, thus making it more efficient.

To sum up, the Project planned and launched a systematic and well organized set of activities aiming at raising public awareness and public participation in designing environmental projects. The ultimate results of these activities are not yet known in detail. Since raising public awareness has long been the GEF project's goal, efforts in this area should be carefully evaluated before further investment takes places.

3.4 Develop the Financing of the Pollution Reduction Programme Within the Danube Strategic Action Plan

The Project should have developed under this objective a portfolio of Danube Basin projects and proposed a mechanism that could provide sustainable financial support for Danube Basin pollution reduction. It should also finalize and come to an agreement on how to go about adopting a revised Strategic Action Plan.

3.4.1 Portfolio of Danube Basin Projects

The present Project developed a portfolio of 421 projects worth $5.5 billion, including documentation for priority hotspots and wetland projects for investment consideration. The projects' costs were estimated according to the best available information, and the degree of priority for the project was duly documented11. However, since the countries' inputs differ in quality and precision, and the ongoing national research is adding new information, the portfolio should therefore be periodically updated. The Project has prepared a database that will easily integrate the updated information [9].

National experts and consultants gathered all the information needed to the portfolio preparation, and later, along with interested industries and public, agreed on the portfolio project's priorities. The projects were then reviewed on a governmental level before being put on a regional priority list. The portfolio results from a national effort and represents what is probably an exhaustive list of Danube pollution priorities.

[11] Annex V, 4.1.1 to 4.1.3; VI, 4.1.1 to 4.1.3; and IX

The portfolio deals, however, with only half of all pollutants in the area. The other half originate from the so called "non point" pollution sources, such as agriculture or storm water that periodically flushes in from cities and villages12. The Project is aware of these pollutants but did not (and could not, given its workload) develop a strategy that takes into account these factors.

3.4.2 Mechanism for Sustainable Financial Support

The Project Document favored establishing a fund that would support priority investments for the whole Danube Basin or Black Sea. The Project Document [15, pages 23, 29, and 33] required a feasibility study for such a fund and demanded that the Project direction prepare structures and rules for this type of regional financing.

As a result of a feasibility study [9] and preliminary discussions with regional partners, the Project put forward two proposals to ICPDR: (1) establishment of a Project Appraisal Group (PAG) that would assess the projects and, if they conformed to the ICPDR standard, recommend them to donors; and (2) creation of a Project Implementation Facility (PIF) that would support the ICPDR in several areas including regional investments programmes that would assist member countries in both project preparation, and results monitoring. The estimate cost of PIF for 3 to 4 years was US$ 2.3 million.

The ICPDR endorsed the PAG and PIF proposals and expects that PIF may be financed by UNDP/GEF.

Although the Project's proposal of establishing PAG and creating PIF is in line with the Project Document requirements and the ICPDR programme, it should be noted that it is not known as to what extent donors and the financing institutions will use the PAG and PIF facilities in selecting projects for financing. On the other hand, it cannot be taken for granted that the governments will address their financing requests through the ICPDR. Without the donor's support of PAG and PIF and the governmental recognition of them, both facilities may remain simply an administrative entity.

3.4.3 Adopting a Revised SAP

The revised SAP and the list of priority projects were discussed at a regional workshop in May, 1999 and presented in the ICPDR Steering Group in June. It will be proposed for adoption in a conference of the involved technical ministries, scheduled for either the end of this year or the beginning of next13.

The portfolio of the Danube basin pollution reduction investments, the proposal of implementation of PAG and PIF, the SAP revision process are the Project's outstanding achievements.

3.5 Project Effectiveness in Realizing Its Objectives

The Project was effective in identifying national pollution sources and in preparing proposals for pollution reduction14. It appropriately implicated the national expertise and the national administration in all steps of the Project objectives realization. The results of these efforts, achieved in such a tight schedule, requires, nevertheless, further improvements. The accuracy of the DWQM should be increased15. National policies, as well as strategies for national policy implementation and regional approaches to pollution reduction need yet to be described and analyzed16. The effectiveness of the public awareness campaigns is impossible to assess at this

[12] Annex VI, 1.2.2.
[13] Annex V, 4.3.2 and 4.3.3; and VI, 4.3.2 and 4.3.3.
[14] Annex VII, 6.9.
[15] Annex VII, 6.2 and 6.3.
[16] Annex VI, 2.

point, since the campaigns' impact has not yet been evaluated17. The written documents produced by the Project that transmit the results would have better served the interested users if they unequivocally stated their objectives and working hypothesis. It would also have been helpful if within these documents the conclusions were clearly stated and supported by evidence.

3.5.1 Project's Actions and Results in Light of Existing GEF Guidelines

The Project's actions were in line with GEF priorities. The pollution reduction projects portfolio is definitely the most outstanding achievement and it represents a great step forward in identification of pollution reduction activities[18]. Another great success of the Project is the fact that high levels of government have endorsed the SAP[19]. The use of the DWQM and all efforts at attaining reliable data production may provide an excellent tool to transboundary pollution monitoring. Finally, the Project's efforts to assume financing for priority pollution reduction investments[20] is one more example of successful GEF programme activity. Still, the SAP will require further improvements, especially in the baseline calculation[21]. (The GEF considers the well-defined baselines as a key element of the SAP.) Realizing these improvements is in fact independent of the project since it requires better data inputs from the countries. The GEF requires, as well, that the SAP contains an examination of national economic development plans and sector economic policies. This will better define feasible environmental plans. The sections of the SAP dealing with these issues are not yet completed.

3.6 Sustainability of the Programme

The Project's main results point to a continued sustainability.

The Project's results benefit the national ministries responsible for Danube pollution, the national industries and the Danube basin countries' people. It bodes well that these countries feel a strong motivation to clean up their environment and that the pressure for a clean environment is growing. The Project results, especially the register of hot-spots and priority pollution reduction projects, should make for a lasting contribution to Danube pollution reduction.

On a regional level, sustainability of the Project's results and, to a larger extend, the Danube River Protection Programme, was boosted recently after the signing of the DRPC Convention by 12 Danube Basin countries (all except Yugoslavia) and its ratification by 11 (all except Ukraine and Yugoslavia).

[17] Annex VI, 3.
[18] Annex VI, 1.1 and 1.2; and VII.
[19] Annex VI, 4.2; and IX.
[20] Annex VI, 4.1 and 4.2; and VII.
[21] For the standards description see WWW site gefweb.org/public/opstrat/ch4.htm, pages 6 to 8.

4 GENERAL IMPACT OF THE PROJECT

This section will look at the Project's general impact on the countries involved and on the international organizations. This evaluation is based on eight criteria: (1) Awareness of the Project's outputs by the participating countries; (2) Degree of ownership and commitment felt by the participating countries towards the Project; (3) The extent to which policy and strategies of the countries are affected; (4) Technical and managerial cooperation among the countries; (5) Cooperation within agencies and ministries of each country; (6) Cooperation among international organizations; (7) Cooperation among the different sectors, specifically the non-governmental and private sectors; (8) The Project's long term sustainability.

4.1 Awareness Among Participating Countries of the Project's Outputs

The Project systematically built up an awareness campaign of its activities and outputs. The national workshops received attention in the media; the Project has trained national teams and working groups of citizens and institutions concerned with identifying pollution problems. Three issues of the periodical "Danube Watch" were devoted to information on Project activities and their outputs. Two additional issues will cover the SAP and the projects included in Pollution Reduction Programme (PRP) [4]. All of the Project's results can be seen by going to the DANUBIS web site.

The Project's achievements were highly praised by the ICPDR Steering Group meeting in June 1999. Especially appreciated and recognized were the various methods used: participatory planning, logical approach, and consultative and iterative planning process.

The Project's high profile and its usefulness served the UNDP/GEF well. In June 1999, the ICPDR Steering Group expressed its appreciation and gratitude for UNDP/GEF's support, conceptual guidance, and coordination in fulfilling the Danube pollution reduction programme.

Finally, encouraged by such a constructive collaboration, the Steering Group invited GEF to build a partnership to help implement the PRP.

It should be noted, however, that there was no independent assessment on how the Project was perceived nor was there a study to gauge awareness of the Project's output among the citizens in Danube region countries.

4.2 Degree of Ownership and Commitment of the Project Among Participating Countries

The countries participated in all the Project's efforts that had been scheduled in he Project Document. All the information the Project needed to design regional programmes was collected by national teams, lead by ministry-designed experts. The Project team itself provided the national teams with data collection methodologies and funds for implementation. It may be presumed than, that the data collected, the working methodology, and regional cooperation are all lasting legacies of the Project owned now by the countries' Ministries of Environment or Water. On a regional level, the Project had been working in close collaboration and frequently consulting with ICPDR. The ICPDR appreciated the outputs from the Project and is seriously looking at their implementation.

The fact that both the countries' technical ministries and the ICPDR own the Project should not raise any concerns. Nevertheless, the endorsement by other ministries and governments of the Project proposals, especially those concerning pollution reduction investments, pollution limitations, and wetland restoration cannot be seen as a fait accompli. Judging by the documents available in the Project files, this endorsement is yet to be a reality. The respective governments will most likely endorse the proposals once they have added their own studies. Several elements will probably need to be completed before the pollution reduction investment are made: a more detailed financial analysis, alternative considerations, impact studies, and some type of public opinion study. In the government's eyes, the Project proposals included in the PRP may be perceived, not as final products ready to be financed, but as reliable indicators of important pollution problems.

4.3 Impact on National Policies and Strategies

The documents produced by the Project devote too small a space to political and strategic considerations. Since policy is very important in designing sustainable and publicly acceptable projects, a wide and detailed approach for policy issues clarification needs to be developed in the future.

The Project's positive impact on country policies probably results from having the pollution issues better documented than in any other previous analyses. Showing the Danube pollution in all its severity provides solid arguments for the environmental lobby.

4.4 Technical and Managerial Cooperation Among Countries

There was good technical cooperation among countries, particularly reinforced through joint efforts in identifying pollution problems. Cooperation among countries is necessary for the purpose of reducing transboundary pollution; the donor's funding being subject to regional scrutiny. Managerial cooperation also stood out as it increased the skills of the various national experts. Much was garnered, as well, in the area of project development, and institutional and private donor relations.

4.5 Interagency and Inter Ministerial Cooperation

The Project-financed workshops were attended by representatives of various ministries and national agencies. However, it is not currently known as to what extent this participation will be responsible in furthering cooperation.

4.6 Cooperation among International Organizations

The Project cooperated closely and successfully with the key international organizations involved in the regional Danube River pollution reduction programme: Phare, GEF, Danube Task Force (became PTF), and ICPBS. The cooperation bore positive results through joint meetings and mutual (and alternative) financing of meetings and activities.

4.7 Cooperation Among all Sectors, Including Non-Governmental and Private Sectors

The Project management paid close attention to strengthening cooperation among the various sectors: the government decision makers, the governmental administrative delegates, and the private sector representatives. For this purpose the Project organized numerous meetings and workshops attended by them. However, no study has been done on the collaboration's impact on pollution reduction practices among Danube basin countries.

4.8 Long-Term Sustainability of the Project Impact

The Project's activities and outputs affected many institutions and organizations. Their long-term effects will vary depending on the lasting impressions and continued interests of the recipients. It is too early to assess the sustainability of the Project, however, the available information, namely the meetings with the countries' delegates, gives us a sense there has been an increase in the awareness of pollution reduction necessity in the Danube.

5 CONCLUSIONS

The conclusions will be grouped under four headings: general conclusions stemming from an overall evaluation of the Project; conclusions related to the Project design; conclusions related to assessment of the Project's general implementation in terms of human and financial resources; and finally, a review of the Project's results measured against its initial objectives and actions.

5.1 General Conclusions

The Project was designed as a UNDP/GEF contribution for reducing pollution in the Danube River Basin and for eventually lessening pollution in the Black Sea. The Project's specific mandate was to have a strong effect on transboundary pollution. It was, therefore, part of the ICPDR (a regional organization mandated to co-ordinate the national programmes in Danube pollution reduction) effort. All Danube basin countries were involved in the Project's activities. The immediate goal, as described in the Project Document, was to: "prepare for funding pollution prevention and reduction activities required to both restore the Danube River basin and to protect the Black Sea." To reach this goal, the Project had to put together a list of the main sources of pollution, review countries' Danube basin protection policies, increase public awareness and participation, and develop financing for pollution reduction programmes.

Overall achievement. The Project identified 421 of the most important pollution reduction investments and ranked them according to the amount of pollution that each respective investment could reduce. Collectively, these projects encompass all of the main sources of pollution in the basin. The Project evaluated their costs according to the best available knowledge and prepared the project documents. The Project management should be praised for this achievement that directly and successfully addressed the principal goal of the Project.

Sustainability. The pollution reduction projects were brought to fore by the efforts of several groups of participants. National experts, administrative agents, national industry representatives, NGOs and members of the private sector all contributed to execute the Project. In each country, national teams prepared lists of pollution sources, evaluated their importance, and incorporated them into their national environmental plans. As a result, the Project's effort will likely be continued well after its end. Moreover, the method used to gather data, as well as the regional standardization of the collection procedure, contributed to a growth of national capacity in environmental management and reinforcement of regional cooperation.

Data quality improvement. The pollution reduction projects were identified over a very short period of time, encompassing 11 countries with varying economic levels and environmental standards. Consequently, the collected data contain numerous inaccuracies and approximations. To overcome these limitations, the Project developed a database to allow for more accurate diagnoses of pollution sources, as well as more precise cost evaluation.

Limitations. These vital achievements, completed in less than one year (excluding training and final data elaboration), was done at the expense of other Project's goals. As a result, the global image of Danube basin pollution strategy is strongly biased towards point pollutants. The diffuse sources that contribute to more than half of all pollution are not in the Project's priority list.

ICPDR, UNDP, and DEF concerns. The ICPDR, a regional organization that voices the need for transboundary pollution reduction in the Danube River basin, was the principal beneficiary of the Project. Many of the Project's activities coincided with the technical objectives of the ICPDR. The most important was the improvement of the outdated SAP, originally prepared in 1994. The UNDP/GEF was interested in the formulation of pollution reduction activities, so as to sort out national and regional (transboundary) costs and benefits. The endorsement of the SAP at high levels of government was equally important for the UNDP/GEF.

The Project drafted a new version of the SAP. The road to improvement of the SAP involved a series of consultations with the national teams and discussions in the technical meetings of the ICPDR. The new SAP was finally adopted at a recent ICPDR meeting in June, 1999. The next step is for the ICPDR to present the SAP to the concerned ministries at the meeting of the Danube basin member countries at the end of this year.

The Project Document insisted that the Project management develop financing for a pollution reduction programme. The realization of this objective was an arduous task, since the Project management is not an ideal intermediary for national and international financing institutions, nor for donors. The Project, however, developed an original financing proposal. It was accepted by the ICPDR and will probably be accepted in the future when the ministries of the member countries meet.

Technology transfer. The Project has satisfied an important UNDP requirement concerning technology transfer and training of national agents. The Project management adequately adopted a standard for the training of national personnel who collect and analyze pollution data. All subsequent steps regarding the treatment of information and the elaboration of result were discussed in international and national workshops. The timeliness of this realization as it relates to national activities attests to the effectiveness of the expertise and the transfer of responsibility from the Project to the national teams.

Link with the past two GEF projects. Before the implementation of the Project, there were two other GEF projects that aimed over six years to improve water pollution in the Danube basin and assist the ICPDR. They helped to prepare the first SAP, as well as develop the DWQM model, gather a list of hot spots, finance public awareness campaigns, edit the Danube Watch, and distribute small grants for pollution reduction programmes. Yet, the documentation of the present Project make no references to past achievements. It is unclear as to what extent the present Project made use of them and what lessons it learned from the past projects.

5.2 Relevance of the Project Design

The Project was a continuation of two previous GEF projects that assisted EPDRB in searching for a long-term solution to the pollution problem in the Danube basin. All three projects concentrated their efforts on building regional cooperation, evaluating and identifying pollution problems, establishing and developing basin-wide pollution monitoring, supporting public participation and developing SAP.

The Project Document adequately covered the most important regional pollution reduction issues, namely:

Completing the knowledge base for priority pollution loads and priority environmental issues in the Danube River basin;

- Reviewing policy for protection (especially natural habitat protection) of the Danube Basin and Black Sea;
- Increasing public awareness and participation;
- Developing the financing for a pollution reduction programme under the Danube Strategic Action Plan.

All these issues are relevant to the GEF priorities, and UNDP area of concentration.

All initial objectives were achieved. Some of them, however, still require more action. The next step in the regional cooperation, therefore, should be to assure the full realization of those partially attained objectives, and attainment of new goals that will emerge. These goals are outlined in more detail under Section 6: Recommendations.

5.3 Human and Financial Resources Use and Backstopping

In practice, the Project completed all its intended activities. This was realized thanks to efficiency and dynamism of the Project management, and strong motivation of the national teams. The UNDO Vienna Office administration support, the administrative backstopping from the UNOPS, and the technical support from the GEF all contributed to the Project's success. The Project funding adequately covered all activities.

Though the Project realized all its activities, the quality of the results was unequal. The next section will review those results.

5.4 Project Results

The Project's main objective was to stimulate sustainable, institutional and financial arrangements for effective management of the Danube River basin, in accordance with the International Water Strategy of GEF Operational Strategy and the International Water Operational Programme No 8.

The immediate goal of the Project was to prepare for funding pollution prevention and reduction activities required to both restore the Danube River basin and to protect the Black Sea environment.

This goal was composed of four objectives:

- Complete the knowledge base for priority pollution loads and priority environmental issues in the Danube River basin;
- Review policy for protection (especially nature protection) of the Danube basin and Black Sea;
- Increase public awareness and participation;
- Develop the financing of the pollution reduction programme under the Danube Strategic Action Plan.

In this section we will review the degree of achievement of each of the four specific objectives. Then, we will assess how well the Project contributed to the immediate goal, and finally, look at the long-term goal of the Project.

<u>Complete the Knowledge Base for Priority Pollution Loads and Priority Environmental Issues in the Danube River Basin</u>

The Project completed the knowledge base for priority pollution loads and priority environmental issues by updating the national reviews. The updated reviews provide the best available set of data needed for both pollution impact and cost analysis of pollution reduction projects. The Project improved the DWQM and produced transboundary analysis, evaluated wetland and floodplain restoration, and analyzed the social impact of pollution. The national reviews differ in quality due to the differences among the countries in data collection standards and laboratory facilities. They focused strongly on pollutant concentration. Pollutant load was seldom mentioned.

On the downside, their analysis and conclusions carry the burden of insufficient data on which they had been build. Globally, however, the updated national reviews, and the very specific and detailed national action plans that resulted from this activity are outstanding and will remain lasting achievements of the Project.

<u>Review Policy for Protection (Especially Nature Protection) of the Danube Basin and Black Sea</u>

The proceedings from the ICPDR and ICPBS meetings and the analyses of the Project's reports show that the country's delegates are at the initial stages of defining the environmental policy concept. The 1999 updated SAP describes in details the point pollution reduction projects and evaluates theirs costs. It does not describe and analyze adequately the national policies and strategies.

Increase Public Awareness and Participation

The Project has planned and realized a systematic and well-organized set of activities that aimed at raising public awareness and eliciting participation when designing environmental projects. Since raising public awareness has long been the GEF Danube basin projects' goal, efforts in this area should be carefully evaluated before any new public awareness activities are launched. Since they are so strongly tied to the NGOs, and in particular to the DEF, the awareness programme needs these institutions to stay cohesive.

Develop the Financing of the Pollution Reduction Programme Under the Danube Stratgic Action Plan

Development of the pollution reduction programme and its financing proposals was completed by:

- A portfolio of 421 projects evaluated at $5.5 billion ranked according to investment cost effectiveness;
- Proposal of funding for regional activities;
- Revision of the Strategic Action Plan so as to include the newly identified projects.

The entire responsibility for realizing objectives was in the hands of national experts and was based on national consultations. Unfortunately, that means, the results reflect national preoccupations and priorities. Even the data quality weaknesses have important political and technical significance. They force one to realize where improvements need to be made and will hopefully motivate the countries to attain similar technical standards.

The immediate goal: prepare for funding pollution prevention and reduction activities

The Project prepared, as it was requested by the Project Document, a list of prioritized pollution reduction projects for co-financing by national and international sources.

The Project proposed to the ICPDR the establishment of a PAG to appraise newly submitted projects, and the creation of a PIF to support the regional investment programmes. The ICPDR endorsed the PAG and PIF proposals.

Overall Long-Term Goal: Stimulate Sustainable, Institutional, and Financial Arrangements for Effective Environmental Management of the Danube River Basin

The Project activities helped to stimulate sustainable, institutional and financial arrangements. The Project implicated fully the national ministry-designed experts, and trained them in data collection, environmental assessment, and regional cooperation. These specialists probably will remain important agents, voicing the idea of regional co-operation among national administrations. On the regional level, the Project has been working in close collaboration with the ICPDR, who become a custodian of all three past UNDP/GEF projects. The role of the ICPDR will be reinforced as well by the expected national project support through PAG and PIF. Both the national administrations and the regional ICPDR will be significantly strengthened as a result of the Project activities.

6 RECOMMENDATIONS

Now that project is complete, further actions need to be taken to sustain the Project's results in the region. These actions, along the lines of GEF goals, will concentrate on two areas: actions to be taken to increase the impact of the Project results, and suggestions for future regional efforts to reduce pollution in the Danube River basin.

6.1 Actions to be Taken to Increase the Impact of the Current Project

All three UNDP/GEF projects that helped develop pollution reduction in the Danube have left a very important legacy on the countries of the region, the ICPDR and the GEF. There is now abundant technical documentation, increased national capacities, and strengthened regional cooperation, as a result of these undertakings. The value of this legacy, once the Project ceases its activities, is less certain. Soon, the technical reports, which have been widely distributed, will no longer be available. The trained national personnel will probably be assigned to other tasks. The institutions involved in the Project's programme will implement other projects. It is therefore important to reflect on and learn from the Project's achievements, and widely distribute conclusions based on this reflection. This Project should be given a special consideration upon its completion because the regional cooperation in the Danube basin is more advanced than other GEF-sponsored river basin collaborations. More importantly, there is a strong expectation from the Danube basin countries and the regionally-based ICPDR, that the GEF assistance will continue. The evaluation mission supports these expectations.

The mission recommends to the Project and UNDP/GEF

1.1 In order to increase the Project's impact, the Project management and UNDP/GEF finance a critical review of the Project's achievements. They may also finance an evaluation of each country's progress in water pollution reduction, including public participation and policy issues as they were outlined in the previous Project Documents. Such a review should be organized and terminated before the Project's next phase of financing. The critical review should be professionally edited, published, and widely distributed.

The Project plans to publish two editions of the Danube Watch and to post the Project findings in the DANUBIS web site. The mission supports these initiatives and recommends to the Project to

1.2 Edit the existing technical materials according to the UNDP standards; pay close attention to rhetoric (clarity, organization, consistent and critical argumentation), and to the internal coherence of the documents.

Finally, the Project itself did not yet evaluated its achievements with respect to the Project Document requirements. This evaluation would have dealt with the GEF guidelines, UNOPS management services, the ICPDR support, regional cooperation, national collaboration, and the countries' expectations. Such an evaluation may be valuable for the Project's successors because it offers up the Project's results. The mission recommends to the Project

1.3 Include, in the final report, an exhaustive and critical evaluation of its achievements and difficulties.

The ICPDR is the regional organization that will benefit directly from the Project outputs. Therefore, the ICPDR should take steps necessary to safeguard the produced documents, databases, and models. The ICPDR should also take all steps needed to assure transfer of outputs and technologies from the Project to the beneficiary countries. The ICPDR should also ensure the necessary arrangements for regularly updating the database, running the models, and actualizing the financial and technical parameters of the priority projects. To this effect, the ICPDR should

1.4 Collect and disseminate information produced by the Project and national teams; organize training and demonstrations; transfer to countries the Project's knowledge and technologies including DWQM; standardize data collection methods and analytical procedures; continue to edit and distribute the Danube Watch; and update regularly the DANUBIS web site.

6.2 Implementation of the Future Regional Assistance to Water Pollution Reduction in the Danube River Bassin

The Project Document has covered a vast spectrum of activities, however, they did not bring out all important issues for regional water pollution reduction. The mission recommends that, in addition to the actions outlined in the Project Document, a future Danube project pay attention to the following issues:

Supply management: The easily foreseeable rapid economic growth of the region will increase demand for water. This increasing demand may create both national and transboundary environmental problems, which, in turn, will affect regional assistance.

2.1 The regional organization and the regional assistance projects should develop consistent criteria for evaluating and monitoring water development investments. These criteria should take into account all direct and indirect costs, potential risks, and impacts.

Municipal and industrial programmess: The demographic forecasts suggest that the countries' respective populations will remain stagnant. However, an increase in living standard will stimulate municipal growth. Industrial development will increase the use of water and thus raising risks of increased water pollution. The regional projects, in collaboration with national authorities, should determine the most effective methods of constructing wastewater and stormwater facilities for towns and industry, and stimulate efforts to reduce industrial pollution through ecologically sound technologies.

2.2 Efforts to control pollution should be monitored for both their site specificity and adherence to water basin requirements.

Agricultural practices: Agricultural practices are a major source of a very difficult to control diffuse pollution. Preventing this type of pollution requires the mass application of sound agricultural practices.

2.3 The regional projects should help countries to identify, test and disseminate sound agricultural practices, and support national awareness campaigns.

Safety of abandoned industry and mine wastes: The waste which accumulated during the past industrial development periods and was abandoned after the closing of obsolete industry, is another source of diffuse pollution.

2.4 The regional project should investigate this problem and help countries to find funding in order to ensure the environmental safety of this waste.

Toxic persistent contaminants: Toxic wastes should be strictly controlled throughout their entire chemical life – from their release into the environment to their safe decomposition.

2.5 The regional project should promote coordination among the affected countries to research the best control measures and an appropriate control policy.

Atmospheric pollution: Water quality is indirectly influenced by atmospheric pollutants such as sulfur dioxide and nitrogen oxide. Atmospheric pollutants are essentially transboundary.

2.6 The regional project can collaborate with other regional organizations involved in the monitoring and control of air pollution. It should support national efforts towards reducing atmospheric pollution.

Additionally, the following three aspects of regional cooperation should be included in a planned regional project.

Project as a regional policy instrument: Regional cooperation is always voluntary. The countries should feel economically or ethically motivated to adhere to regional treaties and standards. The regional projects, in collaboration with the regional organizations, may selectively invest their resources according to regional interest.

2.7 The mandate of the regional project may be to support regional and international organizations that are attempting to apply the regional policy tools. This support may cover areas such as evaluation national projects priorities from the regional point of view (according to GEF standards), establishing of baseline and incremental costs, and investment help for a country complying with the regional standard.

Integrate technical, economic, political, and social dimensions: The regional projects have a unique opportunity to integrate all three of these dimensions. The projects can gather technical data from several countries, collate them, make statistics, prepare comparisons and spread information over the region. Most traditional regional projects are satisfied to simply deal with a regional version of a current national technical problem. More complex data gathering and more sophisticated analytical processing are required for successfully completing environmental projects. Environmental degradation is a visible and measurable consequence of human behavior. An investment that improves one environmental sector may have ramifications in several aspects of human life. It may well become a welcome political issue but could also be seen as a new unwanted expense for the citizens. The regional projects may help countries to comply to the regional decisions and have them consider the technical, economic, political, and social ramifications.

2.8 The regional projects should adopt a holistic approach and take in a list of their activities: data collection and dissemination, training and demonstrations, research, norms and legislation standardization, and public participation and promotion. All of these would be seen in the broad sense of supply and demand for water, and of a country's macroeconomic policy.

Finally, a country may expect that its contribution to a regional effort will be in proportion to its benefit. The regional projects and regional organizations should manage their resources in such a way that the global regional effort under their management has greater value than the sum of national efforts, and that the all participating countries benefit from the cooperation. Therefore it is recommended that

2.9 The regional project prepare periodically a balance of regional expenses and gains, and informs the countries about advantages of adhering to a specific cooperation programme. This balance will help the project and its regional counterpart to mobilize national efforts for a particular programme, and to decide on the amount a country may be willing to contribute to the regional effort.

7 LESSONS LEARNED

The Project experience offers constructive lessons for the UNDP in areas such as human development, capacity building, and an improved understanding of transboundary pollution.

Human development. The sustainability of environmental projects depends on how much the public has learned about the environmental impact, and how much the attitude of beneficiaries towards environment has changed. Increasing the public's knowledge is a relatively easy task compared to changing the attitudes of beneficiaries. Increasing knowledge or raising public awareness can be achieved through training sessions, documents distribution or media implication. Changing attitudes, on the other hand, is very hard. The rate of message adoption and behavioral change depend on the intrinsic value of the message, on the transmission medium, on the past experience of the subjects, and on their expectations. A systematic evaluation of the message adoption rate should be included in the environmental projects. This evaluation may help in selecting the best tools and media to transmit the message.

Capacity building. Capacity increase among the project beneficiaries depends strongly on their personal involvement in the project and on how attractive the project's activities appear to them. One may expect a strong personal involvement in an activity that, for example, helps a person solve a similar problem in the future. For example, the Project trained hundreds of national technicians in data collection and report preparation. They have brought the acquired skills to the national levels. Virtually all information was collected nationally within the national services, using local human resources. These individuals probably still contribute to increased professionalism on the national environmental arena. It would be interesting to the UNDP and GEF to evaluate the impact of these agents on national and regional environmental activities.

Understanding transboundary pollution. Completing the Project's activities advanced the national concerns about the basin-wide water pollution reduction problem. The increase in transboundary pollution understanding will become a lasting record since the Project transformed an abstract concept of a transboundary pollution into a neat package of identified problems. The identified polluting agents have a clear and measurable consequence of pollution. The Project strengthened, as well, personal collaboration among the high-ranking officials of the various ministries. It is, therefore, possible to put a human face on an anonymous governmental decision. Putting a recognizable features onto the vague problem of transboundary water pollution, the Project made this issue more comprehensive than any before in the history of such regional collaboration.

ANNEX I

TERMS OF REFERENCE

Objective and Scope of the Evaluation Mission

1. Purpose

This is a final evaluation of the project: it will consider the impact, effectiveness and efficiency of the project. Consider contribution of project towards capacity development, long-term sustainability and direction for the future.

2. Scope

The evaluation is an activity in the project cycle which attempts to determine as systematically and objectively as possible the relevance, efficiency, effectiveness, impact and sustainability of the project. The evaluation will assess the achievements of the project against its objectives, including re-examination of the relevance of the objectives and the project design. It will also identify factors that have facilitated or impeded the achievement of the objectives. While a thorough review of the past is in itself very important, the in-depth evaluation is expected to lead to detailed recommendations and lessons learned for the future.

In particular the evaluation will address the following issues considering the participation of all countries covered by the project:

2.1 Project Design

a. Review and assess the appropriateness of the project's concept and design to the overall situation in the Danube River Basin (DRB)

b. Apprise the project's current effectiveness in realizing the four objectives, and the extend to which they contribute to the overall development objective as announced in the project document

c. Apprize the project's actions and outcomes in the light of the pertaining GEF guidelines

d. Assess sustainability of the programme

2.2 Project Implementation

The mission will review:

a. Assess the general implementation and management of the project in terms of quality and timeliness of inputs and activities, with particular reference to financial and human resources management

b. Evaluate the adequacy of management arrangements as well as monitoring and backstopping support given to the project by all parties concerned

c. Evaluate changes in the environment in which the project operates and which constituted the rationale for GEF support, particularly in the areas of: regional cooperation, policy development, and public participation.

2.3 Project Impact

The mission shall review the achievements if the project against the announces objectives, outputs and activities as detailed in the project document and summarized below:

I. Complete the knowledge base for priority-settings
   - i. Update national reviews and analyze national actions plans using a common format
   - ii. Complete the transboundary diagnostic analysis

II. Review policy for protection of the Danube Basin and the Black Sea
   - iii. Promote pollution prevention and reduction policy freview

III. Increase public awareness and participation
   - iv. Raise public awareness about pollution reduction activities
   - v. Improve coordination and information exchange

IV. Develop the financing of the pollution reduction programme within the Danube Strategic Action Plan
   - i. Develop portfolio of Danube basin projects
   - ii. Mechanisms to provide sustainable financial support for the Danube River Basin
   - iii. Finalize and agree on the process for adopting a revised SAP

In addition, the evaluation will consider the general impact of the project in terms of the following criteria:

- awareness of the participating countries about the project's outputs;
- level of ownership and commitment of the participating countries towards the project;
- impacts on the policy and strategies of the countries;
- technical and managerial cooperation among the participating countries;
- interagency/interministerial cooperation in each country;
- cooperation among sectors, including the non-government and private sectors;
- sustainability of project impact.

3. Method

The evaluation will be composed of two activities: studying documents and interviews of individuals who are either involved in the project, or who have or might be expected to have impacted by the project.

Although the mission should feel free to discuss with the authorities concerned all matters relevant to its assignment, it is not authorized to make any commitment on behalf of UNOPS, UNDP or GEF.

4. Conclusions and Recommendations

Based on the above the mission shall:

a. Write up its conclusions of the visit

b. Address the relevance of the project design in view of the current situation of the Danube countries and the priorities within the donor community, particularly UNDP, the World Bank, and GEF

c. Assess the general project implementation in terms of use of human and financial resources, and backstopping services provided

d. Review in detail the project results against announced project objectives and actions

e. Advice on the suitability of further actions in the region upon completion of the current project within the overall objective of GEF.

ANNEX II

MISSION CALENDAR

June 1999

7 New York. Meeting with Mr. R. Aertgeerts, UNOPS and Mr. A. Hudson UNDP/GEF

9 Vienna, meeting with the UNDP/GEF Project Management.

10 Vienna, meetings with the Project Management and documentary study.

11 Vienna, meetings with the Project Management and documentary study.

12 Vienna, participation in ICPDR meeting.

13 Vienna, mission internal meetings.

14 Vienna, meetings with the Project Management, FGG, mission internal meeting, documentary study.

15 Vienna, meetings with the Project Management, EU Phare, and documentary study; Budapest, meeting in REC.

16 Vienna, meetings with the Project Management, ICPDR, WWF, EU Phare, and documentary study.

17 Vienna, meetings with the Project Management and documentary study; Frankfurt, meeting in KfW; Munich, meeting in DEF.

18 Vienna, meetings with the Project Management and documentary study; Delft, meeting in Delft Hydraulics.

21 New York, meeting in UNOPS and UNDP/GEF.

ANNEX III

LIST OF PERSONS MET

AERTGEERTS, Roger	Senior Project Manager, Division for Environmental Projects, UNOPS, New York
AKHTAR, Tehmina	GEF Regional Coordinator, RBEC – UNDP, New York
BEDRICH, Milan	Povodi Moravy, Brno
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ANNEX IV

LIST OF DOCUMENTS REVIEWED

1 Analysis of Financing Mechanisms. PCU and Wanninger, R. 1999. No page numbering.

2 Convention on cooperation for the Protection of sustainable use of the Danube River (Danube River Protection Convention). Uated. 43 p.

3 Danube Regional NGO Consultation Workshop Report. REC, 1998. 28 pp. and 5 volumes of specific presentations.

4 Danube River Basin Pollution Reduction Programme Report. PCU, 1999. 57 p. and 15 annexes.

5 Danube Water Quality Model Simulations in support to the Transboundary Analysus. PCU, 1999. 54 p.

6 Eutrophication of the Black Sea: causes and effects. ICPBS and ICPDR, 1999. 70 p.

7 Evaluation of Wetland and Floodplain Areas in the Danube River Basin. PCU and WWF, 1999. 84 p.

8 Final Report. RER/91/G31 and RER/95/G45. Undated. 66 p.

9 Financing Pollution Reduction Measures in the Danube River Basin. PCU and KfW, 1999. 68 p. and 7 annexes.

10 Framework for Development of an Information Network for the ISPDR. PCU,

1998. 105 p.

11 GEF/UNDP Project Implementation Inception Workshop. PCU, 1997. 30 p. and 7 annexes.

12 Guidelines for Target Oriented Program Planning Workshop. PCU, undated. 91 p. and 23 flipcharts.

13 Local Grants for the Danube Pollution Prevention Program. REC, 1998. 16 p.

14 National Review Reports. (1999). Vol. 1,2, 3,and 4.

15 PMTF meetings 1,2 and 3 (1998 to 1999)

16 Project Document. RER/96/G31. 1997. 50 p.

17 Socio-Economic Analysis. PCU and R. Wanninger, 1999. No page numbering

18 Strategic Action Plan for the Danube River Basin 1995-2005. EPDRB, 1994. 109 p.

19 Strategic Action Plan for the Danube River Basin 1995-2005. Revision 1999. PCU, 1999. 130 p. and 4 annexes.

20 Terms of Reference for Programme Management Task Force (PMTF). ICPDR, 1998. 7 p.

21 Transboundary Analysis. Final Report. PCU, 1999. 218 p.

ANNEX V

ACTIVITIES

Objective 1: Complete the knowledge base for priority setting

Sub-objective 1.1: Update National Reviews and analyze National Action Plans, using a common format

1.1.1 Update National Reviews focusing on priority pollutants/sectors agreed in SAP

The UNDP/GEF staff, assisted by three international experts and eleven teams of national experts (45 national experts in total), prepared, from December 1997 to January 1998, guidelines for national reviews including the electronic formats for substance emissions and other water quality data required by the DWQM. Between February and November 1998, the national teams, in consultations with the NGOs and the public, prepared the national reports according to the provided guidelines. These reports were validated between September 1998 and January 1999, and became available to the DWQM. In 1999, the project team, together with the national and international experts, used the information available to prepare, for each country, an analysis of water pollution socio-economic effects, and a description of financial mechanisms for pollution reduction projects.

Two of the countries situated in the Danube River Basin (Austria and Germany) were not eligible for the project funding. Consequently, the project provided the countries with guidelines and formats, but not with financial support for the data collection. Up till now, these countries sent to the project the water quality data essential to development of the DWQM; however, they provided the project only with a part of information needed for their respective national reviews.

1.1.2 Prepare National Reviews for Bosnia-Herzegovina, the Federal Republic of Yugoslavia and Croatia

Bosnia-Herzegovina, Federal Yugoslav Republic, and Croatia were included in the national review studies during the same time as the other countries (see activity 1.1.1), and they provided all the data as scheduled, before the end of January 1999.

1.1.3 Definition of national baselines contribution through analysis of national policies, projects, investments, etc. defined in National-Action Plans

The project staff, assisted by a consultant and by EMIS, prepared in December 1997 and January 1998, a format for the national baselines. Then, in each country, the national teams in consultations with public and NGOs, prepared the national baselines. Between November 1998 and April 1999, the national baselines were introduced into the DWQM.

Sub-objective 1.2: Complete the Transboundary Diagnostic Analysis (TDA)

1.2.1 Prioritization of 'Hot spots'

The hot spots screening methodology that enables their prioritization for N and P pollution reduction projects proposals was completed by the project staff in January 1998. Between February and November 1998, in each country, the list of hot spots was completed ant they were prioritized according to the prepared screening methodology. Between November 1998 and January 1999, the project team, assisted by one consultant and by ICPDR Steering Group, incorporated the prioritized hot spots into a Transboundary Analysis Report.

1.2.2 Develop extended Danube Water Quality Model for priority pollutants

From September 1998 to May 1999, the project team, assisted by a consultant, validated the DWQM results. Simultaneously, the project improved and developed further the DWQM by increasing its analysis capability.

1.2.3 Asses the priority sites for wetland/floodplain restoration for pollution reduction and ecological rehabilitation

Between February 1998 and February 1999, the project team, assisted by a consultant, reviewed wetlands and floodplains in the Danube River Basin, and assessed their ecological functions; especially their nutrient removal capacity. The results were described in a basin-wide overview. Simultaneously, the project prepared an intervention program of wetland and floodplains restoration for inclusion in the Transboundary Diagnostic Analysis and drafted a management schemes outline (with baseline and total costs of management). A detailed development of wetland and floodplain management, initially included in the project document, appeared to be not feasible within the given budget.

1.2.4 Social analysis of pollution in the Danube River Basin and Black Sea

Between November 1998 and January 1999, the project team assisted by a consultant, completed a generalized format of reporting information on social impact of water pollution. In the meantime, the international consultant assisted by the project staff, and on a base of information provided by the national consultants, prepared a basin-wide overview of the national reports. Between January and April 1999, the results were incorporated into the overview of the Transboundary Diagnostic Analysis.

1.2.5 Integrate updated National Reviews and DWQM results with initial Transboundary Analysis (TA) to produce a draft basin-wide environmental status and strategy for tackling priority transboundary issues

The first draft of the transboundary analysis was completed in January 1999, the second in February 1999.

1.2.6 Hold Technical conference on transboundary pollution

In November 1998, the project management selected location, proposed dates, and organized logistic arrangements for a conference on transboundary issues. The program of the conference was developed in December 1998, and the conference itself was held in January 1999. The conclusions and proceedings of the conference were circulated among the Danube basin countries five weeks later. The definitive version of transboundary analysis was available in May 1999.

Objective 2: Review Policy for Protection of the Danube Basin and Black Sea

Sub-objective 2.1: Promote a Pollution Prevention and Reduction Policy Review

2.1.1 Prepare a timetable and a process for implementing and, if needed, updating the Danube SAP with an aim of aggregating quantified targets for pollution prevention and reduction

The project has, so far, within the frame of PMTF meetings, and in collaboration with the International Commission, organized three consultative meetings (in November 1997, October 1998, and in May 1999) with Danube countries to discuss updating the Danube Strategic Action Plan. The participants of the meeting agreed upon approaches to updating the SAP. Working groups, consisting of experts from the Danube Basin Countries, were organized to develop SAP progress indicators, prioritize work on hot-spots and wetlands, achieve policy consensus concerning TDA and GEF pollution reduction targets and ecological rehabilitation. The SAP update was also discussed in national NGO workshops an in national planning workshops.

2.1.2 Hold joint technical discussions with Danube and Black Sea countries to agree load/concentrations and sources of priority pollutants and wetland/floodplains of overall (Black Sea) basin-wide significance

2.1.3 Hold policy discussions with Danube and Black Sea countries to agree necessary pollution reduction strategies for the Black Sea Basin, consistent with GRF Operational Strategy

The project held one technical workshop on December 1998 to discuss: loads, concentration and sources of priority pollutants impacting the Danube and the Black Sea; and the rehabilitation and management of wetlands and floodplains of basin-wide significance. It held also three meetings in March, August and December 1998 to discuss technical strategies and policy basis for reducing the impact of priority pollutants within Black Sea basin.

2.1.4 Prepare pollution prevention and reduction programs for priority pollutants, especially nutrients

In December 1997 and January 1998, the project management developed a general framework for prevention and reduction programs for priority pollutants. The national teams prepared pollution programs and, between January 1998 and June 1999, held consultations with both the economic sector and non-governmental organizations involved. The program was completed in June 1999.

2.1.5 Integrate pollution prevention and reduction strategy into the SAP revision process

Between February and June 1999, the project team incorporated the results of the initial pollution prevention and reduction programs into the drafting process for the revised SAP.

Objective 3: Increase public awareness and participation

Sub-objective 3.1: Raise public awareness about pollution reduction activities

3.1.1 Launch public awareness program based on updated National Reviews and TDA – produce and disseminate a general brochure

In February and March 1998, the project prepared materials for a basin wide workshop to train national facilitators from the government and NGOs, and published guidelines for conducting national workshops. Eleven workshops for national NGOs and eleven national planning workshops were held between May and November 1998.

3.1.2 Hold consultations with local Stakeholders about priorities for transboundary pollution reduction

During the eleven national planning workshops held between May and November 1998, the project organized: (1) review of national transboundry pollution problems, (2) overview of national baselines, and (3) overview of wetlands and floodplains. Then, in January 1999, the project organized a technical conference on transboundary pollution. The conference reviewed the results of the transboundary diagnostic analysis. The project held as well, between May and November 1998, sub-regional and national consultations (planning workshops) and discussions about common strategic approaches to pollution reduction and ecological rehabilitation in the river basin and coastal Black Sea areas. To gain some feedback on the emerging pollution reduction programs, the project organized in May 1999 a pollution reduction program workshop.

3.1.3 Distribute three editions of "Danube Watch"

In March, June and September 1998, the project prepared, edited, and published three issues of the "Danube Watch". The fourth issue (not included in the original work program) will be edited and published in July 1999. Finally, the project will edit an easy-to-read volume of Danube Watch reporting the key points of the SAP and PRP. This fifth edition is scheduled for September 1999.

3.1.4 Support the Danube Environmental Forum and national NGO meetings

The project held two meetings of the Danube Environmental Forum (in November 1998 and in March 1999) to discuss and agree the response of environmental groups to the on-going review of the SAP. From May to September 1998, the project has organized national NGO meetings to discuss strategies for influencing the government, business, and the public on the issues relevant to the Strategic Action Plan review. Finally between May and October 1998, the project, jointly with the Danube Environmental Forum, organized in Bulgaria, Romania, and Ukraine the national workshops aiming at reinforcement of cooperation between the NGOs from these three Danube and Black Sea countries.

3.1.5 Provide small grants for community-based pollution reduction and awareness projects

Between March and May 1998, the project established the mechanisms of awarding small decentralized grants in each Danube country. The grant program was elaborated and publicized widely between May and June 1998. The implementation of grants started in September 1998. The total budget of US$200,000 was allocated. The small grant program will probably be completed in September 1999.

Sub-objective 3.2: Improve coordination and information exchange

3.2.1 Establish Danube internet network

Between January and March 1998, the project assessed the existing information system in Danube region. After that assessment, the project convened, still in March 1999, a Danube information system workshop that reviewed the existing information and created ad hoc working group that developed tools for information Internet network. The members of the workshop, jointly with the project management and the ICPDR, decided to establish the Danube Internet network as a part of the larger ICPDR information system. The government of Austria provided additional US$280,000 for development of that information network. The development of network itself will take one year, between December 1998 and December 1999. Actually (June 1999), the project installed the appropriate hardware and software for the network (supported by additional funding by the Austrian Agricultural Ministry by US$50,000). It is foreseen that the final product of this activity will be delivered as scheduled, in December 1999.

3.2.2 Update and disseminate DANIS

Following the recommendation of the workshop held in March 1998 (activity 3.2.1) and by joint decision of the project management and the IPCDR, the obsolete DANIS information network was incorporated into modern and widely used ICPDR information network DANUBIS

Objective 4: Develop the financing of the pollution reduction program within the Danube SAP

Sub-objective 4.1: Develop portfolio of Danube basin projects

4.1.1 Develop financing strategies for the pollution reduction program within the SAP, in accordance with the Basin-wide strategy

The project prepared formats for financing strategy for pollution reduction as early as in December 1997 and January 1998. The national teams confirmed their readiness to contribute to development of financing strategies and started to prepare the national strategies between February and November 1998. Overall basin-wide financing strategies were reviewed in a workshop held in February 1999. They were finally incorporated in the revised SAP in June 1999.

4.1.2 Prepare project documents for priority hot-spots projects for investment consideration

The model structures of project documents for pollution reduction in Danube countries were prepared by the project management, assisted by a consultant, in December 1998 and January 1999. The elaborated national projects were incorporated progressively into a computerized project file and, in May 1999, all developed projects (according the model) were reviewed in a Pollution Reduction Program Workshop.

4.1.3 Prepare the outline descriptions of wetland, floodplain and demonstration projects for potential donor grant support

The model structures for project document were proposed between February and June 1998. Between June and November 1998, the country teams prepared individual projects with assistance of an international consultant. The implementation strategies were identified and developed between October 1998 and April 1999.

Sub-objective 4.2: Mechanisms to provide sustainable financial support for the Danube River Basin

4.2.1 Feasibility of establishing a Danube Environmental Fund, including the exploration of the economic instruments needed

Between April 1998 and April 1999 the project team, ICPDR, and a consultant conducted a feasibility study of options for establishing an international Danube Environmental Fund. The feasibility of this fund was discussed in a workshop in February 1999. From September 1998 to February 1999, the international community was consulted on provision of funds for the Danube Environmental Fund.

4.2.2 Prepare structures, rules etc. for a Regional Fund, or other mechanism as agreed

The rules and structures of the regional funds were elaborated by the project between April 1998 and January 1999 as a part of the feasibility study (activity 4.2.1).

Sub-objective 4.3: Finalize and agree on the process for adopting a refined SAP

4.3.1 Integrated portfolio of investment and capacity-building projects, and regional financing mechanisms, into SAP

Between February and May 1999, the project organized discussions of results of financing strategies and project pipelines for pollution reduction programs. These strategies were discussed with groups responsible for the updating SAP. As a result, between February and May 1999, the project, the ICPDR, and the drafting group have prepared an updated version of the SAP.

4.3.2 Adopt updated Danube SAP at the ministerial conference

The updated versions of SAP and PRP were discussed at a regional workshop in May 1999 and then presented to the IPCDR Steering Group in June 1999. The ministerial conference that will discuss and eventually adopt the Danube SAP will be organized by ICPDR in November 1999 or early in 2000.

4.3.3 Donor Pledging conference (or PC meeting) for priority investment projects

The project documents, including proposed financing packages for pollution reduction projects, were finalized by June 1999. These documents were consulted with donors during the regular PMTF meting, during individual consultations, and during presentation of country or regional documents to the PMTF. Subsequent meetings with donors are scheduled for November 1999. Two special editions of a journal 'Danube Watch' will discuss the pollution reduction program and review the SAP.

Cooperation between UNDP and The European Commission

The Project assisted the UNOPS and EC in updating an agreement between the UNDP and the European Commission. The updated agreement was presented to the Danube Task Force for review in 1998. The agreement was approved in 1998.

Danube Task Force

The project organized one meeting of the former Task Force (TF), two meetings of the new Program Management Task Force (PMTF), and provided financial support to the recipient countries for attendance. The project participated in discussions concerning the transfer of responsibility for implementation of the SAP from the PMTF to the new TF established under the DRPC.

ANNEX VI

OUTPUTS

Objective 1: Complete the knowledge base for priority setting

(Output description is based on Van Hoof findings – Annex VII)

Sub-objective 1.1: Update National Reviews and analyse National Action Plans, using a common format

1.1.1 Eleven updated National Reviews and an extended and improved Danube Water Quality Model for analysis of transboundary pollution loads and export to the Danube delta and Black Sea

1.1.2 Two National Reviews and an extended and improved Danube Water Quality Model for analysis of transboundary pollution loads and export to the Danube delta and Black Sea

The project has received national reviews from nine countries (except Austria and Germany). The reviews were updated and put in a common format. Each of them contained pollution emission data required for the transboundary analysis and the water quality model simulations. However, the quality of data and the reports produced by the countries was unequal. The most salient inadequacies are:

Slovenia

Frequency of the immission measurements on surface waters is very low (four per year) and mostly performed at low river flows which does not allow reliable calculations of loads of priority pollutants.

Czech Republic

Immission measurement frequency is only twelve per year; load calculations are not given.

Slovakia

Missing information on sampling frequencies; no details on calculation of loads

Only immision concentrations for the priority parameters requested are given. Organochlorine pesticides and triazine herbicides residues are reported without mentioning concentrations.

Hungary

No observation.

Bulgaria

Data available are limited to priority parameters. Low sampling frequency (once per month).

No load calculation description. The report is written in very general terms.

Romania

Methods used for load calculation are not described.

Moldova

Different water quality problems mentioned, but not described systematically. No systematic information on parameters measured and sampling frequencies; no indication on load calculation. Information reported in a non structured way.

Ukraine

Lack of systematic information on sampling frequencies and analyzed parameters. Only immision concentrations are reported. No information about loads.

Croatia

Sampling frequencies are not mentioned. Loads have been calculated by scientifically unsound method.

Bosnia-Herzegovina

Only a very limited set of water quality data is available. Hot spots were not prioritized.

Federal Yugoslav Republic

Lack of reliable time series of immission values after 1992.

1.1.3 Calculation of the national bselines for pollution reduction from priority substances (especially phosphorus) impacting the Danube River and Black Sea

Pollution Reduction Program Report (PRP), page 48, provides national baselines and incremental costs for the proposed projects. The division of total costs into baseline and incremental were calculated in a simple and schematic manner that is satisfying at this stage of PRP reporting. The baselines should be, however, recalculated once an identified donor will consider the project for implementation.

Sub-objective 1.2: Complete the Transboundary Diagnostic Analysis (TDA)

1.2.1 Prioritised list of hot-spots relevant to the pollution reduction program in the Danube River Bassin

The list of prioritized hot spots is incorporated into a report “Transboundary Analysis,” June 1999.

1.2.2 Substantially validated Danube Water Quality Model capable of quantifying transboundary pollution loads in the Danube River Basin and export to the Black Sea, ready for discussion and approval as a management tool by all Danubian countries

The output is described in a document "Danube Water Quality Model simulations in support of the Transboundary Analysis and the Pollution Reduction Programme", dated June 12, 1999. The model (DWQM) simulates the flow of pollutants through the Danube River basin. The Model may simulate pollution by such substances as BOD, COD, N, P, or oils. It aimed at evaluation of transboundary pollution and calculation of various pollution reduction scenarios.

However, now, due to the limited water pollution quality data available, the model may be used in preference to simulate the N and P pollution according to two scenarios (high or low pollution). The results should be interpreted with caution.

The first simulations by the DWQM indicate the most important sources of N and P pollution, demonstrate that diffuse pollution is the most important contributor to N and P pollution in the Danube basin and that the impact of wetlands on N and P reduction is limited.

1.2.3 Basin-wide overview of the wetlands and floodplain network and a program of baseline and incremental management interventions which will contribute to transboundary pollution reduction and nature conservation.

The draft report 'Evaluation of Wetlands and Floodplain Areas in the Danube River Basin' (February 1999) evaluated indirectly (e.g. by the number of days a landstrip has been flooded) the effect of wetlands on N and P removal. The report made clear that:

- Nutrient reduction by wetlands is only a side effect of wetland rehabilitation and should not be considered as an alternative for waste water treatment;
- Involvement of beneficiaries in this activity is a prerequisite for success for wetland restoration.

1.2.4 Basin-wide overview of Danube water pollution on people is prepared and integrated into the Transboundary Diagnostic Analysis

A document that covers this subject is very general and does not handle the hygienic risks adequately.

1.2.5 Draft final version of the Transboundary Diagnostic Analysis for wide international review, including by IC Emissions Expert Group

Transboundary analysis is based on national reviews that contained many inconsistencies The repport describes the results but not mention any conclusions neither in relation to the Danube River basin nor to the Black Sea.

1.2.6 Conference proceedings and the final version of the Transboundary Diagnostic Analysis

The conference was held in January 1999; the results of discussions were incorporated in the definitive version of the transboundary analysis in May 1999.

Overall output of Objective 1:

The outputs from the first sub-objective represent the best available knowledge on Danube River basin pollution. All together, the information provided a first input to the basin pollution model. It helped the countries and the project to identify the important sources of pollution, and to prepare proposals for pollution reduction projects.

The overview of national reports shows, however, that they differ strongly in quality. All reports focus on pollutant concentrations (quantity of pollutant in a given volume of water), whereas pollutant loads (quantity released from the pollution point) - important tools for policy evaluation - are seldom mentioned.

A major problem affecting successful implementation of the objective was lack of sufficient and reliable imission water quality data needed for the transboundary analysis and for the validation of the Danube Water Quality Model. This shortage could not have been overcomed within the duration of the project.

In general, the reports produced represent a high quality despite of the burden of insufficient data. Report on the Danube Water Quality Model demonstrate elegant approach to solve this basic problem. The model as well as other outputs represent a good achievement of the immediate objectives of the project, and will contribute to the development of the region.

Objective 2: Review policy for protection of the Danube Basin and Black Sea

(Findings of S. Manikowski)

2.1.1 An agreed timetable and approach for updating part or all Danube SAP is prepared. In particular the project has designed an approach to updating the pollution reduction targets for priority substances and sectors, required to ensure protection the Danube River Basin and the Black Sea

A common timetable and approach for updated the Danube SAP was elaborated and agreed upon durind a Facilitator Training Workshop in March 19, 1998. The workshop's approach was based on the Target Oriented Program Planning methodology which aimed at reinforcing country-driven initiatives, and ensuring that government, administration, NGOs, scientific institutions, and cooperating agencies are all involved in the planning process.

2.1.2 An agreement is reached on the priority pollutants and sectors affecting the Black Sea Basin, and a strategy is developed to overcome current environmental problems

The agreement on priority pollutants and sectors was reached and the list of the priority pollutant incorporated into the revised Strategic Action Plan (SAP). This agreement was based on the National Reviews, which described and analyzed the socio-economic impact, water quality, water engineering, and financial mechanisms. At the regional level, these data were synthesized and used to prepare a comparative socio-economic analysis, develop a financing mechanisms, and complete an investment portfolio.

2.1.3 First steps are taken toward a technical and policy agreement. These agreements cover the strategy pollution reduction and ecological rehabilitation in the Danube/Dniester/Dnieper/Don river basins and along the Black Sea coastal zones

The workshop and meetings initiated by the project created both a basis for national and regional policies; and strategies for pollution reduction, and ecological rehabilitation of both basins.

2.1.4 Draft national Pollution Reduction Programs for all Danube contries

The drafts of the national pollution reduction programs and the draft of the Danube River Basin Pollution Reduction Program (PRP) were prepared and finalized in June 1999. The final PRP draft was amended on the basis of comments and validating arguments of the decision-makers from the member countries. The PRP corresponds to the priorities defined separately by each nation. It focuses on point source pollution. The PRP is the basis for developing investment portfolio in support of the SAP.

2.1.5 Introduction into the SAP the policy directions concerning pollution prevention and reduction

The SAP was finalized in June 1999, and in contains the policy considerations perceived by member country representatives.

Overall output of Objective 2

According to the Project Document, the activities conducted and the products achieved in the frame of objective 2 should

- Contribute to an agreement on policy directions for pollution prevention and reduction in the Danube River and Black Sea basin;
- Lead to an updating of the Danube SAP;
- Identify in each Danube country a range of pollution reduction targets.

The present section will evaluate activities and their outputs. It will describe how they contributed to achieving each of these aforementioned three goals.

A. Agreement on policy directions for pollution prevention and reduction in the Danube River and Black Sea basins.

The studies and investigations undertaken in activities 2.1.2, and 2.1.3 designed a picture of a progressive poisoning of the Black Sea ecosystems due to pollutants produced by surrounding countries. The studies clearly indicated the countries responsible and warned them about the economic and social consequences of polluting civilization. The studies indicated the current weaknesses in the monitoring of pollution. The information provided helped to bring the issue of reducing Black Sea pollution to politicians, political organizations, economic agents, research institutions, NGOs, and citizens attention.

The project, jointly with ICPBS and ICPDR, attempted to formulate both policy and strategy for reduction and prevention of pollution. The policy is discussed in the “Summary Report of the joint ICPBS and ICPDR of Ad-hoc Technical Working Group” dated May 1990. On page 12, under the section “Policy Perspectives for Controlling Eutrophication”, the report makes reference to an “iterative management” that has been taken by the Black Sea Strategic Action Plan as an approach to reducing pollution.

The iterative management approach is as follows: When complete removal of pollutants is desirable but unattainable in the foreseeable future, the progress in pollution reduction may be achieved by an iterative process. In the first step of this process, each partner agrees to reduce pollution by some reasonable amount during a given time frame. Once this is attained, the partners set the next reduction target. The iteration continues until all partners agree that pollution emission has been reduced to a satisfactory level. The iterative steps in pollution reduction are accompanied by research programs, pollution measurements, and public awareness building.

It seems that both Commissions tacitly agreed on this approach. According to the cited Summary Report (page 11), the group proposed to both Commissions that pollution reduction should aim at restoration in the Black Sea of an ecological state similar to that of the 1960s. This well corresponded to the "satisfactory level" attended at the end of the iterative management method. Furthermore, (keeping in mind the iterative steps) the group believed that (still on page 11) "in order to start, an agreement is needed on Black Sea nutrient input limits and on the state of the ecology regarding these inputs." Then, in the next paragraph, the document proposes to both Commissions to maintain temporarily the discharges at 1997 level in order to see the Black Sea ecosystems response.

The Commission's proposal needs yet to be endorsed by the States and translated into specific commitments by the countries concerning the first step of the iteration process: the limitation of pollutants, and then, the programmes accompanying these limitations. The countries should take initiative in determining the policy directives and policy implementation instruments for pollution reduction since, as it was rightly stressed by three participants of a third meeting Group, and cited in the Draft Minutes of the third meeting (page 5) "any true acting is only at the respective national level, and the function of the Commissions is to have an 'umbrella' via the 'participation of cooperation'."

The Group has also attempted to develop some strategies. In the second meeting of the joint ICPBS and ICPDR Ad-hoc Technical Working Group, the Group defined "possible strategies" for reducing pollution as follows (Summary Report, page 12):

- The long-term goal for all States in the Black Sea Basin is to take measures to reduce the loads of anthropogenically applied nutrients and hazardous substances to such levels necessary to permit Black Sea ecosystems to recover to conditions similar to those observed in the 1960s.
- As an intermediate goal, urgent control measures should be taken by all States in the Black Sea Basin in order to avoid that the discharges of nutrients and hazardous substances into the Seas exceeded those that existed in 1997. The 'Group' recognized that these 1997 discharges are only incompletely known and that further work has to be undertaken to substantiate the size of the loads received by the Seas (Black Sea proper; Sea of Azov).
- The 'Group' concluded that the inputs of nutrients and hazardous substances into both receiving Seas have to be assessed in a comparable way, and that to this very end a common AQC (Analytical Quality Control) system and a thorough discussion about the necessary monitoring, including the sampling procedures, has to be set up.
- The 'Group' also concluded that the ecological status of the Black Sea and the Sea of Azov has to be further assessed, and that the comparability of the data basis has to be further increased.
- Both the reported input loads as well as the assessed ecological status will have to be reported annually to both the ICPBS and the ISPDR.
- The States within the overall Black Sea shall have to a adopt strategies that will permit economic development, whilst ensuring appropriate practices and measures to limit the discharge of nutrients and hazardous substances, and to rehabilitate ecosystems which assimilate nutrients.
- Based on the annual reports and on the adopted strategies for the limitation of the discharge of nutrients and hazardous substances, a review shall be undertaken in 2007. It will focus on the further measures that may be required for meeting the long-term objective (reaching an ecological status similar to the conditions observed in the 1960s).

The Group's definition of the strategy may be considered as a preliminary identification of problems related to the pollution reduction policy implementation. The elaboration of national and regional strategies is yet to come.

In conclusion, the activities 2.1.2, 2.1.3 and their outputs yielded several positive results. They helped in understanding the Black Sea eutrophication problem, provided evidences for the decline of coastal ecosystems, raised the problem of nutrient sources to the Black Sea and warned about the danger of doing nothing. They are the first steps in designing a specific common approach on policies, strategies, and technical measures to pollution reduction and ecological rehabilitation in the Danube/Dniestr/Dnieper/Don river basins and from Black Sea coastal zones.

B. Updating the Strategic Action Plan

The Danube River Basin Environmental Declaration of 1994 required that the SAP prepared in 1994 be evaluated and updated by 1997. The activities 2.1.1, 2.1.2, and 2.1.5 and their outputs aimed at this outcome. The final SAP, the SAP-1999, is one of the outputs.

The SAP-1999 is a document of 150 pages that summarizes the most important pollution reduction measures both current and future for the Danube. For over a year an half, the project its member countries have mobilized representatives of technical ministries concerned, NGOs, and, through the consultations on the national level, the private sector. The project provided several inputs, such as overall guidance, organization, financial support and technical expertise. The national level contributors collected data, prepared documentation, and formulated proposals for the revision of the SAP. As a result, the SAP 1999 reflects an understanding of how pollution reduction is approached by DRPC member countries. The SAP-1999 is accompanied by a Danube River Pollution Reduction Program (PRP) containing description of priority targets for pollution reduction identified in each Danube country. The draft SAP-1999 was discussed at a workshop in May 1999, adopted in June 1999, and will be presented for approval to the technical ministries of the member countries by the end of this year.

Both the SAP-1994 and SAP-1999 stem from the decisions taken by the Environmental Program for the Danube River Basin (EPDRB) created in Sofia in 1991. The content of the SAP should indicate to the countries how the EPDRB program formulated in a document called Danube River Protection Convention (DRPC) will be implemented. The SAP should serve as an important tool for policymakers (SAP dated 1994, page i) and provide direction and framework for regional cooperation among countries in the Danube River basin (Ibid., page iv). The SAP should indicate the regional policies and strategies for water pollution reduction and environment protection (SAP-1999, page v).

Since the SAP-1999 is continuation of the SAP-1994, and both documents concern the program formulated in the DRPC, an evaluation of the SAP-1999 requires a brief presentation on both the DRPC and the first SAP.

Danube River Protection Convention (DRPC)

According to DRPC or Convention, the cooperation among the Danube River basin countries in river pollution reduction may take on several forms including consultations, joint actions and exchanges of information (Article 4 of the Convention). This cooperation should consist of the following (Ibid., Articles 5 to 17):

- Prevention, control and reduction of transboundary impact;
- Specific measures for water resources protection;
- Limitations on emission objectives and criteria for water quality;
- Emission inventories, action programs and progress reviews;
- Monitoring programs;
- Obligatory reporting;
- Consultations;
- Information exchange;
- Informing the public;
- Research and development;
- Communication, warning and alarm system, emergency plans;
- Mutual assistance.

The Convention covers a broad area of pollution reduction, without necessarily involving the EPDRB into policy and strategy efforts. In fact, the word policy or strategy does not appear in the Convention.

Strategic Action Plan of 1994 (SAP-94)

The first Strategic Action Plan (SAP-94) was drafted by a special group mandated by a task force that had been established by the EPDRB. The draft was completed in October 1994. In December 1994, the Environment or Water Ministries of the Danube countries and a Member of the European Commission responsible for the Environment, endorsed the SAP-94.

The SAP-94 has four goals (page 13):

(1) Improvement of aquatic ecosystems and biodiversity in the Danube River basin and reduction of pollution loads entering the Black Sea;

(2) Maintaining and improving the quantity and quality of water in the Danube River basin;

(3) Controlling the damage from accidental spills; and

(4) Development of regional cooperation in water management.

The SAP clusters the sources of pollution and water quality problems into 'Sectors'. The SAP identifies four sectors (page 9 and 10):

(1) cities;

(2) rural towns and villages;

(3) industry, energy production and transport; and

(4) agriculture.

The agents that need to change their behavior so as to ease the pollution problems are called 'Actors'. The SAP considers actors to be (page 10):

(1) public authorities;

(2) public and private enterprises; and

(3) general public and NGOs.

The policies that should help countries achieve the goals consists of (page 16):

(1) Integrated water management;

(2) Environmentally sound sector policies;

(3) Lowering the of risks of accidents; and

(4) Investments.

The SAP-94 identifies 59 wetlands to restore and 179 hot spots for action. It also describes the Danube River basin environment and its important pollution problems and priorities.

The SAP contains some inconsistencies. We will discuss those relevant to the evaluated SAP 1999.

First, the formulation of the SAP-94 goals differs depending on which area of the document you read.

The goals listed on the page 13 have been quoted previously in this section. On the page 71, the first two goals were stated as follows: (1) "Maintain and improve the availability and quality of waters in the Danube River basin;" (2) "Reduce the negative impact of activities in the Danube River basin on the riverine ecosystem and the Black Sea." In the executive summary, page v, the first goal from the page 71 become the second, and the second become the first.

Furthermore, the sectors cited earlier from the pages 9 and 10, are classified differently in page 15: (1) Phased expansion of sewerage and municipal waste water treatment; (2) Reduction of discharges from industry; (3) Reduction of emissions from agriculture; (4) Conservation, restoration and management of the wetland and floodplain areas of the tributaries and main stream of the Danube River basin.

Finally, the meaning of so called "Actors" is not defined. On page 10, the SAP-94 describes the role for two of them in pollution reduction: the public authorities and the general public. Nowhere does it state the role for public and private enterprises. The definition of regional cooperation (page 9) is circular: "Regional cooperation

means the full participation in and utilization of regional mechanisms and structures for international cooperation, consultation and coordination." Table 1.3 that identifies links between actors and actions to water management problems (page 12), proposes some questionable links. For example, the public authorities should ensure adequate tariffs to cities but not to rural towns and villages, nor to industry, agriculture, and livestock. The public and private enterprises should safely dispose the hazardous waste from rural towns and villages but not from cities, industry, or agriculture. Finally, the general public and NGOs are in charge of managing the livestock manure. On pages 16 to 18, the SAP lists the short term and medium term targets, and on pages 18 to 23, it describes in general and qualitative terms, short- and medium-term actions. However it is virtually impossible to put target on these actions.

In conclusion, it can be stated that, (1) the SAP really needed to be improved and updated; (2) nevertheless, it covers a gamut of actions included in the Convention.

Strategic Action Plan of 1999

The SAP 1999 identifies one "core problem" namely the "ecologically unsustainable development and inadequate water resources management in the Danube River basin". From this core problem stems one objective: "Achievement of sustainable development in the Danube River basin," which in turn is composed of three sub-objectives:

1) Improvement of the wastewater and solid waste management. This objective concerns municipalities. Its realization will deliver the following outputs:
   - Extended and upgraded public sewer system by the year 2005, operated in 90% of municipalities with population over 5000;
   - Appropriate wastewater treatment, by the year 2005, assured in 70% of settlements with population over 5000;
   - Proper solid waste management by 2010, applied in 90% of localities with population over 50 000.

2) Introduction of best available techniques, best environmental practice, and abatement of water pollution. This objective concerns industry and mining; it will be achieved through four outputs:
   - Clean technologies and the abatement of water pollution, introduced by the year 2010;
   - Pre-treatment facilities of industrial waste-water, implemented by the year 2010;
   - Adequate management of all enterprises, ensured by the year 2005;
   - Hazardous substances treated and disposed of in proper landfillls by 2010.

3) Implementation of good agricultural practices and mechanisms for sustainable land management. This objective will be achieved through five outputs:
   - Integrated approach for land and water management in all countries by 2010;
   - Adequate use of pesticides and fertilizers; by the year 2010, the number of certified organic farms be increased by 20%, and in other farms the P and N consumption stabilized at 1998 level;
   - Waste water discharged by animal farms properly treated. By the year 2005, 50% of animal arms with over 500 livestock units equipped with the wastewater treatment plants, and by 2010, 75% farms be equipped;
   - An accelerated run-off and erosion prevention plan. By 2010, the length of hedgerows, forest belts and wind breaks increased by 25%, and 2000 km of regulated rivers be restored;
   - Wetlands and floodplains adequately protected and restored. By the year 2005, 110 000 ha, and by 2010, 140 000 ha of wetlands restored.

The SAP 1999 lists 328 hot spots of high and medium priority for consideration by the pollution reduction program.

The SAP 1999 contains a list of nine plans and programs suitable to regional cooperation (page 128). However there is no indication on a specific role these plans would play in pollution reduction or on their link with national plans. It is not clear if national and regional policies as well as institutions are sufficient to support and successfully implement the SAP 1999.

The SAP contains two important sections: 4: Regional Policies and Strategies (pages 45 to 66), and 5: Sector Strategies (pages 67 to 112).

Section 4: Regional Policies and Strategies analyzes regional problems (the core problem, its direct causes, roots, and direct and ultimate effects), identifies causes of water pollution (hot spots, diffuse sources of pollution, and Significant Impact Areas), describes the pollution effects (transboundary and effects on the Black Sea ecosystems), and finally, analyzes the objectives and targets for pollution reduction and sustainable water management. Thus, the section content develops the arguments supporting investment in pollution reduction projects (proposed in the SAP and outlined in detail in the RPR) than rather the regional policy and strategies.

Section 5: Sectorial strategies. The section contains, for all three sectors (municipal, industry and mining, and land use – agriculture), a situation analysis (sector importance, current assets as know-how, legislation, financial resources, public awareness, transboundary effects); a problem analysis (sector core problems, causes end effects of environmental problems); and sector objectives (their description, expected results, important assumptions and impact indicators).

There is no doubt that both sections reflects well the results of national investigation and that they both (summarized) have their place in the SAP. However, the SAP, a document of such political importance, should detail and discuss policy considerations and strategy issues in details. The need for policy and strategic considerations may be justified as follows:

The environmental policy and macro economy's concerns are as follows:

- Finding the best way to achieve an efficient and cost-effective pollution reduction. (This means the point where marginal pollution abatement cost and marginal damages ere equal);
- Finding the ways to assure equitability in distribution of the burden for pollution reduction (the relatively well - off people may be charged more than the less fortunate);
- Funding the ways to assure an acceptable distribution of pollution emission charges;
- Knowing how to assure the policy is enforced at the lowest cost;
- Finally, that it take into consideration ethical issues, moral considerations, and national traditions.

It's important for the project to know to what extent implementation of its objectives helps or hinders national policy; and, on the other hand, to evaluate the policy influence on the project's pertinence, impact, and duration. It would be the most useful for the project, it's implementing agencies, financing institutions, and donors to know the government environmental policy and to check it against the project costs, objectives, assumptions and indicators.

The national policy may be evaluated as well for its coherence at the central, sector and local levels and, on a regional scale, for its coherence among the countries. In particular, it would be useful to evaluate periodically how it compares to the regional and country policies and the proposed project's objectives so as to assure that the project's activities and objectives aim for the same goal as the policies coming from the government or region.

Strategy (or policy implementation instruments)

The governmental strategy for the implementation of an environmental policy is based on two basic instruments: environmental standards and incentives.

An environment standard is the mandated level of performance that is enforced by the law. The best available technology (BAT) which DRCP recommends (DRCP, Annex I part I) is a standard. The maximum released level

of a given pollutant is also a standard. The standards have drawbacks. To be just, the standards cannot be identical for all industries and often the standards do nothing to stimulate, improve or innovate.

The incentives remunerate agents in proportion to their compliance with the law. Taxes, subsidies and transferable discharge permits are the most common incentives. The incentives stimulate the polluter's invention and contribute to technology progress, but they are difficult to apply if the pollution discharge measurements are inadequate.

As in the case of the policy, it is important for the project designers to be aware of the government instrument used to realize the environmental policy. The project's viability and its economic importance depend strongly on the policy implementation strategy.

Regional policy

Finally, the success of a regional pollution reduction project depends on member countries' policies and regional agreements. Regional policy is of equal weight to sovereign national policies. However, international agreements are (usually) voluntary. In consequence, it is reasonable to suppose that a country will not sign a new agreement or honor an old one if the agreement will make it worse off. Knowledge of national policies can help negotiators of environmental agreements to strike the required equilibrium. More important, the regional project which is familiar with national environment policies and regional issues, can invest its resources among countries in such a way that the investment will encourage all countries to take part in a regional agreement. With a wide set of investments, the regional project may well assist a country to resist the temptation to free ride on the pollution control efforts of others.

C. Pollution Reduction Targets: Danube River Basin Pollution Reduction Program (PRP)

The Danube River Basin Pollution Reduction Program (PRP) supports the SAP 1999. It lists the projects for pollution reduction that has been agreed upon by the Danube basin countries during a series of meetings and workshops. The main source of information on projects, priorities and costs are found in the National Reviews. The RPR contains a detailed technical summary of priority projects to be executed in the Danube River basin. It describes 513 identified hot spots, and formulates 421 projects. For each of the 421 projects, the document specifies expected load reduction for BOD, COD, N, and P, baseline costs, incremental costs, and total investment cost.

The total investment is estimated at $US 5 522 million, of which US$ 3 289 million represent the baseline costs and US$ 2 034 million the incremental costs (PRP, Annex 6, page 32). The investment should reduce the load of pollutant as follows:

Type of emission	Estimates of emission in thousand tons per year (SAP 199, page 52)	Expected emission reduction (PRP, Annex 6, page 30)	Improvement in %
BOD	324	421	?
COD	851	623	73..2
N	884 – 944	100	8.8 – 9.4
P	103 – 119	20	19 – 17

The projects were evaluated only in financial terms according to the current (1997) value of local currencies. There is no economic evaluation of the projects. There are great differences in financial cost effectiveness of the projects among countries and among sectors.

According to the PRP, the separation of total costs into basic and incremental is provisional and should be updated.

For five of the eleven countries involved, the total investment in pollution reduction, according to the PRP, represents a budgetary burden equivalent to more than 6% of Gross National Product in 1997 of the Danube River basin area of the country. For Bosnia-Herzegovina, it represents as much as 16% (PRP, Annex 11, page 1).

The PRP discusses little the economic and political consequences of the program on the beneficiary countries. It remarks, however, that the pollution reduction may result in two kind of economic consequences (page 39):

- Inflation of construction prices due to the short-term rise in demand for construction services;
- Restoration of wetlands may require the forfeiting of arable land.

Objective 3 : Increase public awareness and participation

(Based on the contribution of Esther Park, Annex VIII)

Sub-Objective 3.1: Raise Public Awareness about pollution reduction activities

3.1.1 Materials and events to publicise the need for pollution prevention and reduction and ecological rehabilitation in the Danube River Basin

3.1.2 Input to the development of the technical basis and policy for pollution reduction in the Danube River Basin and Black Sea is available.

The project did not produce materials or hold events to raise public awareness as outlined in the project document. Instead, the project felt that the objective 3 would be better served by holding a regional training workshop called "Target Oriented Program Planning" (TOPP), in which one NGO representative and one government representative from each country were trained in public participation methodology.

These representatives then became facilitators in the National NGO Workshops convened by the Regional Environmental Center for Central and Eastern Europe (REC), where national priorities were discussed and identified. These priorities were consequently introduced in the National SAP Planning Workshops where the results from the National Reviews (and the National NGO Workshops) were brought together to result in the revised SAP and the Pollution Reduction Program.

Further, the results of the National NGO Workshops were brought to a Regional NGO Consultation Meeting, in which NGO representatives from all 13 countries came together to discuss regional priorities and to re-establish or revitalize the Danube Environmental Forum (DEF).

In general, the DEF has been weak and unable to participate effectively in implementation of this project. Instead, the REC has taken responsibility for the National NGO meetings. For similar reasons, the DEF was unable to hold a joint workshop with the Black Sea Basin NGO Forum. Cooperation with the Black Sea project has been slow as a whole. So far there has been only a joint technical working group with the Black Sea.

3.1.3 Wide awareness of pollution reduction issues in the Danube River Basin and in international community

The "Danube Watch" has been published in three issues, with two more special editions forthcoming. Four thousand copies of each issue were being disseminated, and now the edition increased to 8000 copies. In the future, the Danube Watch will be published on the DANUBIS site, and its condensed version inserted into another existing environmental publication (in Austria).

After PHARE funding stops in October 1999, sustainability of the Danube Watch will be in the hands of a new publisher. There is the possibility of inserting advertisements into the journal by which it might be self-sustaining.

3.1.4 Stronger role for environmental NGOs in the Danube River Basin and practical cooperation with similar groups in the rest of the Black Sea region

The project was effective in the arena of public participation. Considering the scope of the project, most of the major NGOs in each country were brought into the SAP planning and revising.

The project greatly relied on the DEF for its sustainability in this component. However, the DEF is weak and unable to take on this burden. In the future, the ICPDR is willing to support public participation, but does not necessarily identify DEF as the agency through which it should happen.

It should be noted that the past failures of the DEF have alienated some NGOs from participating, most noticeably those in Hungary. As a group, a number of Hungarian NGOs refused to participate in the National NGO meeting and sent a letter of protest stating that they would not have anything to do with the DEF. Currently, the DEF is in the rather precarious position of not being legally registered as an entity. As with many NGOs, the organization has little know-how with regard to legality, financial viability, and general management. However, they have made good progress in information sharing. The members have created an e-mail network.

3.1.5 A series of community-based projects which will contribute to pollution reduction in the Danube River Basin and Black Sea

The small grants program destined to finance community-based projects was carried out by the REC. The project management developed guidelines for the grant attribution and publicized the program. Because of a delay in actually disseminating the grants, the impact and results of the program have not yet been revealed.

Sub-objective 3.2: Improve coordination and information exchange

3.2.1 Strong communication links among Danube experts, decision-makers and NGOs, and cost-effective means of publishing information about the Danube River Basin

3.2.2 An improved and extended DANIS information system accessible to the general public

The PCU began work on an web site DANIS (the Danube Information System) and found that it would be more effective in the big picture to incorporate DANIS into the system being created by the ICPDR, "DANUBIS." To date, the web site is not yet functional, but is expected to be fully operational by the fall of 1999. In the meantime, PHARE has published a Danube home page connected to that of REC, from which all activity will be forwarded to DANUBIS once it is functional. This home page is being hosted by the REC web site and has the appropriate links to maps, legislation, donors, and other relevant information. A counter was put into the system, from which it can be assumed that up to 1000 people have visited the site.

Overall output from the objective 3:

Although the project achieved its objectives concerning increase of public awareness and participation, the project design hampered the intentions and the goal of the public participation component of the project. While NGOs were effectively drawn into the decision-making process, the government side was less prepared for cooperation on this level. Nevertheless, overall, the project did what it needed to in order to fulfill the objectives. The full impact of many of these efforts has yet to be seen, as timing is a factor. And still, as in the case of any development project, this is just one step in the process.

The past weakness of the DEF and its current unresolved status is a critical factor for the future sustainability of public participation and cooperation in the Danube region. If the legal status of the organization is not adequately established from the beginning, its capacity to attract funding will be greatly diminished. Currently, the representatives of the DEF are unaware as to how and effectively establish the organization.

Objective 4: Develop the financing of the pollution reduction program within the Danube SAP (Prepared on the basis of findings of Friderich Schwaiger)

Sub-objective 4.1: Develop portfolio of Danube basin projects

4.1.1 Financing strategies for pollution reduction developed for the particular circumstances of each Danube Country

The report "Analysis of Financing Mechanisms " issued in March 1999 gives a general financing strategy recommendation for all countries. For the project financing, the study recommends to use at first the national resources (mainly water revenues and public funds), and then, when the national funding is no more available, the international financing. The study recommends promotion of private sector participation. Implementation of these recommendations requires significant improvement in revenue collection for water and waste water services.

4.1.2 A portfolio of investment-related pollution reduction projects for co-financing

4.1.3 A portfolio of wetlands and capacity-building projects for co-financing (grant) consideration

The "Danube River Basin Pollution Reduction Programme Report" of June 1999 contains a portfolio of 421 projects, .including 246 hot-spots and 298 693 hectares of wetlands. The projects were identified, and their cost estimated by national experts. The PCU checked the information for plausibility. Total investment cost equals US$5.5 billion. The total is distributed as follows: municipal projects – US$3.5 billion; wetlands – US$1.1 billion; others –US$0.9 billion The baseline cost are of US$ 3.5 billion, the incremental cost, US$ 2.0 billion

According to the GEF regulations, only the transboundary project incremental costs are eligible for financing. Regarding the waste water treatment plants, the incremental costs represent the tertiary treatment. Regarding the wetland and floodplain projects, incremental is the cost of restoration.

The projects were ranked according to investment cost needed per unit of removed BOD, COD, P and N. Although the data should be systematically updated, according to the project management, the ranking of the top series projects should not be affected, as experience shows a good positive correlation between project size and priority ranking.

Sub-objective 4.2: Mechanisms to provide sustainable financial support for the Danube River Basin

4.2.1 An agreed feasibility study for establishing a fund

4.2.2 Agreed mechanism to set up long-term financing mechanisms for pollution reduction projects in the Danube River basin

A specialized agency (KfW) that conducted the study for creation of a Danube Environmental Fund have concluded that such a fund would not be feasible. The study, described in April 1999 in a report 'Financing Pollution Reduction Measures in the Danube River Basin: Present Situation and Suggestions for new Instruments', arguments thoroughly and convincingly against the fund. The arguments are supported by examples of difficulties experienced by other similar funds. The main arguments are:

- The wealthier countries have not interest in a compensation mechanism (wealthy countries contribute to the fund, less well off countries receive from fund);
- International taxes and pollution charges as source of finance is not accepted by all countries;

- The amount of available donor and IFI money would not increase by such fund - why to carry administration cost for such fund;
- EU extends sizeable concessional money to potential accession countries but not to a fund;
- PMTF can take over a possible brokerage function of the fund and assistance in project preparation.

As an alternative, the agency proposed a fund that will provide assistance for project identification, grants for investment projects, and packaging of projects for financing. This alternative was rejected by ICPDR Steering Committee.

As a result of the rejection, the KfW recommended establishment of a Project Appraisal Group (PAG) that would apprise the projects and, if they were conform to the ICPDR standard, recommend them to donors. Simultaneously with PAG, the KfW recommended creation of a Project Implementation Facility (PIF) that would support the ICPDR in regional investment programs, assist member countries in project preparation, and monitor the results. The cost of PIF for a 3 to 4 years would be of US$2.3 million. The ICPDR endorsed the PAG and PIF proposals, and expects that the PIF may be finance by UNDP/GEF.

4.2.3 Updated revision of the SAP

The project has revised the Strategic Action Plan and enriched it with inputs from national reviews, workshops and international expert studies. The SAP follows the target-oriented project planning method. However it is overloaded with information and contains repetitions. In consequence, the document should be streamlined, restricted to essentials, well structured and made easy to read.

4.2.4 High level endorsement for the policy objectives and pollution reduction targets of the SAP

Endorsement of the final version of the revised SAP by the Ministers of the Danube countries is expected to take place at the Ministerial conference in Romania, scheduled for the end of 1999 or beginning of 2000.

4.2.5 Agreed co-financing for pollution projects

A donor pledging conference or a PPC meeting has not been held yet. However, according to the project management, the regular meetings of the PMTF (two to three times a year), usually combined with the Steering Committee in presence of major donors representatives, actually substitute such a meeting.

Overall output from objective 4

The successful completion of all outputs within the objective four allowed the project to

- Present a portfolio of 421 projects evaluated at US5.5 billion;
- Rank them according to investment cost effectiveness;
- Propose funding for regional activities; and
- Revise the Strategic Action Plan so as to include the newly identified projects.

The whole load of objective realization was in the hands national experts and based on national consultations. In consequence, the results genuinely reflect the national preoccupations and priorities. Even the output's weaknesses due to the difference in the quality of data available in the countries have important political and technical significance. They identify the domains to improve and motivate the countries to attain the same technical standards in project elaboration

ANNEX VII

PROJECT NUMBER: **RER/96/G31 /A/1G/31**

PROJECT TITLE: **DEVELOPING THE DANUBE RIVER BASINPOLLUTION REDUCTION PROGRAMME**

Author: **FRANCOIS VAN HOOF**

Title of Report: **EVALUATION REPORT ON THE COMPLETION OF THE KNOWLEDGE BASE FOR PRIORITY SETTING**

Duration of Contract: **12 – 18 JUNE 1999 (7 days)**

Contract Number: **99-15094**

TABLE OF CONTENT **page**

1. EXECUTIVE SUMMARY

This evaluation mission had to find out whether the objectives related to the knowledge basis for priority setting had been realised .

The major tasks mentioned in the project document have been carried out within the time schedule originally proposed

This resulted in documents being available at the time of the mission on the following topics :

° updated national reviews

° transnational diagnostic analysis (TDA)

° development of a Danube Water Quality Model (DWQM)

° assessment of the priority sites for wetland and floodplain restoration

° social analysis of pollution in the Danube River Basin

Some of these reports were available in draft form only

This project has been very relevant to the Danube river basin countries and The Black Sea and was well in line with UNDP and GEF priorities.

It has been focusing on nitrogen and phosphorus pollution mainly . Although the project has been managed efficiently and produced several high quality reports , some parts (mainly TDA and DWQM) had to deal with insufficient data for emission and imission of N and P .This created uncertainties which have compromised the results obtained in TDA . In the DWQM work , these shortcomings were overcome these with success .

Apart from the technical aspects , increased cooperation between the countries in the Danube region is without doubt a very positive output of this project .

In order to enable sustainability after the ending of this project , the International Commission for Protection of the Danube River (ICPDR) should be supported by intenational financial sources to enable the implementation of differents parts of this project .

2. ACKNOWLEDGEMENTS

Special thanks are herewith extended to:

Mr. R. Aertgeerts , portfolio manager , Mr. J. Bendow , project manager and Mr.A. Garner , environmental specialist , for introducing us to the project and providing all the necessary information .

The colleagues of the evaluation team : Esther Park , Fritz Schwaiger and Stanislaw Manikowski , team leader , for their collegial attitude and stimulating discussions .

3. INTRODUCTION

3.1 PROJECT BACKGROUND

After the end of the first phase of the Danube River Basin Evironmental Programme (1992 - 1996) , which concentrated on building regional cooperation for water management , evaluating and defining problems , implementing a basin wide water quality monitoring strategy and establishing a warning system for accidental pollution , the need was felt for an extension which would cover the following items :

- ° pollution reduction programmes for substances causing eutrophication in the Danube river and the Black Sea
- ° ecological rehabilitation programmes for priority wetlands
- ° development of a revised strategic action plan including linkages with the Black Sea
- ° increasing public awareness
- ° strengthening capacities of NGO's
- ° preparing project documents for priority pollution reduction
- ° improvement of international cooperation

The project should have started August 15 1997 with a duration of 16 months . In practice it started December 15 1997 and will end July 1999 .

3.2 EVALUATION MISSION

UNOPS contracted the final evaluation of the project to a team of individual consultants.

They carried out a field mission from June 12 to June 20 1999.

The team consisted of :

Stanislaw Manikowski , environmental Policy specialist , Team Leader

Francois Van Hoof Environmental Assessment Specialist

Esther Park Institutional Development/ Public Awareness Specialist

Fritz Schwaiger Environmental Finance Specialist

In accordance with the TOR each team member prepared separate mission report . These reports were brought together in one integrated report by the team leader .

4. OBJECTIVES

According to the TOR the main objectives of the evaluation mission should consider the impact , effectiveness and efficiency of the project . In particular the evaluation had to address the following issues :

Project design

Project implementation

Project impact (completion of the knowledge base for priority setting , review the policy for protection of the Danube Basin and the Black Sea , increase public awareness and participation , develop the financing of the pollution reduction programme within the Danube Strategic Action Plan)

5. SOURCES OF INFORMATION

This evaluation report is based on information and documents received during the evaluation mission in Vienna and other locations (cfr. Itineraries of the team members).

The following documents have been consulted :

- ° Updated national reviews of all Danube River Basin Countries except Germany and Austria
- ° Transboundary Analysis (draft report , March 1 1999)
- ° Danube Water Quality Model Simulations (June 12 1999)
- ° Social analysis of pollution in the Danube River Basin (final version 1999)
- ° Evaluation of wetlands and floodplain areas in the Danube river Basin (draft report , February 1999)
- ° Pollution Reduction Programme Report (June 1999)
- ° Environmental Programme for the Danube River Basin : Annual Report 1996

6. REPORT OF FINDINGS

6.1 NATIONAL REVIEWS

All national reviews , updated in a common format , were available (except for Austria and Germany).

All reports contain lists of hot spots in the municipal , industrial and agricultural sectors . Only the report for Bosnia Herzegovina does not mention priotirisation due to lack in experience in this field.

In most cases , the hot spots are categorised according their urgency (high , intermediate , low) .

Each report was evaluated with respect to the data needed for the transboundary analysis and water quality model simulations .

A short overview of the findings for each of the countries is given below .

SLOVENIA

° apart from the priority substances (N,P,COD and BOD) , the report brings data on some pesticides (a.o.atrazine and its metabolites desethylatrazine and desisopropylatrazine) and mentions that fifty percent of the ground waters are unfit for human consumption as a consequence of diffuse pollution (nitrates and pesticides)

° the frequency of the immission measurements on surface waters is very low (four per year) , mostly performed at low river flows . This approach doesnot allow reliable calculations of loads of priority pollutants .

CZECH REPUBLIC

° in adddition to the priority substances to be monitored , attention has been given to some organic and inorganic micropollutants , especially mercury and PCB’s which have caused some problems .

° the measuring frequency for immision measurements is twelve per year . The approach for load calculations is not given .

° 3000 - 4000 abandoned waste sites (industrial and municipal) are mentioned as potential threats to water quality

SLOVAKIA

° information on sampling frequencies is completely missing

° no details are given at all on the calculation of loads

° information is only given in terms of immision concentrations for the priority parameters requested , in addition organochlorine pesticides and triazine herbicides have been found , without mentioning concentrations

HUNGARY

° in addition to the priority parameters requested , a wide set of parameters is measured additionally

° sampling frequencies used for immission measurement areonce a month , once per two weeks or weekly depending on locations and parameters

° the laboratories performing the analysis follow strict quality assurance schemes

° the data obtained are being statistically treated

° in addition to the priority parameters , sufficient data for reliable load calculation are available for phenols , anionic detergents and oil .

BULGARIA

° data available are limited to priority parameters

° sampling frequency once per month

° calculation of loads is not described

° the report is written in very general terms

ROMANIA

° data on priority parameters available

° loads have been calculated over the period 1988 - 1996 for priority parameters

° methods used for load calculation are not described

MOLDOVA

° the report mentions different problems related to water quality but fails to describe them systematically

° there is no systematic information on parameters measured nor on sampling frequencies

° information on priority parameters and and a few parameters is being reported in a non structured way

° no indications on load calculations could be found

UKRAINE

° the report shows a lack of systematic information on sampling frequencies and parameters analysed

° as far as immissions are concerned , only concentrations are reported , loads are not mentioned at all

CROATIA

° results on priority parameters are available for the Danube and the Sava and Drava rivers , results for some organic and inorganic micropollutants have been produced

° the sampling frequencies are not mentioned

° loads have been calculated by multiplying the yearly average concentrations with the yearly average discharges : this approach is scientifically unsound and doesnot allow to produce reliable load figures . as such it renders evaluation of transboundary effects impossible .

BOSNIA HERZEGOVINA

° due to the war in which the country was involved for several years , only a very limited set of water quality data is available as well in terms of parameters analysed as samplings performed .

° due to this situation , the calculation of loads as well as the evaluation of transboundary effects is rendered very difficult

In addition to the chapters on water quality gives important information on the recent evolutions in Bosnia Herzegovina :

° unaccounted for water percentages ranging between 30 to 70 %

° of the waters used , only 15 % is purified in waste water treatment plants

° 30 -40 % of the drinking water doesnot meet the quality criteria

° hot spot prioritisation was not carried out due to lack of experience in this field , nevertheless a list with municipal , industrial and agricultural hot spots is included in the report

° future policies will stress reconstruction of sewerage collection and waste water treatment plants

FORMER REPUBLIC OF YUGOSLAVIA

° the report stresses that Yugoslavia receives confluents of the Danube river which drain 360.000 km2

(45 % of the Danube River basin) and also attracts the attention to the difficult relations with its neighbour countries and international exclusion

In relation to water quality it mentions the following points of attention :

° emission data collected after 1992 are limited and unreliable

° there is a lack of reliable time series of immission values

° unsufficient laboratory equipment

° the laboratories perform only first line quality control , participation in interlaboratory tests (third line control) is non existant

The overview of all national reports learns that they differ strongly in quality . Excellent reports have been produced by e.g. Hungary . On the other hand , the reports of Moldova and Ukraine provide little usefull information .

In general and as far as water quality data are concerned , all reports strongly focus on concentrations . Pollutant loads on the other hand are seldom mentioned , although they are important tools for policy evaluation .

6.2 TRANBOUNDARY ANALYSIS

The document which was available to the evaluation mission is the March 1 , 1999 draft report .

The authors of the document realised that the data available in many of the national reviews were insufficient for carrying out their task . Due to the fact that the 1996 report of the TNMN was not available at the time this topic was engaged , it was decided to use the data in the national reviews for this purpose in spite of many inconsistencies .

The documents correctly mentions that the recommended procedure for calculating loads should be based on monthly average discharges and concentrations corrected for monthly average discharge . This approach can be defended in cases where data are scarce . The report does not give indications whether this approach has been used consistently .

A source of important errors lies in the calculations of BOD loads based on immission results : these values are in most cases very low and as such subject to important analytical errors . Using these figures for load calculation , will lead to unreliable load figures .

The draft report does not mention any conclusions (they will be added later) nor in relation to the Danube River nor to the Black Sea , although the introduction describes the relation between both in detail .

6.3 THE DANUBE WATER QUALITY MODEL

The report entitled " Danube Water Quality Model simulations in support of the Transboundary Analysis and the Pollution Reduction Programme ", dated June 12 1999 was available to the evaluation team .

This report meets the requirements formulated in the project document , taking into account the limited water quality data sets available . As a consequence of this limitation , no modelling could be applied regarding to BOD , COD and oil .

The DWQM was built on generic software used for many years by Delft Hydraulics , which was adapted to The Danube basin and to which were added elements from the AEWS model (Project Code 95-0412 : Development of a Danube Basin Alarmmodel in support of the Accident Emergency Warning System) .

The development of the DWQM aimed in a first phase on nutrients pollution (N,P) with a double aim :

° evaluation of transboundary pollution

° implementation of pollution reduction programmes

In addition the effects of wetlands in terms of nutrient removal had to de addressed as well .

As well as the transboundary analysis , the application of the model came across the lack of consistent and reliable data . Due to the uncertainties in emission values for nitrogen , two emission scenarios (high and low) were considered .

The uncertainties for P , due to a.o. stratification in the river , were taken into account by multiplying the figures with a factor two . Taking into account these hypotheses , simulations have been carried out in support to the Transboundary Diagnostic Analysis and the Pollution Reduction Programme .

Given the prerequisites mentioned above , the results obtained have to be interpreted with caution . Nevertheless, the first results give indication on the most important sources of N and P pollution : they demonstrate a.o. that diffuse pollution is the most important contributor to N and P pollution in the Danube basin and that the impact of wetlands on N and P reduction is limited .

The report lacks clear conclusions and recommendations for future work .

6.4 WETLANDS AND FLOODPLAINS

The draft report " Evaluation of Wetlands and Floodplain Areas in the Danube River Basin " (February 1999) and its annex was available to the evaluators .

This document meets the criteria put forward in the project document including the discussion of the potential of wetlands for nutrient removal . The effect of wetlands on N and P removal , has been evaluated indirectly (e.g. by the number of days a landstrip has been flooded).

During the discussion of the report with the authors , it was made clear that nutrient reduction by wetlands is only a side effect of wetland rehabilitation and should not be considered as an alternative for waste water treatment or policies aiming at reducing nutrient input from diffuse sources . This point of view is confirmed by the limited impact predicted by the DWQM model for nutrient removal by wetlands .

Apart from the activities themselves the sub-contractor carrying out this work , made it clear that ivolvement of local people in this activity is a prerequisite for success . Keeping this in mind , finacial support has been given to local people for improvement of tourism infrastructure (WWF funds) .

6.5 SOCIAL ANALYSIS OF POLLUTION IN THE DANUBE RIVER BASIN

A report on the above mentioned subject written by Reinhard Wanninger (dated March 1999)was available to the evaluators . It covers the topics mentioned in the project document .

The information given in chapter 4 (Population potentially affected by unsanitary conditions in the Danube River Basin) is very general and doesnot cover hygienic risks adequately . However this topic was very poorly described in the project document (point 57 , page 18 : " There is no indication of the extent to which transboundary pollution may contribute to the incidence of these diseases . The project document should have mentioned several outbreaks of waterborne gastro intestinal diseases which have occured in several Danube countries (e.g.Romania) and which are very relevant in this context .

6.6 CALCULATION OF NATIONAL BASELINES FOR POLLUTION REDUCTION

All details for cost analysis , including baseline and incremental costs can be found in the Pollution Reduction Programme Report (section 7.2.4) .

6.7 PROJECT CONCEPT AND DESIGN

The concept and design of the project were appropriate at the time when the project was approved and fit in different UNDP areas of concentration : environmental problems , national resources management , management development and technical cooperation between the countries in the Danube River Basin .

The first UNDP project tied up very well with the EU PHARE project (1992 - 1996) . For the second phase , cooperation between both programmes is less evident .

The project document clearly states the problems which the project intended to solve . Political risks especially linked to the situation in Croatia , Bosnia Herzegovina and the Former Republic of Yugoslavia were recognised .

The framework of the project document clearly stated the objectives and outputs . The phasing of the project activities is realistic given sufficient input (water quality data) is available . However , this was not the case .

The project document strongly stresses the effects of wetlands and floodplains in terms of nutrient reduction , while nutrient reduction in this context should be considered as a beneficial side effect .

The project's actions and outcomes are in line with GEF guidelines related to quality of transboundary waters , habitat degradation , excessive exploitation of resources and the GEF role as a catalyst for eco-system based approach , assisting groups of countries to understand the environmental concerns of their international waters and implementation measures adresssing transboundary concerns . The focus of the project on control of land based sources of pollution and prevention of degradation of critical habitats agree with GEF's focuses .

6.8 PROJECT IMPLEMENTATION

A work plan was developed from the beginning . The project took off several months after the start date mentioned in the project document .

All activities mentioned in the project document have been implemented . Some of them (e.g. the transboundary analysis) were implemented in a less effective way due to lack of water quality data .

The involvement of national staff occurred mainly through the input of local consultants (e.g. the drafting of national reviews and the study related to wetlands and floodplains) .

At least two countries (Bosnia Herzegovina and the Former Republic of Yugoslavia) were in a war situation or were emerging from it , as a consequence their capacity to supply inputs to the project was very limited .

The administrative management of the project was excellent , without cost overruns hindering implementation .

A major problem affecting successful implementation was the lack of sufficient and reliable imission water quality data which were needed for the transboundary analysis and for the validation of the Danube Water Quality Model .

This shortage could not be overcome within the duration of the project .

6.9 PROJECT RESULTS

The results obtained are relevant in the current context and the programme was efficiently managed .

The project produced all the reports required (some of them in draft form at the time of the evaluation mission) . Most of the reports produced have a high quality , nevertheless some reports carry the burden of the insufficient amount of data on which they had to build (transboundary analysis) , others demonstrate elegant approaches to solve this basic problem (Report on the Danube Water Quality Model)

Overall there was a good achievement of the immediate objectives of the project , which can make a contribution to the development of the region .

Effectiveness and efficiency could have been improved by describing the information needs more precisely before the start of the project .

Sustainability can be secured by transferring the results of the project to th International Commission for the Protection of the Danube River .

7. CONCLUSIONS

1. All updated national reviewshave been produced . The reports on Bosnia Herzegovina and the Former Republic of Yugoslavia report only a limited number of water quality data due to their particular political situation .
2. Al national reviews contain lists of municipal , industrial and agricultural hot spots made up by a common methodology , information on national policies with focus on N and P reduction .
3. Based on these data , national baselines are available in the pollution reduction programme report .
4. A mathematical model (DWQM) has been developed which should be used in the evaluation of transboundary pollution and implementation of the pollution reduction programme . Although the model as such is very valuable , its application is greatly hindered by a lack of sufficient and reliable emission and imission data .
5. The lack of reliable imision date and the low frequency of measurements render the calculation of loads necessary for transboundary analysis (TDA) very difficult . It was impossible to generate the data necessary for TDA and application of the DWQM within the project duration .
6. The assessment of the priority for wetlands and flood plain restoration has been carried out in a very satisfactory way .
7. One of the most obvious achievements of this project is the fact that countries in the Danube region have learned to cooperate in spite of enormous differences in their economic and political situations .

8. RECOMMENDATIONS

With regard to the future planning of similar projects , it should be kept in mind that sufficient , reliable water quality data should be available for vital parts of the project . If not , monitoring experiments should be carried out which can supply these data .

Knowledge transfer from this project to the ICPDR should occur in order to use the information generated for water quality management by the commission and further development of those elements in the project which could not be fully implemented by lack of data .

In order to use and further develop the information produced in this project , international funding should be made available to the ICPDR . This is considered the only way to secure sustainability of the project impact and results .

During the last years , the load of some priority pollutant , especially P , from the Danube towards the Black Sea has decreased . At the same time a reversal of trends in algal blooms and its negative consequences has been observed in the Black Sea . As far as the input of P is concerned , the poor economic situation in many Danube countries has certainly contributed in this trend .

It should be strongly advised that under a future improvement of economic activities , stringent policies are implemented which limit the input of nutrients in the Black Sea to at least present day levels .

In order to evaluate the input of pollutants in the Black Sea , a common methodology covering adequately the inputs in the Black Sea should be developed . This should be accompanied by the introduction of quality assurance schemes in the laboratories performing the analytical and sampling activities .

9. LESSONS LEARNED

A major positive lesson is certainly that through this project countries in the Danube River Basin have learnt to cooperate better in management of the Danube waters .

Another positive element is the input of local consultants and NGO's in different parts of the project (e.g. updating national reviews , wetlands and floodplain study).

A negative lesson to be kept in mind is the lack of communication between different important actors (GEF - UNDP , EU PHARE and the World Bank) . The refusal of the World Bank to fund transboundary projects is experienced as negative for effective cooperation among Danube countries .

In the same context , the change in PHARE rules (from multicountry to single country approach) and the take over of former PHARE projects by TACIS did not improve effectiveness nor efficiency .

Another lesson is that before engaging in pollution loads and mathematical modelling sufficient and reliable imission data should be available before the start of these activities . Generating these data in an ongoing project is impossible .

10. ANNEXES

ITINERARY AND SITE VISITS

Sunday , June 13 : Travel from Brussels to Vienna . Arrival in Vienna 15.00 . Meeting with Stanislaw Manikowski , team leader , Esther Park and Roger Aertgeerts , UNOPS portfolio manager : introductory discussion on the tasks of the mission .

Monday , June 14 : Meeting with Joachim Bendow , Programme Manager , Stanislaw Manikowski , team leader , Andy Garner , Esther Park and Roger Aertgeerts , UNOPS portfolio manager , Fritz Schwaiger at the Vienna international Center. Discussion on the methodology to be followed during evaluation .

Afternoon : Discussion of the points to be adressed and where the information can be found . This meeting was attended was attended by the same persons as the morning session , except Mr. Schwaiger .

Evening : evaluation of the national reports of several countries

Tuesday , June 15 : Meeting with Mr. Teun Botterweg , EU/PHARE Programme and Mr. F.Schwaiger, Vienna International Centre on the activities of the PHARE and TACIS in the Danube region

Further evaluation of the national reports of several countries

Afternoon : Meeting with Mr. Andy Garner , environment specialist and Mr. F.Schwaiger on different aspects of the project , Vienna International Centre

Evening : evaluation of the national reports of several countries

Wednesday , June 16 : Meeting with Mr. Helmuth Fleckseder , Technical and Scientific Director of the ICPDR and Mr. F.Schwaiger, Vienna International Centre on the strategies of nitrogen and phosphate reduction .

Evaluation of the national report on the Republic of Yugoslavia

Afternoon : Meeting with Mr. Phil Weller WWF Danube - Carpathian Programme Director on different aspects of wetlands and floodplains at the WWF office Ottakringer Strasse 114 - 116, Vienna .

Meeting with Mr.Wolfgang Stalzer , Director at the Ministerium of Landwirtsschaft and President of the ICPRD on the activities of the ICPRD with Stanislaw Manikowski , team leader , Esther Park and Fritz Schwaiger .

Thursday , June 17 : Meeting with Mr. Stanislaw Manikowski , team leader on the preliminary conclusions of the mission at the Vienna International Centre .

Flight from Vienna to Brussels , arrival in Brussels 21.30

Friday , June, 18 : Travel from Hove to Delft . Meeting with Mr. J. van Gils at Delft Hydraulics .

Return to Hove

Saturday , June 19 : Report writing

Sunday , June 20 : Report writing

ANNEX VIII

Esther PARK

3. Public awareness, public participation, information exchange

3.1 Project Design

The public awareness component of the project was designed to increase public participation and awareness not only in the individual countries, but also on a regional level. Central and Eastern European countries (including NIS countries) in transition were the main targets, assuming that Austria and Germany already had effective third sector development. The rationale for this output is that it will lead to sustainable policies in the Danube Basin.

This aspect of the project had a threefold objective, which was only partially effective due to an inattention to structural considerations, which will be expounded on in section 3.4. The project's effectiveness with regard to public awareness was limited because the "public" was not well defined. It was not clear to whom exactly the awareness campaign should reach. If the target group was non-governmental organizations (NGOs) and governments, then the project was mostly effective. If the target group was the wider public, then the effectiveness of the project is a bit more ambiguous. It is difficult to measure the impact of the project on the wider public without doing a large-scale study. Additionally, the final outcome of the small grants that were given to awareness raising projects is still pending.

The project was more effective in the arena of public participation. NGOs were effectively brought into the process of SAP planning/revising and their input noted. Considering the scope of the project, most major NGOs in each country were brought into the decision-making process. Perhaps the biggest drawback was that of the Danube Environmental Forum (DEF). The project overestimated the potential effectiveness of this organization and its force within the objective was minimal.

Overall, this component contributed well to the development objective, but the most constraining factor on all the elements was timing. From a structural point of view, transitioning governments are dealing with various pushes and pulls, and thus are not always able to be in the ideological position that the project already assumes. For this reason, it would be difficult to implement public participation in countries that were not ready for it. Additionally, the strict time frame of the project caused many components, which could and should have contributed to one another, to overlap.

The project greatly relies on the DEF for its sustainability in this component. At this point, the DEF is weak and unable to take on this burden. The ICPDR is willing to support public participation, but does not necessarily identify DEF as the agency through which it should happen.

Cooperation with the Black Sea NGOs has been somewhat unrealistic. The NGOs in the Danube River Basin must have some history of cooperation among themselves before attempting cooperative efforts with the Black Sea NGO Forum.

3.2 Project Implementation

The project was implemented by the PCU in an excellent fashion with regard to timeliness. Though the design of the project itself was constrained by time, the PCU made the best effort that it could to allow the different components and stakeholders to interact. The PCU also considered the expansion and contraction of various objectives as they deemed relevant to prevailing circumstances.

The bulk of this component of the project was contracted out to the Regional Environmental Center for Central and Eastern Europe (REC), which was in an excellent position to provide this kind of specialized support for the PCU. The REC is a long-standing organization dedicated to the support of environmental NGOs and administers grant programs from governments and other international donors. While headquartered in Szentendre, Hungary, the REC has local offices in every country in which they work. These local offices have formed good relationships with the governments and the NGO communities, respectively; and they know the specific needs of each country. Thus, the REC was an ideal candidate for the work of the project. Because they are established as an organization, there was little reinventing of the wheel and the implementation of the Small Grants Program was relatively smooth. Timeliness of this program was an issue because of the lack of effective communication between the REC and the PCU.

Given the time limits of the project, the REC was probably the best option as subcontractor. However, as a trade-off, the PCU was two steps removed from the NGOs. There was little direct interaction between the two, which may have reflected poorly on the CPCs' level of cooperation with the NGOs.

The "Danube Watch" was also subcontracted out to an independent editor and publisher. Three copies of the Watch were published, but along the way it became clear that the editor was unreliable and the PCU lost control of the content of the publication. At this point in time, the editing and publishing of the Watch has changed hands. Phare has been actively involved in the process and was instrumental in finding a new editor/publisher.

The PCU began work on the Danube Information System (DANIS) and found that it would be more effective in the big picture to incorporate DANIS into the system being created by the ICPDR, "DANUBIS." This project is being co-funded by a combination of Phare, Austrian Trust Fund, and the Austrian Ministry of Agriculture and Industry. To date, the web site is not yet functional, but is expected to be fully operational by the fall of 1999. In the meantime, Phare has published a Danube home page connected to that of REC, from which all activity will be forwarded to DANUBIS once it is functional.

3.3 Project Impact

The PCU did not produce materials or hold events to raise public awareness as outlined in the project document. Instead, the PCU felt that they would be better served by holding a regional training workshop called "Target Oriented Program Planning" (TOPP), in which one NGO representative and one government representative from each country were trained in public participation philosophy and methodology.

These representatives then became facilitators in the National NGO Workshops, arranged and facilitated by the REC, where national priorities were discussed and identified. These priorities were consequently introduced in the National SAP Planning Workshops where the results from the National Reviews (technical) and the National NGO Workshops were brought together to result in a revised SAP and the Pollution Reduction Program.

Further, the results of the National NGO Workshops were brought to a Regional NGO Consultation Meeting, in which NGO representatives from all 13 countries came together to discuss regional priorities and to re-establish or revitalize the DEF. The DEF has been weak and unable to participate effectively in the implementation of this project. Instead, the REC has taken the responsibility for the National NGO meetings. For similar reasons, the DEF was unable to hold a joint workshop with the Black Sea Basin NGO Forum. Cooperation with the Black Sea project has been slow as a whole. So far there has been only a joint technical working group with the Black Sea.

It should be noted that the past failures of the DEF have alienated some NGOs from participating, most noticeably those in Hungary. As a group, a number of Hungarian NGOs refused to participate in the National NGO meeting and sent a letter of protest stating that they would not have anything to do with the DEF. Currently, the DEF is in the rather precarious position of not being legally registered as an entity. As with many NGOs, the organization has little know-how with regard to legality, financial viability, and general management. However, they have made good progress in information sharing. The members have created an email network, which acts essentially as a list serve, and so far there has been good participation.

The Small Grants Program was carried out by the REC, working together with the PCU to develop guidelines and publicize the program. Because of a delay in actually disseminating the grants, the impact and results of the program have not yet been revealed.

The "Danube Watch" has been published in three issues, with two more special editions forthcoming. Four thousand issues were being disseminated, and now it has increased to 8000. Future plans have it being published on the DANUBIS site, as well as a condensed version inserted into another existing environmental publication (in Austria). Unfortunately, the former editor at some point stopped following the developments of the Danube program. After Phare funding stops in October 1999, sustainability of the publication will be in the hands of the new publisher. There is the possibility of inserting advertisements into the journal by which it might be self-sustaining.

The establishment of the Danube program home page has been facilitated by Phare, as mentioned above. This home page is being hosted by the REC web site and has the appropriate links to maps, legislation, donors, and other relevant information. A counter was put into the system, from which it can be assumed that up to 1000 people have visited the site.

Instead of updating DANIS as the project document outlined, the PCU felt it would be better to create a new system with a wider scope, and thus created a working group to create "DANUBIS" in March 1998. Existing components of DANIS, as well as the program home page, will be integrated into the new system.

3.4 Theory (Project Design revisited)

When considering the design of a project, it is important to analyze how it affects societal structure as well as how the project is designed internally. First, looking at societal structure, the decision making process is the focal point. Individual actors bring their own self-interest and ideologies to the table and make decisions based on those interests. Each of these actions comes together to create a collective action, the output from which affects the environment in some way. When the environment is altered, the individual's perception of reality changes. And so the cycle continues. Between each of these stages, there is an imperfect flow of information and communication. Disjunctures among individuals' worldviews can create greater disparity in the outcome of the collective action (if there be any outcome at all), and thus will maintain or intensify the differences among worldviews. If the point is to alter the outcome, the set of notions with which each person comes to the decision-making table must also be altered. Simply introducing a new set of actors will not necessarily bring about the desired outcome.

With regard to the design of a project, factors such as principal-agent problems must be addressed. A hierarchy arises such that the donors and the project staff form one relationship, and the project staff and the sub-contractors form another. Increasing levels of hierarchy widens the opportunity for miscommunication and information gaps. Thus any organization has it within its best interest to minimize its hierarchical levels. Additionally, the number of decision points through which any action must go through is directly related to the cohesiveness and efficiency of that action. The decision to sub-contract usually comes out of the necessity to have specialized services as well as a low level of uncertainty. Also, special effort must be made to assure that processes are linked to goals.

3.5 Conclusions and Recommendations

Overall, the project did what it needed to into order to fulfill the objectives of the project. The full impact of many of these efforts has yet to be seen, as timing is a factor. And still, as in the case of any development project, this is just one step in the process.

In all, the project design hampered the intentions and the goal of the public participation component of the project. While NGOs were effectively drawn into the decision-making process, the government side was less prepared for cooperation on this level. Because many of the countries in the Danube river basin are still in a transitional phase from an authoritarian to democratic rule, government authorities have yet to fully understand

the importance of accountability to the public. With this disparity in social framework, the collective action will also suffer either from a lack of action at all or some of the participants dropping out of the process.

The decision to contract out a large part of the public participation component was probably the best decision to make, though there were trade-offs involved. The project had to its advantage that the REC was a large and well-established organization with a history in many of the countries in the Danube river basin. However, this also necessitated that the contact with NGOs had to go through the REC's bureaucratic structure in addition to that of the project, which at times conflicted. Also, the fact that the REC did not work in all the countries in the basin contributed to a somewhat patchwork approach to NGO involvement as a whole. The nature of subcontracting similarly caused somewhat of a rift between process and goals. The result was that the process was adequately executed, though somewhat in isolation from the other processes in the project. This disconnectedness may also contribute to an undesirable collective action in the implementation stage of the SAP or Pollution Reduction Program.

The past weakness of the DEF and its current unresolved status is a critical factor for the future sustainability of public participation and cooperation in the Danube region. NGOs in Hungary have already collectively decided not to participate in the DEF. If the legal status of the organization is not adequately established from the beginning, its capacity to attract funding will be greatly diminished. Currently, the representatives of the DEF are unaware as to how to most effectively establish the organization.

In light of the above, recommendations are as follows:

1. Support should be given to the Commission to find or implement third sector awareness programs on the governmental level, especially for developing countries. EU requirements for free press have been instrumental in ascension countries thus far, but training programs are still needed. There has to be some kind of history of intra-sectoral cooperation before real changes in decision-making can take place.
2. The Commission should support the DEF through management skills in legality and financial liability, and work consistently to facilitate communication between the DEF and government officials.
3. Should the DEF fail to establish itself, personnel support should be given to the Commission to maintain a network among NGOs regionally until another means of regional cooperation should become apparent.
4. The Commission should update and maintain the DANUBIS system until it can be sustainably given to the work of the DEF or a like organization.

3.6 Mission Timeline

Saturday, June 12:	arrival in Vienna
Sunday, June 13:	meeting with team leader
Monday, June 14:	briefing with project leader, Joachim Bendow
	project delineation, Joachim Bendow, Andy Garner
Tuesday, June 15:	meeting with Entela Pinguli, REC in Budapest
Wednesday, June 16:	meeting with Teun Botterweg, Phare
	meeting with Wolfgang Stalzer, ICPDR
Thursday, June 17:	meeting with Christine Margraf, DEF rep in Munich
Friday, June 18:	depart from Munich

ANNEX IX

PROJECT NUMBER: RER/96/G31/A/1G/31

PROJECT TITLE: DEVELOPING THE DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME

Author: FRIEDRICH SCHWAIGER

Title of Report: EVALUATION REPORT ON OBJECTIVE 4 – DEVELOP THE FINANCING OF THE POLLUTION REDUCTION PROGRAMME WITHIN THE DANUBE STRATEGIC ACTION PLAN

Duration of Contract: 12th – 22nd June 1999 (9 Working days)

Contract Number: CFS-99-1720

Project: RER/97/RG1

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1. Executive Summary

This is the end of project evaluation report, covering objective 4 of the project, the financing of the pollution reduction programme.

A team of four experts carried out a mission to the Project Co-ordination Unit at Vienna. The financial expert was there from 14th to 18th June 1999 with the exception of a visit to KfW Frankfurt, who did the feasibility study for the proposed Danube Environmental Fund.

Some sections of the project document were designed rather optimistically. It practically assumed that an environmental fund will be feasible and that implementation of investment projects could start quickly. In some cases it is very specific and did not cover "what to do if … not". However, the project management applied a very practical approach and so compensated above fact.

The project was implemented within the extended time frame (agreed at the beginning of the project) with the exception of getting the revised SAP endorsed by the Ministerial conference.

The project work was well organised and strictly managed.

The project management applied the logical framework method (ZOPP) and involved to a high extent national experts, which is found good.

Some 400 hot spot projects have been identified with a total investment portfolio of USD 5.5 billion, the majority of projects being municipal waste water projects.

Costs have been split into baseline cost and incremental cost, according to GEF funding criteria. No reliable operation and maintenance cost could be obtained, so the ranking of projects was done on the basis of investment cost effectiveness.

Existing financing strategies in each country have been studied and general financing strategies were presented.

KfW did the feasibility study on the establishment of a Danube Environmental Fund and came to a negative conclusion. The result is found correct. The proposed alternative of establishing a grant facility fund was turned down by the ICPDR, as it would require a modification of the International Convention.

It is now proposed to install under the directive of the ICPDR a PIF (Project Implementation Facility) and a PAG (Project Appraisal Group). The PIF will support ICPDR with regard to investment programs and all regional activities, project preparation and identification. The PAG is a group of national experts who approve investment projects confirming by their seal to a potential donor that a) the project is of quality as defined by ICPDR and b) that it is a priority project.

A comprehensive SAP has been prepared which is not any more a revision but practically a new document. Some more editing is recommended to shorten it and make it easier to read. The document is scheduled to be approved at the Ministerial conference in Romania on 11th November 1999.

The project management does not consider a special donor pledging conference necessary since practically all interested donors are represented in the PMTF which meets 2 to 3 times annually anyway.

Revenues from water supply waste water services is a primary source of finance of waste water projects. A project should be executed aiming at improving the revenue collection efficiency.

Financing of investment projects will be done on a bilateral basis. There are good prospects for substantial WB/GEF funds for financing primarily incremental cost. Addition financing by UNDP/GEF to ICPDR, their bodies and activities is essential for maintaining the integrative element and financing of regional projects. The cost for running the PIF are about USD 2.5 million for a period of 3 to 4 years.

The Multi Country Programme of the EU ends by October 2000. Future assistance will be given only at the country level and primarily to EU accession countries. This also stresses the need to extend further GEF support to ICPDR.

2. Introduction

2.1 Project Background

A first phase of the Danube Programme was carried out from 1992-96, concentrating on building regional co-operation in the water sector in the Danube river basin. The main output of this phase was the Strategic Action Plan (SAP) 1994.

A Phase II project was designed and named "Developing the Danube River Basin Pollution Reduction Programme" – being the project subject to this evaluation.

The main purpose of this project is to prepare prioritised pollution reduction projects for co-financing by national and international sources within the strategic policy framework for the Danube river basin and Black Sea.

The project comprises of the following objectives:

Objective 1: Complete the knowledge base for priority-setting

Objective 2: Review policy for protection (especially nature protection) of the Danube River Basin and the Black Sea

Objective 3: Increase public awareness and participation

Objective 4: Develop the financing of the pollution reduction programme within the Danube Strategic Action Plan (SAP)

2.2 Evaluation Mission

UNOPS contracted the end of project evaluation of referenced project to a team of individual consultants. Every team member worked on particular objective. The team consisted of:

Dr. Stanislaw Manikowski	Team Leader, Policy and Institutional Expert
Dr. Francois Van Hoof	Technical Specialist
Esther Park	Specialist on Public Awareness
Fritz Schwaiger	Financial Specialist

The team carried out a field mission to Vienna with individual trips to Budapest, Frankfurt and Delft in calendar week 24/99. The Financial Specialist stayed in Vienna from 14th to 18th June 1999 with the exception of a one day mission to KfW Frankfurt on 17th June 1999.

In accordance with the TOR the team members prepared individual mission reports covering their tasks and discussed their findings with the Team Leader who prepares an integral final report.

Consequently this financial report should be read in conjunction with the other reports.

3. Acknowledgements

Special thanks is herewith extended to:

- all PCU-GEF Project Team headed by the Project Manager Mr. Joachim Bendow at the UNDP office in the VIC (Vienna International Centre) for all administrative and logistic support extended to the evaluation team
- the KfW (Kreditanstalt für Wiederaufbau) for the lively discussions in their offices and sparing sufficient time.
- Mr. Rainhard Wanninger, Financial Consultant to the PCU
- the Team Leader and all other members of the evaluation team for the fruitful discussions during project evaluation.

4. Objectives

This is the final evaluation of the project and should consider the impact, effectiveness and efficiency of the project and its chances for sustainability. The scope of the evaluation shall cover the:

- Project design
- Project implementation
- Project impact

5. Sources of Information

This evaluation report is based on information and documents received during the evaluation mission to Vienna. A schedule of meetings held and documents received is attached in Annex 1.

6. Report of Findings

6.1 Project Design

6.1.1 The Scope of Works as per the Project Document

Objective 4 consists of four sub-objectives and each sub-objective consists of several activities and tasks. They are briefly summarised below.

Sub-objective 4.1: Development of project portfolio and financing strategies

Activity 1: Develop financing strategies.

National and international financing strategies should be developed for each country for the two different types of projects (i.e. capacity building / demonstration projects and investment projects) by:

a) preparing a model structure for each Danube country

b) preparing national financing strategies including confirmation of national contributions

c) holding a workshop to review basin-wide financing strategy.

Activity 2: Portfolio of hot-spot projects

Brief project documents should be prepared for priority hot-spot projects. Cost estimates should distinguish between incremental cost and base line cost. O&M cost should be considered carefully. This to be achieved by:

a) preparing a model structure for project documents

b) preparing project documents for individual projects

c) agreement on implementation strategies for each project

Activity 3: Prepare wetland, floodplain and demonstration projects

This types of projects would not create any revenue stream and should therefore be grant financed. Cost estimates should distinguish between incremental cost and base line cost. O&M cost should be considered carefully. To be achieved by:

a) making a model structure for project documents

b) preparing project documents for individual projects

c) the agreement on implementation strategies for each project

Sub-objective 4.2: Mechanisms to provide sustainable financing (Danube Environmental Fund)

Activity 1: Feasibility study on establishing an environmental fund

In order to promote and finance transboundary pollution projects, the establishment of an international (or a series of national) Danube Environmental Funds (Trust Fund) should be studied. This should be achieved by:

a) preparation of a feasibility study of options to establish an international fund and possibly merge with the upcoming Transnational Danube Recovery Fund

b) Hold a workshop to agree on the approach

c) Hold consultations with the international community

Activity 2: Prepare structures, rules and mechanisms for the environmental fund

The legal basis, organisational structure, rules of procedure, financing sources etc should be prepared for the fund by:

a) preparation of basic documents for establishing the fund

b) completion of administrative procedures to establish legal basis

c) setting-up the required organisations to manage the fund

Sub-objective 4.3: Finalise, agree and adopt a revised SAP

Activity 1: Integrate portfolio of investment and capacity building projects and the financing mechanisms into the SAP

The existing SAP shall be refined and augmented with the elements described above, leading to a single document. This shall be achieved by:

a) discussion of the results of the financing strategies and proposed projects with the group responsible for updating the SAP.

b) Preparation of an updated version of the SAP.

Activity 2: Adopt updated SAP at Ministerial Conference

The original SAP, being adopted by the member countries through the Minister Conference in 1994 states that it will be updated after 3 years. A Ministerial Conference should therefore be organised covering the following:

a) organisation of a consultation meeting with the Country Programme Co-ordinators and representatives of the International Commission

b) provide support to logistic organisation of the conference

c) prepare wide spread publication of the SAP including the Ministerial declaration

Activity 3: Preparation of a donor pledging conference (or PPC meeting)

Careful preparation and intensive consultations with bilateral and multilateral donors and IFIs should be done to ensure a successful conference.

a) Finalisation of project documents

b) Hold a series of consultations with potential financiers

c) Hold a donor pledging conference

d) Publicise widely the achievements and settled financing

6.1.2 Comments on the Project Design

General

Generally the project document is well prepared, well structured, easy to understand and to read.

The project was designed at the end of Phase I. It is set up in a way to ensure a smooth change from Phase I to Phase II and a rapid progress in the next step in the project cycle, leading finally towards actual project implementation and investments.

The project document reflects much optimism. It is commonly agreed that national as well international financing contributions should be combined. It seems that the establishment of a Danube Environmental Fund (trust fund) has actually been decided.

Due to this “clear vision” where the project will go to, not much room has been given to thoughts about alternatives if things do not develop as programmed.

It is understood that project documents need to be formulated in an optimistic way and with objectives set rather high, in order to achieve all the project settings. Criticsm mentioned above needs to be seen in this respect.

Sub-objective 4.1

specifies the development of financing strategies / financing models for each Danube country and the confirmation of expected national contributions. Due to the economic problems these countries are facing at the moment, it is very unlikely that any commitments can be achieved for these projects.

Sub-objective 4.2

comprises the preparation of a feasibility study on a Danube Environmental Fund and the associated legal requirements and rules and structures for operating such fund. It actually recommends to merge with the upcoming Danube Recovery Fund lead by Germany and does not deal with the possibility of a negative result of the study.

The feasibility turned out to be negative. The project team (and their consultant) could have stopped working on this issue then. Nevertheless, they continued looking for alternative solutions.

Sub-objective 4.3

is again specified with much optimism but generally considered correct.

6.2 Project Implementation

6.2.1 Time Schedule

The project was originally set up for a period of 16 months. This is unrealistically short.

When the project team (manager) started to work and made its work planning, a project period of 24 months was agreed. This is still considered very short.

The project has been executed within the specified 24 months. All outputs have been produced as specified with the exception of the conference for high level endorsement of the revised SAP and the donor pledging conference.

Endorsement of the revised SAP is scheduled for the conference of Ministers in Romania on 11th November 1999.

A special donor pledging conference has not be organised since donors meet anyway regularly in the PMTF (Project Management Task Force). So the Project Manager does not expect any benefit from organising a special conference.

6.2.2 Project Management

The project was well managed and strictly controlled. High priority was put on keeping the time schedule.

The contacts already established in Phase I of the project helped to quickly have efficient communication with the Country Co-ordinators and Experts. Workshops and clear guidelines how to collect and present data and information substantially contributed to the efficient information flow. All 13 Danube countries submitted the National Review Reports, without exception.

Concern has been raised that the strict time keeping and the time pressure may have affected the quality of input data, work and output. Regarding objective 4 this can not be confirmed. According to the project team and their Financial Consultant, the quality of the input data would not have improved significantly if more time was available.

KfW (Kreditanstalt fuer Wiederaufbau) of Frankfurt was commissioned to carry out the feasibility study for the establishment of a Danube Environmental Fund. KfW is the state owned bank in Germany in charge of export financing and bilateral and multilateral economic co-operation. This fact and the fact that Germany is the most potential Danube river riparian country may have made KfW the consultant of choice for doing the study. KfW usually does not provide consulting services but accepted this request since it was channelled through the German Ministry of Co-operation. The output of the study is satisfying. It has to be seen in the future whether or not such an involvement of a bank will additionally benefit project work (e.g. selling of projects to IFIs easier).

6.2.3 Project Approach

The project was organised and executed such that the involvement of national experts was given priority to the execution of the works by international experts. They were only used to co-ordinate the national experts and summarise the results. This approach is considered correct.

Generally the logical framework method of (ZOPP) target oriented project planning was applied. National experts were trained in this method which helped considerably to create a uniform structure of all inputs and reports. Nevertheless, also this approach has its limits of application and should not be reflected in reports to an extend which makes them difficult to read (see revised SAP report).

6.3 Project Impact

Sub-objective 4.1: Development of project portfolio and financing strategies

Financing strategies

The report "Analysis of Financing Mechanisms " issued in March 1999 deals with the requested model for a financing strategy of pollution reduction projects. In a summarised form the essence of this report is contained also in the revised SAP report.

The report describes well the existing financing mechanisms and environmental funds in each of the Danube countries. It outlines the big differences of national financing capacity and in parallel the decreasing efficiency of water / waste water revenue collection systems in each country with a clear falling gradient following the Danube river in flow direction.

The study does not present individual model structures for financing strategies for each country (as per ToR) but gives a general recommendation for all countries. In short this is

a) to improve and to use to a maximum the national resources (mainly water revenues and public funds) and

b) only then to use international financing

c) to promote private sector participation.

This requires that the revenue collection systems for water and waste water services are significantly improved in most countries in order to change the situation that the governments / municipalities have to raise the financing.

The approach is considered correct and absolutely essential for the financing of such projects.

A confirmation of expected national contributions to the projects – as specified in the ToR – has not been received.

Financing mechanisms were discussed at each of the National Planning Workshops. Preliminary results of the study were presented in the Transboundary Analysis workshop in Baden in January 1999 and finally in the workshop on Development of a Financing Facility in Baden in February 1999.

Portfolio of hot spot and wetland & floodplain projects

The "Danube River Basin Pollution Reduction Programme Report" of June 1999 contains a portfolio of 421 projects. In total 513 hot spots were identified with 246 of them being actually based on existing improvement projects. A summary of the key figures is contained also in the revised SAP.

The grand sums are:	
Total investment cost	USD 5.5 billion
Thereof	
municipal projects	USD 3.5 billion
wetlands	USD 1.1 billion
others	USD 0.9 billion
Thereof	
baseline cost	USD 3.5 billion
incremental cost	USD 2.0 billion

The projects were identified and cost estimates provided by national experts. They were trained in a workshop on how to collect and verify the information and a model structure of a project document (data sheet) was handed over to them.

The PCU team managed to get from all Danube countries – without exception – information in return and managed to compile country reviews. The quality of work certainly varies from country to country.

The PCU team checked the so collected information for plausibility. A source of error is seen in the conversion of cost estimates from local currency to USD. Generally the official exchange rates were applied.

The careful assessment of operation & maintenance cost is specified in the ToR but no reliable information could be obtained.

As per GEF funding regulations, water projects need to have a transboundary effect and only this element is eligible for GEF funding. It is generally accepted that the annual nutrition load (nitrogen and phosphorus) is the main cause of eutrophication of the Black Sea. The river Danube is one of the main contributors. The general approach was that measures aiming at P and N removal are incremental cost and all other cost are baseline cost.

Regarding waste water treatment plants the incremental cost represent the tertiary treatment. The removal of carbon and other elements are considered as baseline cost. Regarding wetland and floodplain projects, the provision of land is considered as baseline cost and the cost for restoration as incremental cost.

The cost effectiveness method was used as a parameter for ranking of projects. Due to the vague O&M cost information, a ranking of projects was done according to investment cost needed per unit of removed BOD, COD, P and N.

The method using the present value approach was presented in the Pollution Reduction Programme in Hernstein in May 1999 to the country experts and it was agreed that the project data need to be completed and updated to be able to apply such method.

Concern has been raised about the quality of data, also in relation to the short project period. PCU staff explained that the quality of financial data (cost estimates) would not have improved with and extension of time. Data are based mainly on cost estimates on projects of former years and an improvement of the data quality could only be obtained if individual (feasibility) studies are carried out for each project.

The PCU staff confirms that the identified projects include all major hot spots. Some medium size projects may still be missing and smaller projects are not included. However, the data bank established needs to be regularly updated and projects be included step by step. The ranking of the top series of projects should not be affected as experience shows a good positive correlation between project size and priority ranking.

Regarding the argument of possible deficiencies in cost data and the incompleteness of projects, the big gap between projects identified with associated investment cost and the realistic investments to take place in the next years has to be seen. In addition each project will be checked again before investments actually take place.

The ToR also specify the need to agree on implementation strategies for each of the pollution reduction programme rather vague. If this term refers to eligibility of GEF funding and the ranking of projects by cost effectiveness than this task has been covered.

The ToR further require the definition of revenues achieved by the projects. Most of the projects are waste water treatment projects which do not generate any revenues. Only in exceptional cases they have an effect of reduction of alternative treatment cost.

Sub-objective 4.2: Mechanisms to provide sustainable financing (Danube Environmental Fund)

Feasibility study on establishing a Danube Environmental Fund

PMU contracted this task to KfW who published their work in the report: "Financing Pollution Reduction Measures in the Danube River Basin: Present Situation and Suggestions for new Instruments" in April 1999. After careful analysis they came to the conclusion that such fund is not feasible due to the following:

- The wealthier countries have not interest in a compensation mechanism (wealthy countries contribute to the fund, less well off countries receive from fund,
- International taxes and pollution charges as source of finance is not accepted by all countries
- The amount of available donor and IFI money would not increase by such fund; why to carry administration cost for such fund?
- EU extends sizeable concessional money to potential accession countries but not to a fund
- PMTF can take over a possible brokerage function of the fund and assistance in project preparation.

Very similar was the outcome of a study from a different consultant regarding a Black Sea Environmental Fund.

KfW then investigated into alternative solutions and recommended a Danube Environmental Facility Fund (DEFF). This fund would not be an intermediary for IFIs but would concentrate on providing grant money for:

- Technical assistance for project identification
- Grants for investment projects (which can not be financed by loans)
- Packaging of projects for financing by IFIs.

KfW provided details who such fund should function and be administered. The DEFF was supposed to be placed under the ICPDR. However, this would require an addendum to the International Convention to set the legal basis. In view of the difficulties and the time needed to implement and ratify such addendum, the idea to establish an DEFF was dropped in the June 1999 Steering Committee Meeting of the ICPDR.

The KfW study then recommended the establishment of a Project Appraisal Group (PAG) and a Project Implementation Facility (PIF), both of them under the ICPDR.

The PAG would be an expert group for project appraisal. By this, less attractive projects could be sold better to donors. Secondly the PAG would approve and authorise projects from individual countries, confirming that the project is up to the standard defined by the ICPDR and an ICPDR priority project. The President of the ICPDR thinks that the PAG facility will be necessary for a some period of time, until national experts have gained experience in this work.

The role of the PIF would be

- To support the work of ICPDR regarding regional investment programs
- Assist member countries in project preparation (acceptable for IFIs and GEF)
- Monitoring of results

ICPDR has welcomed this idea and hopes that the required financial support is provided by UNDP/GEF. An exit strategy could be that finally PPC takes over this role or the PMTF is charged with additional competencies, similar to the METAP model.

The cost of the FIP for a 3 to 4 year period are USD 2.5 million.

Preparation of structures, rules etc. for the Environmental Fund

The project document was set up with the assumption that the fund will be certainly established. It also mentions, that the proposed fund should be merged with the upcoming transnational Danube Recovery Fund, lead by Germany. Such fund has not materialised.

As outlined above, the feasibility of the Danube Environmental Fund was negative and so there is no need to prepare structures and rules for the fund. Nevertheless, KfW has outlined such structures and rules for the proposed DEFF.

Sub-objective 4.3: Finalise, agree and adopt a revised SAP

Preparation of a revised SAP

The ToR specify the revision of the original SAP by refining the existing content and integrating the portfolio of projects and the regional financing mechanisms.

The PMU prepared practically a new SAP. The main reason for it was, that the SAP should be a strategic paper containing policy and strategy issues and no actions and projects. They were put into the "Pollution Reduction Programme" report. These major changes are not very much appreciated by country experts who were strongly involved in the preparation of the first SAP.

The revised SAP is a comprehensive and substantial document with inputs from the national reviews, the results from the workshops and from international experts. The document has recently been sent out for the final review by the national experts.

The document strictly follows the target oriented project planning method which is principally appreciated. But, the document is overloaded with information and contains repetitions. The report should be streamlined, restricted to the essential information, well structured and made easy to read.

The previous SAP document was considered the "bible" for the ICPDR. As long as the International Convention was not signed and ratified, it was the only document binding ICPDR together. The revised SAP should be finalised with the same expectations.

Ministerial endorsement of the revised SAP

The PMU does not expect major changes and comments to come back from the national experts on the SAP, so the endorsement of the final version of the revised SAP by the Ministers of the Danube countries is expected to take place at the Ministerial conference in Romania, scheduled for 11th November 1999.

Donor pledging conference

A donor pledging conference or a PPC meeting has not been held yet.

The project management informs that the regular meetings of the PMTF (2 to 3 times a year) which are usually combined with the Steering Committee meetings actually substitute such a meeting. At these meetings all major IFIs and donors are present and a special donor conference would not attract additional financiers.

7. General Remarks

7.1 Activities of Other Organisations in the Sector and Region

EU Phare and Tacis

This project co-operated well with EU Phare in Phase I. Phare and also Tacis complemented the Phase II programme of UNDP/GEF covering the early warning model, financing pilot projects, some of the working groups and activities of ICPDR, the PMTF etc.

The fact that some countries fall under Phare and others under Tacis makes administration for their Project Manager rather difficult. It also does not support the crucial aspect of integrating all countries into the programme.

The project operates under the Multi Country Programme which was terminated by the EU. Approximately ECU 5 million are still available under the ongoing project and have to be earmarked until October 1999. The project will end by October 2000.

It is planned that Phare and Tacis will then continue their assistance in this sector and region at the country level. Special technical assistance and financial support (ISPA funds etc.) is expected to be given to the EU accession candidate countries which have to improve the environmental situation before becoming EU member country.

This aspect obviously does not contribute to the integrative aspect of all Danube countries.

Private Sector Participation

In view of the budgetary constraints of the down stream Danube river countries, private sector participation may play an important role in achieving the set goals. French water companies are already established in the region.

The Austrian company FGG – Finanzierungsgarantiegesellschaft is an organisation of the Ministry of Finance extending guarantees to Austrian companies for foreign investments. FGG has recently established in Budapest with an Hungarian state bank the joint venture company Duna Development Ltd. This organisation identifies and formulates projects in the environment and energy sectors and promotes them to private industries.

KfW is in the process of establishing credit lines through local banks among others also in the Danube river countries. They aim at projects in the range of DM 5 to 10 million by financing up to 2/3 of the total project cost.

7.2 Remarks on the General impact

The project has been working mainly with national experts which is good. These experts are the people who are already convinced about the need for investments in improving the environment. The dissemination of this understanding still needs to go on in horizontal and vertical direction in the governments and administrations, but this needs time.

The involvement of the private sector was not part of this project, but should be promoted.

Project implementation will mainly be going on at the country level. Donors and IFIs will negotiate on a bilateral basis. There are expectations that WB/GEF could make available a USD 70 million WB/GEF grant portfolio for investment projects for the Danube and Black Sea region. These funds could cover incremental cost and WB will offer (might tie) complementary loan financing for meeting the base line investment cost.

In addition to above, the integrative element of the ICPDR is very important. Further assistance should be extended by UNDP/GEF to the ICPDR and its activities. Some of the projects do not qualify for loan financing and have regional character, so need to be promoted through ICPDR. Continued UNDP/GEF assistance in parallel to incremental financing of WB/GEF is essential.

ICPDR needs continued financial assistance to ensure sustainability of the integrative role of ICPDR.

8 Conclusions

1) All substantial elements of the project have been completed within the (modified) project period.
2) All outputs in form of reports and workshops have been delivered.
3) A portfolio of some 400 projects (hot spot and wetland) has been prepared.
4) A priority ranking of the projects has been done on the basis of investment cost effectiveness as no reliable operation & maintenance cost could be gathered. Cross checking of the data is advised but can be done on a project to project case when picked up by a potential financier.
5) Projects still need to be hooked on to national / international financiers.
6) The establishment of a "big" Danube Environmental Fund is not feasible.
7) The alternatively proposed Danube Environmental Financing Facility (a grant fund facility) can not be realised as well.
8) The revised SAP is actually a new report and not only a revision. Some more editing would improve easy reading and quality of the document.
9) Ministerial endorsement of the revised SAP is expected to be obtained on 11th November 1999.
10) The primary source of finance for this type of investment projects is revenues collected from water and waste water services plus other national financing plus international grants. Only then international loans should be used.
11) The project management does not consider a special donor pledging conference necessary since practically all interested donors are represented in the PMTF which meets regularly.
12) Financing of investment projects will (and should) be done on a country level. GEF funds for financing incremental cost (here nutrition removal) is needed for the proposed projects but should not be tied to international loan financing.
13) Private sector participation could play an important role and should be promoted.
14) EU accession countries are faced with the requirement of the EU, to improve their environmental situation. Significant financial assistance from the EU is expected towards these countries. It can be expected that this is the main driving force for investments in the environmental sector in these countries.
15) The main driving force for the other (non EU accession) countries is a) the will to improve the environmental situation, b) to reduce pollution load to the Black Sea. Both incentives are weaker than the EU accession arguments. An increase of the existing disparity in the environmental situation between the Danube countries can be expected.
16) The ICPDR is an integrative element. It needs to be given the power and financial capacity to maintain its role in particular in view of above prospects.
17) Any future non-national (regional) activities / projects must be placed under the umbrella of the ICPDR.
18) ICPDR´s activities should be on the policy and strategy level. However, regional activities which are of no significant interest to individual countries need to be taken up by ICPDR. Special bodies under ICPDR like PIF, PAG etc. should be charged with these activities.

9 Recommendations

1) Further editing of the revised SAP to make it a smart policy and a strategy document.
2) Get Ministerial endorsement for the SAP
3) Co-ordination of all future regional activities by the ICPDR.
4) Any future body established (PCU, PIU, PIF, GAP etc.) on a regional level must be under the directive of ICPDR.
5) Continued UNDP/GEF support to the ICPDR, their activities and bodies is needed in order to maintain the integrative element and to implement regional projects which are of low priority to individual countries.
6) ICPDR should operate on the policy and strategy level and get involved in activities only for regional aspects which would not be taken up by individual Danube countries.
7) Project implementation and investment financing will go on at the country level. Each country will negotiate its own terms. ICPDR should assist the national experts in preparing bankable projects.
8) An essential financial source for financing waste water projects is the revenues from water sales. A project should be formulated covering each individual country to improve revenue collection efficiency with the following scope of work:

   a) analysis of the current revenue collection system (technical legal and practical aspects)
   b) define the socially acceptable tariffs
   c) calculate the revenue potential country wide
   d) defines the necessary legal modifications to improve the situation
   e) define the necessary technical and administrative modifications to improve the situation
   f) formulate the investment package (water meters, computer systems etc)
   g) formulate training requirements of water company staff
   h) define an project with budget for public awareness building
   i) make realistic projections for increased income from water sales

9) GEF financing of incremental cost is needed but should not be tied to international loan financing.
10) Private sector participation should be included in future activities.

ANNEX 1

RER/96/G31/A/1G/31
DEVELOPING THE DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAMME

FINANCIAL ANALYST
SCHEDULE OF MEETINGS

Date/ Time	**Location / Participants**	**Subject / Documents received**
Mo. 14.06.99 08:30	Arrival in Vienna	
Mo. 14.06.99 09:00 – 11:00	VIC Mr. Joachim Bendow, Project Manager Mr. Roger Aertgeerts, UNOPS Mr. Stanislaw Manikowski, Team Leader Mr. Francois van Hoof, Technical Specialist Ms. Ester Park, Public Awareness Specialist Mr. Fritz Schwaiger, Financial Specialist	Introduction to the team members and to the project by the Project Manager Documents received: List of documents. All documents (output) produced by the project.
Mo. 14.06.99 11:00 – 13:00	VIC Mr. Roger Aertgeerts, UNOPS Mr. Stanislaw Manikowski Mr. Francois van Hoof Ms. Ester Park Mr. Fritz Schwaiger	Introduction by the Team Leader to proposed approach and discussion of individual tasks. Documents received: Checklist for drafting the evaluation report.
Mo. 14.06.99 13:30 – 15:00	FGG-Finanzierungs Garantie Gesellschaft Dr. Wilhelm Hantsch-Linhart, Infrastructure Financing Specialist Mr. Fritz Schwaiger	Introduction to their approach to stimulate private sector investments in Hungary and other CEECs by establishing a Project Development Company in the recipient country. Documents received: FGG Brochure Description of Duna Development Ltd.
Tu. 15.06.99 09:00 – 10:30	EU Phare Mr. Teun Botterweg, Team Leader Mr. Francois van Hoof Mr. Fritz Schwaiger	The Phare Environmental Programme for the Danube river. Documents received: 1996 Annual Report Danube Strategic Action Plan Implementation Programme 1996-99
Tu. 15.06.99 10:30 – 11:30	VIC Mr. Stanislaw Manikowski Mr. Francois van Hoof Mr. Fritz Schwaiger	Internal; Relevant Documents
Tu. 15.06.99 13:30 – 15:00	VIC Mr. Andy Garner, PCU, Environmental Engineer Mr. Francois van Hoof Mr. Fritz Schwaiger	Organisations involved in the Programme
Tu. 15.06.99 15:00 – 16:30	VIC Mr. Joachim Bendow, PCU Project Manager Mr. Fritz Schwaiger	Time schedule, comments on outputs, and organisations involved in the Programme
Tu. 15.06.99 16:30 – 17:30	VIC Mr. Stanislaw Manikowski Mr. Fritz Schwaiger	Social elements in the project
We. 16.06.99 09:00	VIC Mr. Stanislaw Manikowski	Documents received:

Date/ Time	**Location / Participants**	**Subject / Documents received**
	Mr. Fritz Schwaiger	Revised and agreed project time schedule (07/97-06/99)
We. 16.06.99 10:30 – 11:30	ICPDR office, VIC Mr. Hellmut Fleckseder, Technical & Scientific Director, Mr. Francois van Hoof Mr. Fritz Schwaiger	Status of the Danube river and the Black Sea; monitoring; Documents received: Eutrophication in the Black Sea: causes and effects
We. 16.06.99 13:30 – 15:30	VIC Mr. Reinhard Wanninger, Financial Consultant to the PCU Mr. Fritz Schwaiger	Objective 4 of the project; data collection, calculations, conclusions
We. 16.06.99 16:00 – 17:00	Ministry of Agriculture and Forestry, Vienna Mr. Wolfgang Stalzer, ICPDR President Mr. Stanislaw Manikowski Mr. Francois van Hoof Ms. Ester Park Mr. Fritz Schwaiger	Performance and benefits of the project to ICPDR, future activities needed.
We. 16.06.99 18:00 – 19:00	Vienna Mr. Wilhelm Kittinger, past President of ICPDR Mr. Francois van Hoof Mr. Fritz Schwaiger	Performance and benefits of the project to ICPDR, future activities needed.
Th. 17.06.99 10:00 – 15:00	KfW, Frankfurt Mr. Jürgen H. Lottmann, Chief of the Environment and Public Health Division, Mr. Dieter Schulze-Vornhagen, Senior Project Manager, Promotional Banks Mr. Fritz Schwaiger	Feasibility Study on the Danube Environmental Fund.
Fr. 18.06.99 10:00 – 11:00	VIC Mr. Joachim Bendow Mr. Fritz Schwaiger	Clarification of questions, future input needed from UNDP/GEF Documents received:
Fr. 18.06.99 10:00 – 11:00	VIC Mr. Stanislaw Manikovski Mr. Fritz Schwaiger	Debriefing of the Team Leader

Developing the Danube River Basin Pollution Reduction Programme

TERMINAL REPORT
Sept. 10, 1999

Basic programme/project information :

Programme/Project number and title:	RER/96/G31/A/1G/31 Developing the Danube River Basin Pollution Reduction Programme
Designated institution:	
Project starting date:	Sept. 1, 1997
Originally planned:	
Actual:	
Project completion date:	
Originally planned:	Dec. 31, 1998
New:	Sept. 30, 1999
Total budget ($):	
Original:	3,900,000 US Dollars
Latest signed revision:	3,900,000 US Dollars
Period covered by the report:	Sept. 1, 1997 to Sept. 30, 1999

PART I: NUMERICAL RATING

Rate the relevance and performance of the programme or project using the following scale:

1 - Highly satisfactory
2 - Satisfactory
3 - Unsatisfactory, with some positive elements
4 - Unsatisfactory
X - Not applicable

Place your answers in the column that corresponds to your role in the programme or project.

SUBSTANTIVE FOCUS	Rating by Project Manager	Comments - Project Manager
A. RELEVANCE		
1. How relevant is the programme or project to the development priorities of the country?	1	The project is highly relevant to efforts to build regional cooperation, improve water quality as well as to prepare most Danubian countries for entry into the European Union. It fits well into regional and national plans of DRB countries.
2. How relevant is the programme or project to the promotion of sustainable human development? Indicate your rating on the thematic focus which the programme or project was designed to address. (a) Poverty eradication and sustainable livelihoods (b) Protection and regeneration of the environment (c) Gender in development (d) Promoting an enabling environment for SHD, including governance	1 a) X b) 1 c) X d) 2	The programme is very relevant to the promotion of SHD, via capacity building, use of national experts, development of cooperation with national counterparts etc. b) Project contributed via activities leading to nutrient reduction to the Black Sea, and positive impacts on water quality in the DRB. d) Achieved positive result due to use of participatory approach, NGO involvement and activities to strengthen NGOs in the Danube.
3. To what extent are appropriate beneficiary groups being targeted by the programme or project, based on the following considerations? (a) Gender (b) Socio-economic factors (c) Geographic location	a) X b) X c) 1	c) All Danube Countries participated actively in the project with a particular emphasis on integrating Bosnia-Hercegovina. NGOs and the civil society were involved as well as national focal points from the respective governments
4. Given the objectives of the programme or project, are the appropriate institutions being assisted?	1	The appropriate institutions have been involved with a particular focus on the ICPDR, focal points at the national level and NGOs.

SUBSTANTIVE FOCUS	Rating by Project Manager	Comments - Project Manager
B. PERFORMANCE		
1. Using the following indicators, rate the contribution of the outputs to the achievement of the immediate objectives: [a/]		
(Indicator 1) Completion of knowledge base for priority setting	1	Knowledge base for priority setting significantly improved and expanded. The Pollution Reduction Programme represents a large step forward in the knowledge of priority pollutants (emphasis on N and P) as well as hot spots and identification of priority projects and measures. The new level of information, has been placed in a databank which the ICPDR will now be updating and improving regularly.
(Indicator 2) Policy review for protection of the Danube River Basin and the Black Sea	2	National and Regional policies for protection and improvement of the Danube River Basin/Black Sea reviewed and recommendations for improvements prepared. National policies were reviewed and recommendations for improvement were developed in the frame of National Review reports and inter-sectoral National Planning Workshops including national stakeholder representatives. The Strategic Action Plan was also developed by reviewing National outputs in a regional context. The SAP was finalized in a regional participatory workshop. Further joint technical working group Danube-Black Sea provided the base for development of basin-wide policies.
(Indicator 3) Increase in Public Awareness and Public Participation	1	Public Awareness and Public Participation increased. NGOs were included in important elements of the project including national NGO consultation workshops, National Planning Workshops etc.
(Indicator 4) Development of financing for a Pollution Reduction Programme within the Danube SAP	1	Financing for the Pollution Reduction Programme developed. Financing mechanisms of all DRB countries reviewed. Regional mechanisms in the frame of Danube Environment Financing Facility developed. Investment portfolio prepared and donors meeting planned.
2. Rate the production of target outputs.	1	Outputs expected from Project document largely achieved within the constraint of very tight time limits.
3. Are the management arrangements of the programme or project appropriate?	1	Management arrangements of the programme functioned very well with excellent cooperation with the ICPDR, DRB countries, PHARE/TACIS Danube programme, World Bank etc.

[a/] The programme or project manager must list the indicators as reflected in the programme support document or project document or agreed on by the stakeholders.

SUBSTANTIVE FOCUS	Rating by Project Manager	Comments - Project Manager
4. Are programme or project resources (financial, physical and manpower) adequate in terms of:		
a. financial resources	1	adequate for tasks required
b. physical resources	1	equipment, office space etc. met project needs
c. manpower		
(a) quantity?	2	Project support (i.e. secretary) missing at project start
(b) quality?	1	Project team worked well as a team and identified and cooperated well with large team of international and national experts
5. Are programme or project resources being used efficiently to produce planned results?	1	Project resources were allocated efficiently with an emphasis on utilizing national expertise where possible which was also more cost effective
6. Is the programme or project cost-effective compared to similar interventions?	1	The GEF Danube Pollution Reduction Programme has been very cost effective particularly in comparison to the previous GEF intervention in the Danube.
7. Based on its work plan, how would you rate the timeliness of the programme or project in terms of:		
(a) Production of outputs and initial results?	1	Outputs were timely with all major outputs completed by June 1999.
(b) Inputs delivery?	2	Mainly satisfactory however there were some difficulties with UNOPS concerning contracts and services

Please indicate your overall rating of the programme or project using the following numbers:

1 - Highly satisfactory
2 - Satisfactory
3 - Unsatisfactory, with some positive elements
4 - Unsatisfactory
5 - Not applicable

	Rating by Project Manager	Comments - Project Manager
OVERALL RATING OF THE PROJECT	1	The Project Objectives were significantly achieved. The results have been well received by the ICPDR as well as Danube River Basin Countries assuring the sustainability of results. The results provide an excellent basis for implementing pollution reduction measures in the future.

Explain the basis of your rating, which need not be limited to, or which may be different from, the relevance and performance criteria rated above. For the last year of the programme or project, the overall rating should include an assessment of the potential success of the programme or project as well as its relevance and performance.

PART II: TEXTUAL ASSESSMENT

1. What are the major achievements of the programme or project vis-à-vis the expected results? Please explain them in detail in terms of potential impact, sustainability of results and contribution to capacity development.

Table: Major Achievements vis a vis Expected Results

Expected Results (per Project Document)	Major Achievements	Potential Impact	Sustainability of Results	Contribution to Capacity Development
1. National and basin-wide pollution reduction programmes for substances causing eutrophication (especially nitrogen and phsophorus) coming from municipalities, industry and agriculture;	a) *National Reviews* completed, hot spots of pollution (N and P) identified and projects planned; *National Planning Workshops* held to develop national strategies and programme for pollution reduction resulting in an agreed national approach for reduction of nutrients; b) *Pollution Reduction Programme* developed containing 421 projects for reducing N and P and quantifying reduction	a) Impact expected to significantly focus and stimulate implementation at the national level; b) Expected to lead to greater implementation of pollution reduction projects in the Danube Basin. Allows a basis for monitoring results (project database) and to quantify achievements.	a) Results should be sustainable and long lasting. Use of participatory approach ensures "ownership of results". b) Project Database developed to allow for countries to constantly improve information about projects in the Pollution Reduction Programme, as well as allows for projects to be added and subtracted based on implementation and consistent review at both the national and regional levels.	a) National capacities were strengthened given the project's approach of primarily using national expertise to collect and analyze data and information at the national level under guidance of international experts. b) Consistent use of methodology for data collection and analysis in each country harmonized approach. Regional workshop to develop PRP integrated and strengthened national capacities throughout the basin.
2. Revised Danube River Basin Strategic Action Plan (SAP) which includes a policy direction for the Danube River Basin;	a) The Strategic Action Plan for the Danube River Basin was revised based on a participatory approach based on input from all DRB stakeholders. The national policies and strategies for pollution reduction developed in a consistent approach at the National Planning Workshops were integrated and placed in a regional context.	a) The revised SAP is expected to serve as the guiding policy document for the implementation of the Danube River Protection Convention by the ICPDR.	a) The SAP should be a living document and reflect the current environmental, socio-economic and political situation in the Danube River Basin. Thus it is expected that revisions are to be done periodically to "revise" the SAP to new circumstances. The SAP revision 1999 reflects the current policy and strategic needs in the Danube River Basin and should serve as the guiding policy instrument until the next revision in 2003.	a) Only experts from the Danube River Basin were involved in developing the SAP as well as the national plans that form the basis of the 1999 revision. This unique cooperation using a logical framework approach, strengthened national capacities in developing coherent, logical, target oriented policies and strategies.

Expected Results (per Project Document)	Major Achievements	Potential Impact	Sustainability of Results	Contribution to Capacity Development
3. National and basin-wide pollution reduction and ecological rehabilitation programmes for priority wetlands, floodplains, and adjacent groundwater resources, and demonstration projects in cooperation with the European Union's Phare and Tacis Programmes	a) Danube River Basin Wetland Inventory completed and a Basin-wide Wetland and Floodplain Rehabilitation Programme was developed. Programme was developed in close cooperation with the EU's PHARE and TACIS programmes which have initiated demonstration projects in wetland rehabilitation.	a) This relatively small component of the GEF Programme will have a very important impact in stimulating wetland rehabilitation activities in the Danube River Basin. It provides concrete rehabilitation projects that can be supported by national governments, NGOs as well as be presented to interested donors.	a) Given the direct involvement of national and regional NGOs in developing the programme, the activities in wetland rehabilitation should not only be sustainable but also expanded in the future. Efforts to develop a Lower Danube Green Corridor are currently underway to rehabilitate wetlands in Bulgaria, Romania, Moldova and the Ukraine with significant donor interest and involvement.	a) National wetland focal points were utilized to collect and verify data and information at the national level using a consistent methodology. The project results were strengthen capacities of national governments to appropriately integrate wetland rehabilitation and protection projects and measures into national pollution reduction programmes.
4. Transboundary Analysis of actual water pollution and its effects from country to country and to the Black Sea;	a) Transboundary Analysis (TDA) of Water Pollution in the Danube River Basin was completed. b) Danube Water Quality Model (DWQM) greatly improved as a tool to analyze transboundary pollution (from country to country) as well as to evaluate potential rehabilitation measures.	a) The TDA provides the first comprehensive basin wide analysis of transboundary pollution problems in the Danube and lays the technical basis for identifying remedial and preventative measures; b) The DWQM is a tool that improves the ability to identify, quantify and to evaluate transboundary pollution.	a) This first TDA provides a comprehensive framework for collecting and analyzing transboundary water pollution. It is expected that this will continuously be improved and updated in the future as better more consistent water quality data is collected in the DRB.	a) National experts were used to collect and analyze data and information working in multidisciplinary teams. Experts participated in a regional target oriented planning workshop to finalized the Danube Transboundary Analysis.
5. Increased public awareness and participation in pollution reduction activities related to the SAP and improved information accessibilitiy and transparency;	a) National NGO Workshops held in 11 Danube Countries; b) National Planning Workshops held in 11 Danube Countries; c) 5 issues of Danube Watch published (including special editions on the Transboundary Analysis and the SAP/Pollution Reduction Programme respectively); d) ICPDR Information System (DANUBIS) developed in part to disseminate results.	a) Both NGO and National Planning Workshops ensured broad participation from all stakeholders as well as provided a vehicle to build public awareness at the national level. b) same as above c) Used to inform the interested public about Danube Pollution Reduction Programme activities. d) A primary goal of the new ICPDR Information System	a) The activities developed a framework for bringing NGOs together at the national level which should be utilized again in the future. b) National Planning Workshops sets the basis for multidisciplinary, inter-sectoral planning in the future. c) Successfully started using the sale of advertisements to reduce the cost of producing the Danube Watch with the ultimate goal of self-sufficiency.	a) Experience in conducting and participating in target oriented planning workshops provided to national NGOs. b) Experience in conducting and participating in multidisciplinary, inter-sectoral target oriented planning workshops provided to Danube Stakeholders. c) Experts and journalists from the Danube River Basin provided input to Danube Watch. d) Danube River Basin experts

Expected Results (per Project Document)	Major Achievements	Potential Impact	Sustainability of Results	Contribution to Capacity Development
		being developed in the frame of GEF assistance, is to significantly increase the ability of the public to access information produced in the PRP as well as to provide a better way for building public awareness and support for the PRP.	d) The information system will be owned and operated by the ICPDR, a permanent institution funded by member countries assuring the further operation of the information system.	responsible for developing ICPDR information system. Training to be provided to primary users within the ICPDR.
6. Strengthened capacity of environmental non-governmental organizations (NGOs) involved in Danube and Black Sea issues;	a) National NGO Workshops held in 11 Danube Countries; b) NGOs participated in National Planning Workshops in 11 Danube Countries; c) Danube Environmental Forum was re-established and framework developed for sustainable operation;	a) Both NGO and National Planning Workshops ensured broad participation from all stakeholders as well as provided a vehicle to build public awareness at the national level. b) same as above c) National representatives to the DEF were chosen at the National NGO Workshops. Two regional DEF meetings were held. DEF representatives participated in the regional workshops.	a) The activities developed a framework for bringing NGOs together at the national level which should be utilized again in the future. b) National Planning Workshops sets the basis for multidisciplinary, inter-sectoral planning in the future. c) Slovakian NGO supporting DEF Secretariat. DEF developed statues and then established itself as a legal entity in Slovakia. Proposal developed and presented to donors for the further development of DEF.	a) Experience in conducting and participating in target oriented planning workshops provided to national NGOs. b) Experience in participating in multidisciplinary, inter-sectoral target oriented planning workshops provided to Danube Stakeholders as well as representing civil-society interests. c) Strengthened ability of Danube River Basin NGOs to organize themselves at the regional level.
7. Improved international cooperation in the sustainable management of the Danube river Basin and Black Sea, including the integration of Bosnia-Herzcegovina and the Federal Republic of Yugoslavia in international management of hte Danube River Basin.	a) GEF programme supported the ratification process of the ICPDR; b) Both Bosnia-Herzcegovina and the Federal Republic of Yugoslavia were successfully integrated into all GEF Pollution Reduction Programme activities.	a) DRPC ratified, ICPDR established with a permanent secretariat which will strengthen regional cooperation. b) Valuable cooperation as well as much needed technical information gained from B-H and Yugoslavia's participation providing comprehensive information needed for the Transboundary Analysis, SAP revision and the completion of the PRP.	a) Permanent Secretariat of the ICPDR established financed by member country contributions assuring continued regional cooperation in the DRB; b) Strong institutional contacts as well as contacts at the expert level established providing the basis for further cooperation in the future despite the conflict in the region. The functioning of this network in the FRY after the war indicates the sustainability of the cooperation established.	a) Improved ability to cooperate with donor organizations; b) Provided national experts with experience with cooperating at the regional level as well as with working with international organizations. Experience in target oriented planning workshops provided as noted above.

Expected Results (per Project Document)	Major Achievements	Potential Impact	Sustainability of Results	Contribution to Capacity Development
8. Prepared project documents and financing packages for a series of priority pollution reduction projects, and mechanisms for attracting additional international support;	a) Pollution Reduction Programme developed consisting of 421 priority projects as well as important policy measures that will lead to the reduction of priority pollutants in the Danube River Basin. b) Danube Partnership Programme, a portfolio of 60 priority investment projects, prepared for presentation to donors; c) National review of financing mechanisms conducted and a detailed proposal for the development of a Danube Environmental Financing Facility (DEFF) was completed and presented to donors.	a) Expected to lead to greater implementation of pollution reduction projects in the Danube Basin. Allows a basis for monitoring results (project database) and to quantify achievements; b) Provides basis for presenting prepared projects to interested international financial institutions (IFIs) and donors; c) Provided clear understanding of what are the strengths and weaknesses of existing national financing mechanisms. Reviewed possible regional financing mechanisms resulting in a proposal for the DEFF.	a) Project Database developed to allow for countries to constantly improve information about projects in the Pollution Reduction Programme, as well as allows for projects to be added and subtracted based on implementation and consistent review at both the national and regional levels. b) Donor conference scheduled to assure implementation of part of investment portfolio; c) Sound analysis of what options would be sustainable in the future.	a) Consistent use of methodology for data collection and analysis in each country harmonized approach. Regional workshop to develop PRP integrated and strengthened national capacities throughout the basin; b) Provided experience to national experts in preparing investment projects with sufficient documentation and level of detail for presentation to IFIs and donors; c) Strengthened the ability to identify the strengths and weaknesses of existing and proposed financing mechanisms.

2. What factors affected the achievement of programme or project results?

While we rate the project overall to be a very good success, the achievements were affected by the following:

- *Data gaps as well as inconsistency and the lack of good quality, verifiable data from country to country*. This made it difficult at times to compare.

- *Lack of information on diffuse sources of pollution*. Due to the negligible level of information on diffuse sources, it was generally not possible to adequately include concrete measures to address difuse sources of pollution in the final Danube Pollution Reduction Programme.

- *Short project time frame*. The project had a very tight implementation period (initially 16 months) that even after extension was perhaps too tight. The results might have been even stronger given more time.

3. What lessons (both positive and negative) can be drawn from the experience of the programme or project?

We saw the need to develop national review databases consisting of 5 individual databases: Emissions, Water Quality, Socio-Economic data, financial information as well as a Project database. These databases will respond to the need for:

a) periodically updating national information and to fill data gaps,

b) an incentive for countries to improve data provided or to provide data in the future where currently it does not exist and

c) tools to monitor implementation.

This will help to insure the sustainability of the Pollution Reduction Programme.

4. What are the views of the target groups with regard to the programme or project? Please note any significant gender-based differences in their views.

The main target groups of the UNDP/GEF assistance were the participating countries particularly as represented by the ICPDR. They have indicated satisfication with the results and feel that it has strengthened cooperation between countries as well as within the framework of the ICPDR itself. It should also be said that the main beneficiaries i.e. the countries, were also primary contributors to the programme. Thus the ICPDR and the participating countries are also “owners” of the successful outputs of the Pollution Reduction Programme.

5. If the programme or project has been evaluated, what is the implementation status of the recommendations made by the evaluators?

As we have just received the project evaluation, we have not yet had time to respond to the recommendations.

6. What activities or steps do you recommend as follow-up to the project?

Follow-up activities to the GEF Danube River Basin Pollution Reduction Programme should focus on primarily the support the further development of the ICPDR and include activities to stimulate implementation of the PRP with a particular focus on facilitating the necessary policy changes in DRB countries for nutrient reduction.

7. Provide any other information that may further support or clarify your assessment of the programme or project. You may include annexes as you deem necessary.

Please see the project evaluation report.

For target group (ICPDR):

Name: GERHARD VERCONY

Title: Executive Secretary

Signature: G. Vercony Date: 10.05.99

For the project manager:

Name: **Joachim Bendow**

Title: **Project Manager**

Signature: Date: August 30, 1999

ANNEX 13 Endorsement Letters

MINISTRY OF THE ENVIRONMENT OF THE CZECH REPUBLIC
Department of Global Relations
Vršovická 65, 100 10 Praha 10
Tel: (00420 2) 67 12 29 16, Fax:(00420 2) 67 31 03 07

Prague, September 15, 2000
Ref. No. 1694/920/00

Subject: Letter of Endorsement for the Project Proposal:
"Strengthening Implementation of Nutrient Reduction Measures and Transboundary Cooperation in the Danube River Basin"

Dear Mr.Bendow,

I wish to acknowledge with thanks receipt of your Fax message Ref. No. 02459 of 6, September 2000, advising us on additional explanation in the matter of financial budget items before we will be able to comfirm the Project.

Hereby I would like to inform you that Ministry of the Environment of the Czech Republic is pleased to endorse the above mentioned project. We will be glad to participate in its implementation.

We consider that the project will further support the activities of the International Convention for Protection of the Danube river and all other Danube countries to develop and implement policies and strategies for pollution control and nutrient reduction, which will facilitate our country efforts towards harmonization process with European Union Water Framework Directives and other related environmental legislation.

We are looking forward to our next cooperation.

Yours sincerely,

Martina Motlová
Director of Global Relations Department

Mr. Joachim Bendow
Executive Secretary
ICPDR Permanent Secretariat
Vienna International Center
D-0412,PO Box 500
A- 1400 Vienna, Austria

MINISTRY OF THE ENVIRONMENT
OF THE SLOVAK REPUBLIC
Department of Air Protection
Ivan Mojík, *Director*

August 31st, 2000
No: 794/2000-2.1

Subject: Project proposal "*Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation*" - GEF focal point endorsement letter

This is to confirm our interest in and support of the project proposal "Strengthening the implementation capacities for nutrient reduction and transboundary cooperation" you have submitted for our endorsement for funding by the Global Environment Facility.

The overall objective of the Project is to complement the activities of the International Convention for Protection of the Danube River required to provide a regional approach and global significance to the development of national policies and legislation and the definition of priority actions for nutrient reduction and pollution control with particular attention to transboundary effects within the Danube River Basin and the Black Sea area.

In line with the immediate objectives, the particular project components of the proposed Regional Project can be grouped as follows :

- development of nutrient reduction policies, legal instrument and measures for exacting compliance
- institutional strengthening and capacity building for transboundary cooperation in nutrient reduction
- awareness raising and reinforcement of NGO participation in nutrient reduction activities
- strengthening the monitoring and information mechanisms related to transboundary pollution control and nutrient reduction

Main benefits of the project are improvement of Danube river basin water quality and water quality of the Black Sea, from point of view of nutrient and toxic pollutants and the strengthening of transboundary cooperation through monitoring and pollution control of water.

Taking this into account, hereby I endorse the project "Strengthening the implementation capacities for nutrient reduction and transboundary cooperation" for funding by the Global Environment Facility.

Ivan Mojík
GEF Operational Focal Point

Permanent Secretariat ICPDR
International Commission for the Protection
of the Danube River
Vienna International Centre
P.O. Box 500
1400 Vienna, AUSTRIA

MINISTRY FOR ENVIRONMENT

H – 1011 Budapest, Fő u 44 – 50, Hungary
Phone: + 36 1 201 3843;
Fax: +36 1 201 2846

Budapest, August 30, 2000

Mr. Christopher Briggs
GEF Regional Coordinator
UNDOP-PBEC
New York

Subject: Endorsement of the project brief for the Danube regional projekt "Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation in the Danube River Basin" (Submitted by the Secretariat of the Danube River Protection Convention)

Dear Mr. Briggs,

As a designated GEF Focal Point for Hungary hereby I endorse the referred above project proposal expressing our readiness to participate in its implementation.

Sincerely yours

László Becker
Head of Department

C/C
Mr. Joachim Bendow
Executive Secretary
ICPDR Permanent Secretariat
Vienna

31. Aug. 2000
02452

REPUBLIC OF SLOVENIA
MINISTRY OF THE ENVIRONMENT AND SPATIAL PLANNING
Dunajska c. 48, SI-1000 Ljubljana, Slovenia
Phone: +386 1 478 7332 • Fax:+386 1 478 7422

Reference: 922-00-19/97
Date: 29 August, 2000

ICPDR Permanent Secretariat
Vienna International Center
D-0412, PO Box 500
A- 1400 Vienna, Austria

Subject: **Letter of Endorsement for the Project Proposal**:
"Strengthening Implementation of Nutrient Reduction Measures and Transboundary Cooperation in the Danube River Basin"

Dear Sirs,

hereby I would like to inform you that Slovenia supports the UNDP-GEF initiative for the above mentioned project and we will be glad to participate in its implementation.

As the designated GEF Focal Point for Slovenia, I am pleased to endorse the project proposal: "Strengthening Implementation of Nutrient Reduction Measures and Transboundary Cooperation in the Danube River Basin" as presented in the documents dated August 2000.

Yours sincerely,

Emil Ferjančič
Head, International Relations,
GEF Political and Operational Focal Point

REPUBLIKA SLOVENIJA MINISTRSTVO ZA OKOLJE IN PROSTOR LJUBLJANA 25

M1. Bendow
43 1 26060 5895

REPUBLIC OF CROATIA
MINISTRY OF ENVIRONMENTAL
PROTECTION AND PHYSICAL PLANNING
10000 Zagreb, Croatia, Ulica Republike Austrije 20
Phone: +385 1 3782-444 Fax: +385 1 3772-822

Class: 018-04/00-01/48
Reg.No.531-04/1-00-1
Zagreb, 29. August, 2000

Mr. Joachim Bendow
ICPDR Secretariat
1400 Vienna
Austria

SUBJECT: Endorsement for the GEF Danube Regional project "Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation"

Dear Mr Bendow,

We would like to express our endorsement for the GEF Danube Regional Project "Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation" whose long-term objective is to contribute to sustainable development in the Danube River Basin through reinforcing its capacities of the participating countries in developing effective mehanisms for regional cooperation and coordination in order to ensure protection of international waters, sustainable management of natural resources and biodiversity.

The overall objective of this Project is to help providing a regional approach and global significance to the development of national policies which can contribute Croatia's efforts to join the EU.

The economic transition process in Croatia has caused significant reduction of industrial and agricultural production, thus temporarily reducing production-related pollution loads, which has created an opportunity to establish and integrate environmental objectives into industrial and agricultural policies and legislation in line with EU guidelines.

As well as other countries currently in the process of fulfilling the basic accession criteria, this Project shall assist Croatia to develop adequate policies and legislation for emission control with particular attention to nutrient reduction.

Sincerely yours,

REPUBLIKA HRVATSKA 2 ZAGREB MINISTARSTVO PROSTORNOG UREĐENJA I ZAŠTITE OKOLIŠA

Božo Kovačević
Minister

C.c.: - Mr. Željko Ostojić, *Danube Convention Programme Coordinator* (State Water Directorate)
Ms Mojca Lukšić (State Water Directorate)

Bosnia and Herzegovina
Federation of Bosnia and Herzegovina
Ministry of Physical Planning and Environment
Titova 9a, Sarajevo

Mr. Joachim Bendow
Executive Secretary
ICPDR
fax: 431 26060 5895

Subject: Endorsement of the proposal for the project "Strengthening the implementation of nutrient reduction measures and transboundary cooperation in Danube river basin"

Dear Mr. Joachim Bendow,

This letter is to acknowledge that the Ministry of Physical Planning and Environment of Federation of Bosnia and Herzegovina is pleased to endorse the above referred project.

We consider that the project will further support the ICPDR and the Danube countries to develop and implement policies and strategies for pollution control and nutrient reduction, which will facilitate our country efforts towards harmonization process with EU Water Framework Directives and other related environmental legislation.

This is in my capacity, acting as the UNDP/GEF focal point, to endorse on behalf of the Ministry of Physical Planning and Environment of Federation of Bosnia and Herzegovina the above mentioned project.

Sincerely,

Mladen Rudež
GEF Focal Point of Bosnia and Herzegovina

Encl.

СР Југославија
FR Yugoslavia

Савезно министарство за развој, науку и животну средину
Federal Ministry for Development, Science and Environment

YU-11070 Beograd Palata federacije Tel. **(381 11) 311 42 40, 311 11 70 Telex 11448 Fax: **(381 11) 311 29 09

m.s. September 13, 2000

Mr. Christopher Briggs
Regional Co-ordinator
UNDP/GEF
Regional Bureau for Europe and CIS
United Nations Plaza 1
New York
Fax. 99 1 212 906 6595 / 6267

Subject: Danube Regional Project: Strengthening of Implementation Capacities For Nutrient Reduction and Transboundary Cooperation

After consideration of the project brief for the elaboration of the above-mentioned project we would like to inform you that we endorse its realization and our readiness for full participation.

Accept, Sir, the assurance of my highest consideration.

Sincerely yours

Federal Minister

Prof. Dr Nada Šljapić

Cc.
Mr. Joachim Bendow
Executive secretary ICPDR
VIC Vienna, P.O. Box 500
Austria
Fax. 99 43 1 260 ~~26~~ 5895~~6~~

REPUBLIC OF BULGARIA

MINISTRY OF ENVIRONMENT AND WATER

September, 1, /2000

TO: Mr. Chris Briggs
GEF Regional Coordinator
Europe and CIS UNDP

CC: Mr. Antonio Viliganie
Resident Representative
UNDP Bulgaria

ICPDR Secretariat, Vienna, Austria

BSEP – PIU, Istanbul, Turkey

RE: Regional Projects endorsement

Dear Mr. Briggs,

Herewith the Government of the Republic of Bulgaria expresses its support for the PDF B proposals entitled "Strengthening Implementation of Nutrient Reduction Measures and Transboundary Co-operation in the Danube River Basin " and "Control of Eutrophication Hazardous Substances and Related Measures for Rehabilitation of the Black Sea ecosystem". Bulgaria is interested in participating in these initiatives and is very appreciative of the partnership between UNDP, World Bank, UNEP and the International Commission for the protection of the Danube River Basin.

As you will be aware, the final draft proposals will be presented at the forthcoming Steering Group meetings in Vienna, Austria and in Istanbul, Turkey, respectively, where the Bulgarian delegations will confirm the endorsement of the two project proposals.

We are looking forward to our future co-operation.

Yours Sincerely,

Neno Dimov
Deputy Minister
Ministry of Environment and Water
GEF Operational Focal Point

30. Aug. 2000

R O M A N I A

MINISTERUL APELOR, PADURILOR SI PROTECTIEI MEDIULUI
MINISTRY of WATERS, FORESTS and ENVIRONMENTAL PROTECTION

Cabinet Secretar General Adjunct Deputy Secretary General Office

Nr. 15246/VD/ 30.08.2000

To: Christopher Briggs
GEF Regional Coordinator
UNDOP-RBEC
New York
Fax 99 1 212 906 5539

Mr. Joachim Bendow
Executive Secretary
ICPDR
Fax 431 26060 5895

Subject: Endorsement of the proposal for the project " Strengthening the implementation of nutrient reduction measures and transboundary cooperation in the Danube river basin "

Dear Mr. Briggs/Mr. Bendow,

This letter is to acknowledge that the Ministry of Water, Forest and Environmental Protection is pleased to endorse the above referred project.

We consider that the project will further support the ICPDR and the Danube countries to develop and implement policies and strategies for pollution control and nutrient reduction, which will facilitate our country efforts towards harmonization process with EU Water Framework Directives and other related environmental legislation.

This is in my capacity, acting as the UNDP/GEF focal point, to endorse on behalf of the Ministry of Water, Forest and Environmental Protection the aforementioned project.

Yours sincerely,

DEPUTY SECRETARY GENERAL,
Virgil DIACONU

0253

MINISTERUL MEDIULUI ŞI AMENAJĂRII TERITORIULUI
AL REPUBLICII MOLDOVA

MINISTRY OF ENVIRONMENT AND TERRITORIAL
DEVELOPMENT
OF THE REPUBLIC OF MOLDOVA

30.08.2000 Nr. 225

La nr._____ din _____

Mr. Joachim Bendow
Executive Secretary
Permanent Secretariat
International Commission for the
Protection of the Danube River

Endorsement Letter

Hereby, in my capacity of GEF Operational Focal Point in the Republic of Moldova, I would like to confirm that we support the project proposal " Strengthening of Implementation Capacities for Nutrient Reduction and Transboundary Cooperation" submitted by the International Commission for the Protection of the Danube River.

Arcadie Capcelea
Minister

MD 2005 or. Chişinău str. Cosmonauţilor nr.9
Tel. 22-86-08, 22-16-67, telefax. 22-07-48

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7. 09. 2000 р
№ 09/2-10-4

To: Dr.Mohamed T.EI-Ashry
Chief Executive Officer and Chairmen
GEF Secretariat

From: Dr.Yaroslav Movchan
GEF

On behalf of the Ministry of the Environment and Natural Resources of Ukraine Iet me present our compliments to GEF Secretariat and you personally.

I would like to inform you that after thorough studying in pursuant to GEF policies and procedures I confirm my approval of the block A PDF for elaboration of a Danube Regional Project Strengthening of Implementation Capacities for Nutrient Reduction and Transboundary Co-operation

The project is really addressed to the main problems in the eld of Institutional Strengthening field Capacity Building for transboundary co-operation. It rises a lot of issues have to be solved in the near future, in regards to the relevant policies and legal mechanisms development for nutrient control and reducing as well as harmonisation of water quality standards and methodology of water sampling and laboratory analysis.

Please, consider this letter as an official note of the GEF Operational Focal Point.

Yaroslav Movchan

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International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

Mr. Christopher Briggs
Regional coordinator, GEF
United Nations Development Programme
Regional Bureau for Europe and the CIS
1 United Nations Plaza
New York NY 10017
USA

Vienna, 13 September 2000
Ref.no. 02472

Subject: Endorsement of the proposal for the regional project " Strengthening the implementation of nutrient reduction measures and transboundary co-operation in the Danube river basin "

Dear Mr. Briggs,

With reference to the Steering Group Meeting held on 4-5 September 2000 in Vienna, I would like to inform you that the International Commission for the Protection of Danube River is pleased to fully endorse the above-referred regional project.

Through this endorsement, we confirm that each recipient country of the Danube river basin have acknowledged the project goal, which is to contribute to sustainable human development in the Danube river basin through reinforcing the capacities of the participating countries in developing effective mechanism for regional co-operation and co-ordination in order to ensure protection of international waters, sustainable management of natural resources and biodiversity.

We consider that the project will further support the ICPDR, its structures and the Danube countries to develop and successfully implement policies and strategies for pollution control and nutrient reduction, with particular attention to achieving sustainable transboundary ecological effects within the DRB and Black Sea region.

This is in my capacity, acting as the president of the ICPDR, to endorse on behalf of the Danube countries, the aforementioned project

Sincerely,

Emil Marinov
President of the ICPDR

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