GEF – DANUBE RIVER BASIN POLLUTION REDUCTION PROGRAM

NATIONAL REVIEW SUMMARY REPORT

FOR THE REPUBLIC OF

SLOVENIA

FINAL REPORT

Elaborated by the National Team:

Country Program Coordinator (CPC):	Mitja Bricelj, M.Sc.
National Team Leader and Water Quality Data Expert (Part B):	Asst. Prof. Dr. Boris Kompare
Socio-Economic Expert (Part A):	Asst. Prof. Dr. Marjan Ravbar
Water Engineering Expert (Part C):	Asst. Prof. Dr. Uroš Krajnc
Financial Expert (Part D):	Janez Kimovec, B.E.

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Executive Summary

The state of the Danube environment in the national context

Slovenian diverse landscape and natural and geographical features contribute strongly to the extent and level of environmental pollution in Slovenia, as does its industrial development until now. The most polluted areas are the basins (the Celje Basin, the Ljubljana Basin etc.) and deep mountain valleys among the Alps and their foothills (the Zasavje, Mežica, upper Sava valleys ...). The enclosed relief enhances negative landscape effects of environmental pollution even with relatively small emission levels, produced by relatively small cities. The period from the end of the 1960s to the beginning of 1980s was the period of greatest pollution of Slovenian industrial and energy supplying areas. It is generally accepted that environmental pollution was on the increase until the middle of the previous decade and that from that time onwards, a decrease in pollution emissions is noticeable. While the quality of surface water is in general improving, the quality of goundwater is mostly still decreasing.

The effects of human activities on water are observed through the prism of changes in the extent of urbanisation and employment structure. The population increased by almost half a million after 1945. As early as in the 1960 has the domination of the primary sector in the active population structure passed to the domination of the secondary structure, while at the same time -especially in the last decade- there was an increase in the share of the tertiary and quaternary sectors. The process of urbanisation increases the concentration of population in the lowlands and decreases in the highlands, karstic and hilly areas. The conclusion is that the concentration of population, industrial areas, animal farms and intensive agriculture has a decisive impact on the pollution of water in the Slovenian part of the Danube river basin, especially in the river basins of:

the Drava: Maribor, Ptuj with Kidričevo, Ravne in Koroška, Ormož and Ruše;
the Mura: Murska Sobota, Lendava, Ljutomer and Gornja Radgona;
the Sava: Ljubljana, Kranj, Velenje, Celje, Kamnik, Trbovlje, Škofja Loka, Vrhnika, Jesenice, Rogaška Slatina, Hrastnik, Krško, Kočevje, Domžale, Štore, Šoštanj, Stična, Novo Mesto.

Population affected by water pollution

Systematic research of number and share of the Slovenian population that have health and other problems due to contamination of drinking and other water sources has not been explicitely conducted, therefore the extent of contamination of water supply sources can only be indirectly inferred (from records of hydric diseases, or local investigations). The contamination of the Danube river basin rivers varies from moderate to grave (i.e. from 2nd to 4th class on 1 to 4 scale, 1 being the best). The rivers are not used for drinking water supply – cca 90 % of Slovenian drinking water is obtained from groundwater or springs. Data on water quality of groundwater and karstic sources point to a gradual deterioration of sources of drinking water. The population of some regions in the Sava, Drava and Mura

river basins is supplied with groundwater that often contains higher concentrations of nitrates and pesticides than allowed, especially the concentration of the atrazine. The water from the karstic sources in the river basins of the Sava and Kolpa needs to be disinfected since it is often bacteriologically inadequate. The increase of heavy metals and micro pollutants in the sediments of some sources points to the endangered health of the population of the Karst region of the Danube river basin.

Water quality and impact on ecosystems

Due to the pollution of the Danube basin rivers through many years, the polluted rivers mainly affect biotopes in river beds, but have a lesser impact on other elements of the ecosystem or river basin. In the Sava basin, the biotopes are changed the most in the lower streams of the Ljubljanica, the Kamnik Bistrica, Rinža, Paka, Savinja and Voglajna and the middle courses of the Sotla, and because of PCB, life forms in the Krupa in Bela krajina are affected. In the Drava river basin, life forms were most affected in the Meža, however, the situation is improving. In the Mura river basin, water life was degraded the most in the Ščavnica and Ledava. Water pollution caused an increased pollution of river sediments and of sediments of karstic sources was also noticeable.

The diminishing of surface water quality does not necessarily affect other elements of the ecosystem. Due to pollution of the Bled Lake there is eutrophication or occasionally accelerated growth of the algae. Rehabilitation measures are improving the situation. The population of salmonidae which dropped in many rivers in former decades is recovering.

Hot spot analysis

The upadating, evaluation and ranking of hot spots was done according several criteria and several approaches. We have followed previous national plans for environmental protection (NPEP's), judged present trends and views to environmental pollution and its mitigation, checked solutions against EU Water Framework Directive, etc., and finally ranked the resulting hot spots according the cost-effectiveness and relevance from the international point of view (GEF incremental funding). The results of the National Planning Workshop for Slovenia (NPWsS), held at Brdo, 17-20 June 1998, are also suitably included.

We have listed several 16+1 municipal waste water discharges in rivers or lakes which need secondary or even tertiarry treatment and which we believe are suitable for EU funding. The last waste water treatment plant (WWTP) was added during compilation of this Summary Report and is not (yet) included in our national reports (Part A through D). Additionally, 9 industrial WWTP's were identified (according to the criteria of more than 2t COD/day, or 1t BOD_5/day (Kresnik, 1998)). Toxic or other inappropriate waters for biological treatment have to be pre-treated at the site anyway (according to EU and Slovenian legislation), and are not eligible for GEF funding, anyway. Agricultural point sources can be regarded as industry, and these are mainly animal farms, of which we spotted 4 big pig farms for GEF funding. Besides point sources, agriculture is predominant diffuse polluter and responsible for nitrates and pesticides in groundwater which is used for drinking water. Roughly half of groundwater is not appropriate for direct use for drinking water due to diffuse pollution.

Actual foreseen pollution reduction measures

Foreseen pollution reduction measures were defined as the result of the expert team's work and upgraded, or influenced also by the work of the participants at the NPWsS. The concrete polluters, and pollution measures identified at the NPWsS were practically identical to those of the expert team. So, the overall (general) agreed pollution reduction measures at the level of expert group and subsequently the Ministry of Environment and Physical Planning of Slovenia, are:

(1) Introduction of proper waste water collection systems (improvement of existing, construction of new ones) and WWTP's according to Slovenian implementation of EU UWWTD. The same result was obtained at the NPWsS, with the distinction that first the priority list for the construction of the WWTP's shall be made, second suitable financial resources shall be provided, and third for small settlements adequate WWTP's shall be proposed, e.g. alternative technologies, as wetlands.
(2) Designation of eutrophic zones and subsequently third stage of treatment on adjacent municipal WWTP's. (Not identified at the NPWsS)
(3) Introduction of proper BAP (Best Agricultural Practice) in agriculture and intensive education of farmers and other land users, maybe start first on pilot farms (result of NPWsS, too).
(4) Sanitation of existing land-fills (dump sites). Construction of proper land-fills. Both also emerged as results of NPWsS.
(5) Stricter controll of flow/transport of hazardous substances from the source to the final disposal (result of the NPWsS).
(6) Pricing strategies for the »unclean« industries (result of the NPWsS).
(7) Disinfection of effluents from WWTP's on areas suitable for bathing during bathing seasons.
(8) Introduction of buffer zones in agriculture (also result of the NPWsS).
(9) Rehabilitation of lost or degraded wetlands (some study proposals already accepted by PHARE) (the same result was obtained at the NPWsS).
(10) Construction of constructed (artificial) wetlands (also result of the NPWsS).
(11) Proper control of sedimentation and hydrological regime which will be changed due to construction of a chain of hydro-electric power stations on the Sava River (result of the NPWsS).
(12) Training for CMP (Catchment Management Planning). This was the result of NPWsS.
(13) Treatment of water from roads. (This was the result of NPWsS).
(14) Introduction of ecological compensation (rent) to those that suffer from pollution, or are endangered with possible pollution (e.g. vicinity to land-fills, WWTP's, etc.).

Planned projects and investment portfolio

In details elaborated list (of complete portfolios) is still not available at this time. But we have designated a long and a short term list of waste water treatment plants (WWTP's), which is given in the Annex I.

1. Description of the state of the Danube environment

Water resources

The Mura (1376 km^2), the Drava (3253 km^2) and the Sava (with the Kolpa and the Sotla rivers) (11 734 km^2) river basins in Slovenia all belong to the Danube river basin. The watershed between the Black Sea and the Mediterranean basin runs in Slovenia from the north-west and across the highest ridges of the Julian Alps, the northern parts of the Alpine foothills and across the ridges of the Dinaric-Karstic planes to the border between Slovenia and Croatia in the south-west part of Slovenia. The major part of the watershed runs over carboniferous rock formations, therefore the underground watershed is predominant. The river basins of major rivers in the Danube river basin share one feature: they rise in the mountainous area with a high rainfall, then transverse through the foothills of the Alps and the hilly area to the lowlands. They usually leave the Slovenian territory in a day or two, which in general means lower sensitivity to eutrophication. The length of surface river streams is approximately 22 600 km, and the average river network density is 1,33 km/km^2. River network density is 1,38, (the biggest in the Drava basin -1,88) and is high with regard to more than 40 % of karstic surface, especially because of the high rainfall. In the Black Sea basin there are 98 % of dynamic underground water resources in aquifers with intergranular porosity and 85 % of all dynamic underground water resources in Slovenia.

Ecosystems and biological resources

Physical, geographical and ecosystem characteristics of the Danube river basins are mainly a reflection of Slovenia's transitional geographic position, where alpine, subalpine, dinaro-karstic and subpanonian characteristics interweave. The Drava basin bioclimatically marks a transition from the Alpine and Dinaric part of the basin with very humid climate to the humid climate of the main part of the Sava basin and to the semi-humid and partly semiarid climate of the Drava and the Mura river basins. Almost entire Danube basin area belongs to potentially forest ecosystem, which is, however, reduced. The forest surface has increased by approximately 10 % in the last forty years, although the trees are damaged due to diseases and air pollution. Forest ecosystems cover approximately half of the Danube basin area and are prevalent in the Dinaric-karstic, Alpine and subalpine part of the Sava river basin and highland areas of the Drava river basin.

Humid biotopes include various forms from the high and the low moor, swamps, flood and swamp forests and meadows, backwaters etc. It is estimated that they cover an area of 26.000 ha or 1,25 % of the Slovenian territory. Some wetlands are parts of natural parks or protected as natural reserves. It is estimated that 10.500 ha of humid biotopes are protected in the Black Sea basin, which represent 17,5 % of protected areas in natural parks. Half of protected wetlands is situated in the Sava river basin, however, the wetlands only represent 10 % of areas protected in natural parks.

Human impact and key issues of environmental degradation due to water pollution

Due to the hidrology rivers' flow changes considerably during the year. River pollution (concentration) changes from low in Spring and Autumn (higher flows) to high in Summer

and Winter (low flows). Slovenia has many rivers with small streams polluted from dispersed industry dumping its waste leading to the whole water system being polluted. After 1990, there has been a noticeable reduction in water pollution due to reduced production levels, better waste management and punitive actions. Industrial pollution of rivers and streams has fallen by 30 to 40% since 1990 whereas municipal pollution has remained at the same level.

The Sava river basin covers 58% of Slovenian territory, has 53% of population and two thirds of all sources of drinking water. In the Sava and its tributaries as much as 4/5 of Slovenian waste water is discharged. Its pollution begins already at the source, with waste water discharge from Kranjska gora and Bohinj, and strongly increases with the Sora tributary, but especially after Ljubljana, which is one of the rare European capitals that has yet to take care of its waste water treatment. From Ljubljana onward, the river is in the 3rd or 2nd to 3rd quality class, all the way to the border with the neighbouring Croatia. After Ljubljana, it is further polluted by waste water from the Zasavje region, (in former time especially from the coal separation), and by the Savinja river at Zidani most. Waste water treatment is more properly conducted in small settlements, with over 100 small municipal waste water treatment plants.

By the time the Drava flows into Slovenia, it already falls into 2nd to 3rd quality class (especially noticeable is presence of lead and zinc). Moderately polluted tributaries flow into Sava all way long, but they do not greatly change quality class until the Croatian border.
The Mura has improved its quality class from the 3rd to 2nd class in the last five years, also due to improvements in pollution control in Austria (paper mill industry). There are two acutely polluted tributaries, the Ščavnica (4th class) and the Ledava (3rd, occasionally 4th class).

On the Drava, Mura and Celje fields, intensive agriculture and farming with a high use of protective chemicals and mineral fertiliser has lead to pollution of groundwater. The high level of pesticides in the water is already exceeding safety levels for drinking water according to European standards.

2. Population development and water sector relevant characteristics

Analysis of demographic data and projection of urban and rural population in the Danube catchment areas

Three variant projections made for the period until 2020 by the Statistical Office of the Republic of Slovenia, caution that, according to the most optimistic variant, the population growth will reach approximately 2,21 million of inhabitants, or annual growth of approximately 8400 inhabitants. The middle variant predicts the continuation of slow population growth, so that it will only increase to approximately 2,05 million, while the pessimistic projection estimates a drop of between 105.000 to 150.000 inhabitants by 2020. The number of inhabitants in Slovenia would therefore regress from nearly 2 million to 1,89 million.

In the urbanised, lowland and valley areas a further growth of population and economic activities can be expected, mainly channelled to products less demanding both with regard to energy and raw materials, and to service activities. The most optimistic estimation of the

population growth in the urbanised areas is an annual rate of + 0,5 %, while the population number will continue to decrease in the countryside. The total of population in the Slovenian part of the Danube river basin will at best increase from the present 1,74 million to 1,94 million by 2020.

Estimation of actual and future demand for water

From the viewpoint of drinking water supply of the Slovenian part of the Danube river basin population, groundwater is the most important source, followed by karstic sources. In the Mura river basin, the groundwater areas are the only, and in the Drava and Sava basins, prevalent drinking water resources.

In 1995 there were 91 million m^3 of drinking water available from the drinking water supply for the Slovenian population. The annual per capita water consumption has not changed greatly in recent years and is between 45 and 50 m^3. In 1995, it was 46,4 m^3/(inh. a) = 127 l/(inh. a). In the Black Sea basin, 80 % of all drinking water (served by municipal utilities) is used for household supply. Drinking water consumption will not drastically change in the years to come. Due to water losses in water supply systems, a greater exploitation of water supply systems is to be expected. The quantity of the existing drinking water resources is adequate and will be able to procure the needed quantity of drinking water in all river basins, even with minor consumption growth. The smallest reserves of drinking water in the captured sources are, with regard to the relatively low share of population connected to public water supply systems, in the Mura river basin.

Estimation of actual and future production of waste water

The sewage system in the Slovenian part of the Danube basin is poorly developed, since less than a half of households is connected to public sewage systems. A goal set in the previous decades, namely to bring water into every household, has been achieved, and now effort will have to be made for an adequate waste water disposal. The sewage system network is denser in extensive fields with urban centres, under which there are the biggest drinking water resources. In the next two decades, the sewage system can be expected to expand and it ought to be of better quality. Central waste water cleaning plants will have to be constructed for big urban settlements. A simultaneous expansion of the sewage system in less densely populated areas and construction of small waste water cleaning plants will be a necessity, especially up to 1000 PE.

Analysis of health hazards through water pollution and unsanitary conditions

Thorough research of health and other hazards through water pollution probably does not exist in Slovenia. But, analysis of drinking water quality are regularly made, and records of hydric diseases are reported to the Public Health Institutions. Surface water is only exceptionally used as a source of water supply of the population, since traditionally, groundwater (57%) and karstic springs (38%) are used as the source for potable water (77 % of all population served by public water-supply systems). Most of the Danube river basin water in Slovenia is moderately polluted. In 1994, 1995 and 1996, only the river sections at the sources of Alpine rivers of the Sava river basin fell into the 1st and 1st to 2nd quality class (the Tržiška Bistrica, Kokra, Kamniška Bistrica, Savinja) and the Meža in the Drava river basin. The Sava Dolinka, Sava Bohinjka, Sora, the upper section of the Ljubljanica, the

middle section of the Kamnik Bistrica and Savinja, the upper section of the Krka, and the Kolpa as far as the confluence with the Lahinja in the Sava river basin, all fell into the 2nd quality class. There are no major river sections in the Drava and Mura river basins that would fall into the 2nd quality class. Due to poor river quality and temperature conditions, only certain upper and/or middle river sections are suitable for bathing in the summer (for example: the Kolpa, Krka, Sora and Savinja rivers), however, few people also bathe in the rivers that fall into the 3rd or an even lower quality class. Therefore we can indirectly conclude, that there is small health hazard for the population when preparing drinking water from surface water, while river water is only exceptionally used as the source of household water supply. If the negative trend of deterioration of captured water sources (groundwater, karstic sources) continues, water supply problems, health problems and other negative effects on the population can be expected. In the case of a sudden accidental pollution, the karstic sources of the Sava river basin (the river basins of the Ljubljanica, Krka and Kolpa) will be potentially more affected. In 1995, 5 % or approximately 90 000 inhabitants of the Danube river basin were dependant on water from the water supply systems where the concentration of nitrates or pesticides were exceeded. Another 12% of samples did not correspond to microbiological conditions, and 9% to physico-chemical tests. It is estimated that some 3% of population may annually suffer from microbiological contamination of drinking water.

3. Analysis of actual and expected impact of economic activities on water demand and potential pollution of aquatic systems

Industrial activities

In 1995, Slovenian industry and mining spent 113 million m^3 of fresh water, namely 76,6 million m^3 as industrial water and 36,3 million m^3 as drinking water. For production, 48 million m^3 of water was spent and 50,7 million m^3 for cooling. Coal mining spent 2,2 million m^3 of fresh water, 1,6 million m^3 of industrial water and 0,7 million m^3 of drinking water. Industrial water was mainly used for production, while drinking water was mainly used for sanitary purposes. 1,4 million m^3 of water was abstracted from rivers and the rest from other sources.

Industrial and mining activities discharged 765,728.000 m^3 of waste water into environment, 2,606.000 m^3 directly into the ground, somewhat more than 30 million m^3 into the municipal sewage system, and as much as 733,102.000 m^3 into surface waters. The following activities discharge the biggest quantities of waste water: paper manufacturing and production (27,562.000 m^3), metal manufacture (6,827.000 m^3) and chemical manufacture (8,223.000 m^3). 46,775.000 m^3 or 6,11 % of waste water is treated in industry and mining, 17,319.000 m^3 mechanically and 26,128.000 m^3 chemically and biologically.

Municipal discharges

In 1995, 131,816.000 m^3 of water was collected through the municipal sewage systems in Slovenia, and as much as 118,958.000 m^3 in the Black Sea basin alone. 71,376.000 m^3 or 60,0 % of waste water are completely treated in waste water treatment plants. Data valid for the whole of the country state that 61,0 % of waste water is only mechanically treated, 0,1 % only chemically treated, and 2,7 % only biologically treated. 36,2 % of all treated

waste water are treated combining various treatments. 60 waste water treatment plants, with an overall capacity of 1,446.491 PE have been built in the Sava river basin, while those waste water treatment plants with the capacity of 1000 PE total 46. Therefore more than a half of all WWTP's are situated in the Sava river basin, however, only 226.536 or 19,1 % of inhabitants are connected to the 42 waste water treatment plants that treat municipal waste water. The greatest number of inhabitants connected to a WWTP is in the Domžale – Kamnik system (50.000), Šoštanj (27.000), Kranj (25.000) and Novo mesto (20.000). The most urgent problems (from the emission point of view) are the incomplete or nonexistent Ljubljana, Maribor and Celje WWTPs.

Agricultural activities (irrigation, consumption of fertilizers and pesticides, ...

There are 93 680 ha of land (84%) in the Slovenian part of the Danube river basin that is often affected by drought and needs to be irrigated. Most part or 74% of land is in the Mura and the Drava river basins, where there are eight hydromelioration systems (which also include drainage systems), and the rest or 26% of irrigated land is in the Sava river basin. The national irrigation plan (1994) states that 120 080 ha of cultivable land can be irrigated, which would take 235,6 million m^3 of water, mostly abstracted from the Mura, Drava, Sava and Kolpa, and from groundwater and reservoirs. In 1995, 4 200 ha of land surface in Slovenia was prepared for irrigation, of which 1 592 ha were actually irrigated. It is estimated that approximately 80% of Slovenian irrigated surfaces are in the Danube river basin. In 1995, 4,785 000 m^3 of water was accumulated for irrigation, 6% from groundwater, 29% from rivers and 63% from reservoirs.

Intensive use of mineral fertilisers and protective chemicals is the main diffuse source of groundwater pollution, while massive animal concentration is a considerable point source of water pollution. Numerous pig, cattle and poultry farms are preserved from the past. Extensive pig breeding farms present the most problematic, point and dispersed form of stream and river pollution. In the Sava river basin there are huge pig farms with the following average number of pigs: Ihan (53 700), Stična (12 000) and Klinja vas near Kočevje (17 300) (in the karstic part of the Krka river basin) and Pristava near Leskovec (15 000). In the Drava river basin there is a pig farm in Draženci near Ptuj (40 500), and in the Mura river basin Cven near Ljutomer (10 000), in Podgrad near Gornja Radgona (21 300) and the Nemščak farm near Beltinci (Ižakovci) with the Jezera near Rakičan farm (56 300). Big pig farms in the Donava river basin with the average number of pigs of approximately 230.000, present a problem especially due to the lack of agricultural land in the vicinity of the farms to apply manure and only partial waste water treatment. Pig farms in the karstic areas (e.g. Klinja vas), in groundwater areas (e.g. Pristava, Nemščak) and in the vicinity of water streams with modest flow (Ihan, Stična), are another particular problems. All of the farms have yet to reach the demanded quality of waste water on the discharge into surface water.

Solid waste disposals and possible soil and groundwater contamination

A lot of potential hot spots (HS), or "time-bombs" still wait to be discovered - e.g. practically all landfills are a source of untreated (or not adequately treated) leachates, some of the landfills are in inundation areas, many are above aquifers which procure drinking water, etc. Only a few landfills have all needed measures to protect surface- and groundwater. The majority of existing landfills will get full in 5-7 years, but there is a strong

NIMBY public opinion which makes impossible to design and construct proper regional landfills. Solid waste disposal is an acute environmental issue now and will get drammatic dimensions in just a few years.

4. Analysis of water quality data and description of environmental impact on ecosystems and human quality of life (3 pages)

Surface water quality is in general slowly improving. This is mostly due to restructuring of industry and not so much to real care for the environment, although several municipal WWTP's are under design and construction (complying with EU Urban Waste Water Treatment Directive). The contribution of nutrients to surface water is roughly 50:50 from municipalities and industry vs. agriculture and other diffuse sources (disperse urbanisation).

At present, in main streams BOD and DO are not any long the problem. More severe is acute (lakes) and latent, i.e. hidden (rivers) eutrophication, which dictates in a national scale that possibly all the country will be declared as sensitive area due to eutrophication. If drinking water supply is going to increase the use of surface water, eutrophication will be an issue.

Regarding bathing water we have not yet officially designated bathing areas. But according to tradition, there are some rivers, or river stretches, where hygienisation (disinfection) of WWTP's effluents will be needed. Especially river Kolpa at the border with Croatia deserves to be designated as bathing water through its whole course.

More than water quality itself it is concerning the quality of sediments, which are moved, or washed during high flows, typically during flood events. In sediments, a lot of past pollution load is burried, and can be activated during sediment transport.

In the view of international, or transboundary water quality problems, we have identified several rivers, or their stretches, or wetlands, which shall attract most attention of public and experts. Border rivers, such as Sotla or Kolpa, are given highest priority.

Water quality data critical to the transboundary analysis (DWQM)

There were 163 operating water-level gauging stations in Slovenia in 1997 (roughly 80% of them are situated in the Danube River Basin), of which two are located at the lakes (Bled and Bohinj), and one is located at the sea (Adriatic/Mediterranean Basin). The average density of these gauging stations is one per 124 km^2 (the WMO guide 1 per 100-250 km^2). The water-level gauging stations are of three types, i.e. either water-level gauge (52 stations, or 27.3 %), or water-level recorder (limnigraph, 124 stations, or 65.3 %), or automatic (14 stations, or 7.4 %). The data obtained from these three types can be categorized into four classes (A) water-level recorder of 30 or more years of continuous measurements, (B) water-level gauge (1 datum per day) of 30 or more years of continuous observations, (C) measured or observed data improved by or supplemented with correlation, and (D) incomplete string of data. A lot of stations have been abandoned (during some time twice as much stations were operating in Slovenia, i.e. 350).

It shall be noted that water-level gauging stations usually do not coincide with sampling points for water quality monitoring programme. For the purpose of water quality determination, the discharge is calculated (modelled) for the profile in question from the nearest water-level gauging station. The exception are groundwater data, which are typically taken in wells, or boreholes.

There are 102 surface water quality monitoring stations in Slovenia, among which roughly 80 % are in the Danube River basin. Usually, 4 measurements during the year are made. For the sake of getting the most representative chemical, biological, bacteriological, and saprobiological values, the sampling is typically done during low flows (prevealing conditions). Thus, the mass balance of pollutants, and especially sediment transport, which massively occour during high flows, are not measured and also can not be predicted. The measured values can give only the lower estimate for the mass balances. Still, there are two TNMN (Trans National Monitoring Network) stations situated on border with Croatia on Sava (Jesenice), and Drava (Ormož) Rivers with monthly water quality monitoring of basic physical, chemical and bacteriological parameters and additionally a few times per year some analyses of saprobiology, metals, sediment, organic compounds and mineral oils.

Sediment quality is measured on roughly 35 locations (depends from year to year), the determinations also vary from site to site, i.e. only some metals, or more comprehensive, including organic compounds, PCBs, AOX, EOX, mineral oils, etc. The detailed data can be obtained in the reports of monitoring at the HMI (Hydrometeorological Institute), or summarized in the annual reports on the status of the environment or on the water quality.

Sampling, preparation of samples, and analyses are done according international standards ISO 5667, with adequate equipment and accuracy (intercalibration, etc.). The HMI and other laboratories are in the course of implementing the ISO 9001 standards of operation.

Concentration and loads of nutrients and other pollutants in the Danube River and its tributaries

As said above, only a few (usually 3-4) measurements during the year are not enough to adequately assess the annual dynamicity of the concentration and loads. In general, rivers in Slovenia are not heavilly polluted with BOD or COD, i.e. oxygen depletion is not a serious problem. More exposed is tertial pollution with nutrients from WWTP's and due to percolation and washout from agriculture. Cronical and acute eutrophication is present in lakes and slowly flowing rivers, while in fast flowing rivers due to short hydraulic retention time the eutrophication is not developed (latent, or potential eutrophication). Pollution with toxic or dangerous substances is generally lower than MAC for surface water, but quite high concentrations can be found in sediments. There is not enough data to estimate how much of sediments is moved during high flows and what are the concentrations of pollutants in water due to resuspension. From present knowledge we think that regarding the rest of the Danube river basin, Slovenia mostly contributes pollution with nutrients.

A first assessment of pollution loads and balances to watercourses in Slovenia was done under Haskoning study in Danube Integrated Environmental Study, Phase I, 1993, and Phase II, 1994. The summary table of pollution balance from (national contribution to) that study is reproduced in Annex II. There was done another study on nutrients balance in 1997, Nutrient Balances for Danube Countries, PHARE: ZZ9111/0102, by Institute for

Water Quality and Waste Management, Univ. of Techn., Vienna, Austria, and Dept. of Water and Wastewater Engineering, Univ. of Techn., Budapest, Hungary, with partners from other Danube countries. There is significant difference in results of both documents, so we would like to point out that the numbers given in either study shall not be taken as very accurate, but rather be understood as a range, or order of magnitude.

Transboundary effects of pollution

We believe there are not any critical, or to say, extremely accented and acute transboundary effects, which would call to immediate action either in Slovenia, or neighboring countries (Austria as contributing to, Croatia and downstream countries as suffering from Slovenian pollution). Still, there is some contribution of Slovenia to the pollution load in the DRB, and this shall be properly evaluated: (a) from the point of view of two neighboring countries, and (b) from the point of view of the whole basin and final receiver, the Black Sea.

From the first point of view, i.e. crossborder effect to immediate bordering country Croatia, we have identified these possible effects: (1) eutrophication due to increased level of nutrients, (2) reduced usability of water due to pollution with micro-pollutants, especially pesticides, PCB, AOX, metals, (3) health risk for bathers due to microbiological pollution from not desinfected waste water, (4) decreased aesthetical value due to change of appearance and of biotopes of water and riparian land, (5) increased erosion due to sedimentation in impoundments, (6) possible deterioration of water quality during flushing of sediments in the impoundments.

From the second point of view, (importance of) pollution contribution of Slovenia to downstream countries diminishes with the river lenght travelled, and is very low at the mouth of Danube in the Black Sea (estimation around some % of total load).

From the above mentioned positions we limited our study of transboundary effects to neigboring countries only. That is reason why we gave highest priority to rivers flowing on the border with the mentioned countries, or to the immediate basins.

5. Identification, description and ranking of hot-spots (3 pages and Tables in Annex)

Municipal hot spots

Slovenia's specific characteristic is that around 50% of population lives in dispersed settlements of less than 2000 inhabitants. And we have only two cities of more than 100 000 inh. Both lie on big rivers, where even untreated waste water dischare does not make considerable problems. On the other side, smaller rivers and creeks are more polluted due to their smaller buffer and self-purification capacity. If we were to chose the dynamicity of construction of WWTP's we would begin with those on smaller rivers, where the most improvement can be obtained, and leave the bigger WWTP's for bigger settlements for the end, as they lie on rivers with more capacity. But this is in direct conflict with the EU UWWTD (Urban Waste Water Treatment Directive). Right now there are studies in progress how to most efficiently approximate (harmonise) Slovenia to the EU in terms of environmental protection.

We identified those municipal hot-spots which most contribute to the eutrophication or bathing water quality in both national and transborder point of view. According to the mentioned EU UWWTD we are obliged to construct only secondary treatment, so we proposed the tertiary stage is funded from international funds at it indeed represents care for international problems. The identified (16+1) municipal WWTP's can be seen from the first table in the Annex III. The last WWTP was added during compilation of this document from the updated version of the NPEP and is not (yet) reflected in our National Reports A through D.

Industrial and mining hot spots

According to EU and Slovenian legislation industry is obliged to treat its effluents before releasing it into the environment or sewerage to reach the standards. Slovenia is in the process of harmonizing its legislation with the one of EU, so there will not be any significant difference in a few years. Indeed, already now the standards are compatible, or comparable; the difference is maybe that our legislation is not always completely followed, as this might impose measures which will have more negative impact on the society (e.g. loss of jobs) as has the present pollution. On the other hand, industry has reduced its pollution considerably in last decade due to restructuring, preorientation to EU market and its conditions (PPP principle and economic conditions, etc.).

So we identified the most severe industrial polluters from the record of the MoEPP, where each bigger polluter (over 680 in Slovenia) is monitored and adequately charged for pollution of water. The criteria was to identify around 10 polluters, which turned to be approx. equivalent to pollution load of 2t COD/day, or 1t BOD_5/day. The list of 9 identified polluters is in the second table in the Annex III.

Agricultural hot spots (point and diffuse sources)

Agricultural point sources are mainly big livestock farms, of which 9 pig farms are the biggest polluters. None of these farms has until now completely solved the waste water and the manure problems, although they all have some plans for the improvement of technology and reduction of the impact on the environment. The farm Podgrad already has sufficiently well designed WWTP, which can meet the effluent standards, but due to malfunctioning of the equipment (which is not repaired) the effluent standards are not met any more. The farm Podgrad also causes transboundary problems to Austria – i.e. bad smell in tourist spa resort. The problem of pig farms was selected for investigation by PHARE (see report Part B). We have identified 3 bigger farms + Podgrad which cause most environmental problems, also with regard to drinking groundwater, for potential GEF funding. These 4 selected farms are given in the third table in the Annex III.

Nonpoint sources are dispersed practical all over the agricultural land. The main polluters are nutrients (artificial fertilizers, or manure; MAC exceeded in 34% of samples in 1994) and plant protection chemicals (pesticides, mainly Atrazine; MAC exceeded in 30% of samples in 1994) which leak into groundwater that is present under the fields. The agricultural pollution affects thus the most common source of drinking water in Slovenia – the groundwater. Serious problems are detected in Celje (Savinjska dolina and Bolska), on Mursko, Prekmursko, Apaško, Dravsko, and Ptujsko polje, etc.

Ranking criteria under consideration of transboundary effects

The ranking criteria can be seen from the description in the above points. In short, we mainly considered these critera:

- immediate effect on the neighboring country (eutrophication, bathing water quality)
- total pollution load and its respective reduction if properly tackled
- relevance also for national scale (mainly influence on drinking water)

National priority is protection of (existing and potential) drinking water sources, only after that other environmental issues follow.

6. Identification and evaluation of pollution reduction measures (5 pages)

6.1 National targets and instruments for reduction of water pollution

The Environmental Protection Act (EPA) of 1993 and the national water resources strategy are the two fundamental statements of objectives for water policy and management. The EPA - including its implementing regulations - concentrates on the control of water pollution from point sources. It sets out the principles of control by State organs, local authorities and polluters, of liabilities for pollution and damage, and of public access to relevant information.

The national water resources strategy is to be prepared by the MoEPP and will be part of the national water programme. It will aim at ensuring sufficient water supply for all users. Drinking-water supply is a priority. The programme is expected to be completed in 1999. Its main strategic directions will be:

- Formulation of a sustainable water policy;
- Implementation of integrated water management;
- Creation of regional institutions and enterprises to manage water quantity and quality;
- Development of a financial system for the support of the strategy;
- Development of the inspection and control system;
- Development of an information system on the water economy.

Integral management in individual water basins regarded as closed ecological units comprises, among other things, spatial management and planning (urbanisation, agriculture, traffic, recreation and the development of numerous other economic activities), with the following targets of protection and the development of an area:

- introduction of optimum exploitation and protection of the volume of water, as well as the protection of the quality of water riches, taking into account the functioning of water ecosystems and their in-exchangeability, as well as the limited quantity of water reserves, with emphasis on the protection of drinking water supplies and the ecological balance of water basins;
- introduction of dynamic, interactive and multi-sector water management on the basis of the protection and optimum exploitation of potential water resources, with emphasis on drinking water resources and taking into account the technological (BAT), social-economic and ecological (BEP) the existing, as well as the planned development of both, the water basin itself and the country as a whole;

- planning, adopting and implementing programmes that contain clearly defined development guidelines conveyed by the institutions that have responsibility for water management on the national level, as well as by the immediate water managers and water managing systems (on the regional level - offices of the MoEPP, operators of power plants, operators of tourist facilities, representatives of fishery, etc.);
- warranting institutional, legal and financial mechanisms to implement programmes and concrete investment projects in the area of integral management of waters in individual water basins;

The drinking-water quality standards that have been applied almost until today were those of the former Yugoslavia. New national standards which take into account WHO and the EU standards are in force from mid 1997 (Order on drinking water quality).

A general law on water is currently under preparation. It is expected to be enacted in 1999. Regulations required by the EPA focus on emission limits for waste-water discharges and all aspects of monitoring. They were adopted in 1996. The intention is to regulate discharges along rivers in agreement with the EC water quality directive. Regulations on the amounts and calculations of charges and fees and on EIA are also required. So far, there is no explicit master plan for sewage and waste-water treatment, but we have several documents that partly cover this issue, e.g. Water Law (in prep.), National Program for Environmental Protection (NPEP, in prep.), ongoing projects of MoEPP, etc.

To improve water quality, EU standard emission limit values and best available technology are the guiding principles for the MoEPP. However, it is not clear to what extent these principles currently are, or can be, enforced. The efficiency of inspection should be assessed, once the recent organisational changes have stabilised, and the organisational arrangements and resources available for inspection become clear. Efficient economic incentives or market tools to stimulate compliance with regulations require the drafting of more regulations.

The MoEPP decides on investments in water-supply, sewerage, waste-water treatment and technology. Since 1991, investment expenditures have amounted to 7.5 – 12.5 MXEU per year and are gradually increasing. In 1996, 5 MXEU were invested in clean industrial technology, 1.4 MXEU in water supply, and 2.9 MXEU in waste-water treatment. The main difficulties are in financing both investments and operating costs. Therefore, water prices will probably have to be raised in the future. A full assessment of funding needs, financing requirements and the scope of possible supply price changes for water has to wait until a master plan for waste-water sewerage and treatment has been drawn out.

The level of water-supply prices is based on the Order on Water Use Payments, issued in 1995. Payments are applied to water use (distinguishing between energy and other industries) and water pollution. The pollution charges levied by municipalities differ between the subdivisions, and between water use categories (industry, agriculture and households) within them. Taxes on sewage depend on the quality and quantity of discharges.

In 1995, a regulation introducing a waste-water tax was adopted. The tax is either applied to the volume of waste water discharged, or, in the absence of appropriate measurements, to the water-supply. In the first case, the polluter pays directly to the State budget. In the second, the tax is collected by the water-supply company. The tax is proportional to the

pollution loads of the waste water. It is set to cover both investment and operating costs for a technology reducing pollution loads of effluents to permitted levels. The legal provisions have not yet been fully implemented.

The MoEPP is responsible for the overall water management in Slovenia, and, consequently, for establishing regional plans on all water aspects. The MoEPP acts to solve wider water problems, not only at the national but also at the river-basin level. The Ministry has seven institutes including the Nature Protection Authority and the Hydrometeorological Institute. The Nature Protection Authority includes in particular the water management department, which is divided into six sectors on planning, consents and permits, concessions, public services, investments and the water fund. The monitoring of groundwater sources, springs and surface waters is done by the Hydrometeorological Institute. However, according to the EPA, polluters are obliged to monitor the quality and quantity of their effluents, but not many do so.

Regarding water management, the Slovene territory is divided into eight subdivisions. They do not constitute a separate 'regional' level of administration. The inspectorate of the MoEPP are responsible for the implementation of water protection laws and serve as co-ordinators between the municipalities and the Nature Protection Authority. In each subdivision, the municipal authorities are responsible for exploiting, supplying and developing the water resources. Possibilities for connecting water distribution networks between different localities within the same subdivision are limited, and between different subdivisions non-existent.

6.2 Actual and planned projects and policy measures (List of ongoing and planned projects in Annex)

Preventive measures: emission control projects, treatment plants, ...

For expected impacts of EU-Directives to Water Pollution control, the Legislative Gap Analysis provided covers the entire Environmental Acquis, although the available resources have been focused to emphasise the most important legal differences between the existing Slovenian and EU requirements. Eleven directives and groups of directive were identified as potentially contributing 92% of the total capital cost of environmental approximation. These major categories in the field of water management lie in the following: Water Quality - particularly the Urban Waste Water Directive and the Drinking water Directive. In addition a further 19 directives and groups of Directives were considered to have a medium impact on costs. In general this was because they required changes and improvements in the regulatory, monitoring, information and administration framework. Although these are not very costly - certainly in relation to the Major Category areas they required to be analysed further. These medium categories in the field of water management lie in the following: Water Quality - particularly the Bathing Water Directive and Nature Protection - particularly the Habitats and Wild Birds Directives.

These 29 project areas and their associated directives cover all of the significant costs of environmental approximation. The total capital costs are estimated to be around 2,700 MXEU with annual current costs at full development of 100 MXEU. The Present Value of

the Cost Stream is 2,500 MXEU at 5% time discount rate and the Total Annualised costs of Approximation are estimated to be 200 MXEU.

Present preventive measures referring to the water quality management are as follows:

- construction of sewage system network in settlements
- construction of municipal waste water treatment plants
- new technologies (upgrading or modernising) in industry
- construction of industrial waste water treatment plants in terms of pre-treatment and discharge to sewage system network in settlements or construction of industrial waste water treatment plants in terms of complete treatment and discharge to watercourse
- reduction of pesticides and artificial fertilisers use in soil

Concrete measures are summarised according to investments in the past years, financed by Ecofund. Ecofund's main projects in the field of reduction of water pollution from municipalities in the years 1995, 1996 and 1997 were:

- Municipal infrastructure (sewage/waste water treatment systems, solid waste disposals, drinking water ..., tender in the amount of 4 MXEU)
- Municipal infrastructure 96 (sewage/waste water treatment systems, solid waste disposals, drinking water..., tender in the amount of 6.5 MXEU)
- Municipal infrastructure 97 (sewage/waste water treatment systems, solid waste disposals, city busses, drinking water..., tender in the amount of 6.5 MXEU)

Ecofund main projects in the field of reduction of water pollution from industries in the years 1995, 1996 and 1997 were:

- Industry 96 A - reduction of pollution (air, water, solid wastes, ODS, tender in the amount of 5.5 MXEU)
- Industry 96 B - reduction of pollution (air, water, solid wastes, tender in the amount of 4 MXEU)
- Industry 97 A - reduction of pollution & new, environmentally friendly technologies & products (tender in the amount of 8 MXEU)

The list of ongoing nad planned projects is shown in Annex I. Estimation of investment and running costs of planned projects (waste water treatment plants for municipalities):

Waste water treatment plant	long term investment program MXEU		short term investment program MXEU	
	Capacity	Costs	Capacity	Costs
SAVA river basin	1,454,000	157	601,000	114
DRAVA river basin	380,000	56	280,000	50
MURA river basin	98,000	15	60,000	8
SUM	1,932,000	228	941,000	172

Running costs are approximately 42 MXEU/year for long term program and 20.5 MXEU/year for short term program.

The pollution of surface and groundwater by nitrates is considered one of the most serious environmental concerns in the context of agricultural pollution. Atrazine and more often its

metabolites DEA and DIA have also been detected. In 1995, in certain regions, the values of these substances in the water exceeded the recommended limit values of the EU. In addition, poorly managed sewage systems and waste-water treatment plants -or their mere absence -contribute to nitrate pollution in groundwater, and it is not always easy to distinguish the share of agriculture in nitrate pollution. Nevertheless, the application of mineral fertilisers in regions with intensive agricultural land use is thought to be the main source of nitrates in the environment. The plains of Pomursko, Mariborsko (intensive field crops with cereals) and Celjsko (hop plantations) are affected by this form of pollution. Manure surpluses from big livestock farms (Pomursko, Celjsko) are reported to be partly responsible for nitrate concentration in groundwater. The regions concerned are not only the most fertile, where even more intensification is planned (according to the National Irrigation Plan), but also the most densely populated.

Remedial measures: rehabilitation of wetlands, flood plain control, ...

Remedial measures include rehabilitation of floodplains and wetlands. An area of Sečovlje' s salt works (Adriatic coast) is in the list of wetlands with an international significance since 1993. Some of proposals for new local wetlands of international significance, which fulfil conditions to come on the list of international significant wetlands are in preparation:

- Ljubljansko barje (Ljubljana's swampland)
- Cerkniško jezero (Cerknica's lake)

The other important wetlands, suitable to definition of The Ramsar Convention, are classified on the list of IBA – important ornithological regions of Europe (Important Bird Areas in Europe):

- meanders of Drava river from Maribor to Zavrč
- meanders and flooded forests of Mura river from Veržej to Gibina
- Črni log – alder forests along Ledava river
- Krakovski gozd – the rest of flooded oak forests
- Jovsi – wetlands along Sotla river

Drainage, building, construction, regulations, polluting and other human activities exert negative influence upon wetlands; they are for that reason the most affected (endangered) ecosystems in Slovenia.

6.3 Expected results of planned measures and projects with particular attention to transboundary effects (quantified)

Qualitative assessment of transboundary effects is already shown in chapter 4.0. To summarize, we will achieve with the implementation of planned WWTP's:

a) improvement of water course quality : Sava, Drava and Mura river
- reduction of biochemical pollution;
  short term reduction : 51 t BOD_5/d and in long term additionally 104 t BOD_5/d
- reduction of nutrient quantity;
  short term reduction: 8.3 t N/d and 1.9 t P/d and in long term additionally 19.1 t N/d and 4.3 t P/d

b) improvement of boundary river quality : Mura, Ledava, Sotla and Kolpa rivers

- reduction of biochemical pollution
- reduction of nutrient quantity

c) preservation of river natural conditions, establishment of natural parks and bathing water: Sotla and Kolpa river

d) preservation of natural resources: wetlands, flood-lands etc.

Nutrient emissions

- Introduction of proper waste water collection systems (improvement of existing, construction of new ones) and WWTP's according to Slovenian implementation of EU UWWTD.
- Designation of eutrophic zones and subsequently third stage of treatment on adjacent municipal WWTP's.
- Introduction of proper BAP in agriculture and intensive education of farmers and other land users.

Hazardous substances

- Sanitation of existing land-fills (dump sites). Construction of proper land-fills.
- Stricter controll of flow/transport of hazardous substances from the source to the final disposal.
- Pricing strategies for the »unclean« industries.

Microbiological contamination

- Disinfection of effluents from WWTP's on areas suitable for bathing during bathing seasons.

Wetlands rehabilitation

- Introduction of buffer zones in agriculture.
- Rehabilitation of lost or degraded wetlands (some study proposals already accepted by PHARE)
- Construction of constructed (artificial) wetlands.

Sedimentation and hydrological regime

Sedimentation and hydrological regime will be changed due to construction of a chain of hydro-electric power stations on the Sava River.

7. Analysis of national financing mechanisms (5 pages)

7.1 Policies for funding of water sector programs and projects

Overall policy and funding strategy for water quality projects is outlined in a Strategy for Economic Development of Slovenia. The Strategy assumes that yearly 1.5% of GDP will be spent for environmental investments and programs. According to the Strategy 2/3 of funds

will be public funds. At the beginning of nineties, 0.5% of GDP was used for environmental projects. The increase to 1.5% of GDP is therefore substantial. But new estimations, which were made recently, show that the implementation of EU synchronized environmental legislation will require even more than 2% of GDP (our estimation is around 3% for long-term period).

At the time of preparation of this report, the National Environmental Protection Programme which includes water sector development plans has not been officially adopted, yet.

Available public funds for financing water sector programs and project are:

- funds of Ecofund,
- funds of Ministry of Environment and Physical Planing,
- funds of state budget,
- funds of municipal budgets.

Water supply

Municipal wastewater treatment

Industrial wastewater treatment

Improvement of agricultural practices

There are separate policies for funding water supply, municipal wastewater treatment, industrial wastewater treatment or improvement of agricultural practices. In general, each of these sectors has its own structural funds which usually can not be combined, mostly due to the lack of coordination. We hope that for each of the mentioned activities the most appropriate funds will be used, counting also on efficient coordination.

7.2 Funding mechanisms for water sector programs and projects

Centralized national institutions and banks

The Slovenian Ecofund was established by the stipulations of the Environmental Protection Act (EPA) and began its operation in 1994. The Republic Slovenia is its sole founder and stock holder. The Ecofund is a public legal entity whose rights, obligations and responsibilities are determined by law and the Statute. The Ecofund is organized as a company limited by shares. Ecofund is a non-profit oriented financial organization which provides loans for environmental protection investments at a favorable interest rate. The main area of operation of the Ecofund is the provision of loans to environmental investments defined by the EPA, from its own capital basis, at an interest rate which will ensure maintenance of the real value of the capital stock and the coverage of normal operating costs, with the proviso that the Ecofund shall not make additional profit. The Ecofund shall in its own name and on behalf of the others engage in the acquisition and channeling of assets for the crediting of ecological investments at an interest rate which ensures the covering of the acquired credit costs and of normal operating costs of the Ecofund.

The capital of the Ecofund at the end of 1997 was approximately 37.5 MXEU. The Ecofund provides loans on the basis of a public announcement - tendering procedures for individual purposes and in accordance with the priorities of the national environmental protection program.

Main water related projects of the Ecofund in the year 1997 were:

- Municipal infrastructure 97 (sewage/waste water treatment systems, solid waste disposals, city busses, drinking water..., tender in the amount of 6.5 MXEU or 1 198 million SIT)
- Industry 97 A - reduction of pollution & new, environmentally friendly technologies & products (tender in the amount of 8.0 MXEU or 1 475 million SIT)

Other public funds for water sector projects are non-repayable grants from the Ministry of Environment and Physical Planing. In 1997, the available sum of grants for water sector projects was 1.9 MXEU or 360 million SIT.

Beside funds of the Ministry of Environment and Physical Planing and Ecofund, there are also funds provided directly from the state budget for selected projects. In the 1997 budget, there were 43 kXEU or 8 million SIT granted for Gornja Radgona water treatment plant. In the 1998 budget, there is 150 kXEU or 28.1 million SIT granted for Gornja Radgona and Libeliče water treatment plants.

In Slovenia there are 30 commercial banks and at least 10 of them are capable of providing all services in funding water sector projects. All of 10 major commercial banks are in position of handling international funds.

International cooperation in establishing development banks and/or funds to finance water sector projects

All major international financial institutions as World Bank, European Bank for Reconstruction and Development (EBRD), European Investment Bank are present in Slovenia. These institutions have financed various projects in energy supply, transport and

environmental projects. Slovenia has also bilaterally arangements with Austria, France, Germany and the United States and it is also a big beneficiary of PHARE assistance.

In the water protection area PHARE remains financially most engaged entity. Within PHARE programme for Slovenia the following water projects are anticipated:

- ongoing investment for drainage system in Gornja Radgona.
- construction of pollution control equipment in Gornja Radgona and in Libeliče. For these two projects the 1998 budget funds of the Republic of Slovenia were reserved.

Also, in 1999 certain water protection projects should be financed partly within the PHARE programme, but the selection of projects is still underway.

7.3 Actual cost and price policy

Water and wastewater tariffs and charges

A legal basis for formation of prices of municipal activities where water supply and discharge as well as municipal waste and precipitation waters treatment are encompassed is represented by the Law on Prices (Official Gazette No. 1/91). Certain questions regarding prices are settled also by the Law on Economic Public Offices (Official Gazette of the RS No. 32/92) and the Law on Environmental Protection (Off. Gazette of the RS No. 32/92) with its sub-laws.

With the Law on Prices the competence regarding formation of prices in the sphere of municipal services passed to municipalities. However, already at the end of 1991, the Government deprived the municipalities of this competence with the explanation that they allowed a too big rise in prices. So the competence and the mode of prices bringing into force in the sphere of municipal products and services were transferred under state control. From 1992 on, the State has been settling modification of prices in the sphere of municipal activities by governmental decrees by which it allowed rise in prices lower than the inflation rate. This retention of prices of municipal services resulted in worsening of financial results of the public companies performing municipal services. Regarding the fact that public companies performing municipal services are mainly in the ownership of municipalities their financial operation has been solved by introduction of special contributions, taxes and fees included into prices. With such measures the majority of public companies succeeded in retaining their revenues on the level of costs. But in the same time this resulted in a price composed of two parts, i.e. of the official price and of the additions to the price, dictated by the municipalities.

The Statistical Office of the Republic of Slovenia monitors prices of municipal services only in four towns in Slovenia. This is why for the review of prices of water supply and discharge of waste and precipitation waters data from Complete Analysis of Prices of Basic Municipal Products and Services for the period of 1991-1997 was used. This analysis gives prices of water supply as well as prices of discharge and treatment of waste waters. The prices given in tables are average prices valid in 147 municipalities in Slovenia. The given prices do not encompass sales tax and republic or municipality taxes, either. In most of municipalities in Slovenia water and waste water tariffs are set for four different type of customers. The customers are divided in households, industrial users, public users and other users. The

average water and waste water prices, which were charged by companies providing services for this four groups were as follows:

Average water prices

	SIT/m3	SIT/m3	XEU/m3	XEU/m3
Date	31.12. 1996	30.4. 1997	31.12. 1996	30.4. 1997
Households	55,89	60,05	0.30	0.32
Industries	104,57	109,66	0.56	0.59
Public users	81,43	83,38	0.44	0.45
Other	94,91	100,43	0.51	0.54

Average prices for Collection and Treatment of waste water

	SIT/m3	SIT/m3	XEU/m3	XEU/m3
Date	31.12.1996	30.4. 1997	31.12.1996	30.4. 1997
Households	38,94	44,31	0.21	0.24
Industries	82,42	86,35	0.44	0.47
Public users	43,87	51,01	0.24	0.23
Other	72,67	61,23	0.39	0.33

The water and waste water prices shown in tables above are prices without taxes and fees. On the average the price of water, charged by a company providing services, represents only 60 % of a price paid by a customer. The customer shall pay additional 3% of total water price for sales tax, 25% for fees charged by municipality and 12% for state fees.

Public and private sector expenditures (cost) for waste water treatment and environmental protection of aquatic ecosystems

A summary list of planed water quality and water management programes and projects is given in the table. The list was derived from a draft of the National Environmental Protection Programme and includes only the projets which can be related to Danube river basin programme.

Summary of planed water quality and water management programmes and projects

No.	Type/name of Project or Programme	Total Capital Requirements			Remarks
		MSIT	MUSD	MXEU	
I.	Measures of collecting and treating municipal waste waters				
	Total I.	14.857,0	85,9	79.2	total 1,25 mio PE
II.	Measures of BAT implementation				
	Total II.	5.998,0	34,67	31.9	
III.	Measures for optimal use of water sources				
	Total III.	18.815,0	108,76	100.3	
IV.	Other measures				
	Total IV.	82.709,0	478,09	440.7	
	Grand total	*122.379,0*	*707,39*	*652.1*	

Economic and financial incentives for investments and running of treatment facilities and protection of aquatic ecosystems

Expenditure for environmental purposes can be deducted from corporate and personal income tax. The corporate income tax rate is 25%. Funds established for ecological and other non-profit purposes are exempted from this tax. Equipment imported for environmental projects has no overall facility of payment of import duties, but some types of equipment are partialy or totaly excused of import duties. In accordance with the Privatization Law, enterprises coukd in the period of privatization earmark funds for remediation of their environmental problems. Practice of discounting assets for privatisation with environmental commitments has had two consequences. Firstly, it allowed cheaper privatization of the company. Secondly, in the presence of shortages of working capital and relatively expensive bank loans, it made it possible to use company funds as working capital and relatively expensive bank loans. To ensure that commitments actually lead to environmental investments, a new regulation is before Parliament for approval. It stipulates that, should an enterprise not use the committed funds to improve the state of environment, the amount should be transferred to the Eco-Fund. It can be expected that this regulation, if enforced, will be sufficient to ensure that existing commitments are met.

7.4 Actual and planned public and private investments for water quality and waste water management projects (see also chapter 6.2 and Annex)

Municipal projects

The list is given in the first table of the Annex III.

Industrial and mining projects

The list is given in the second table of the Annex III.

Agricultural measures and projects

For non-point pollution the project is not explicitely known in this phase, but we anticipate that a proper BAP (Best Agricultural Practice) program should be developed and made effective through widespread Farmers Advising Service.

For agricultural point sources, the projects are in our national reports also mentioned under industry, as in Slovenia we look on big livestock farms as on an industry. The list of WWTP's for agricultural point sources is given in the third table of the Annex III. The most burning hot-spots are thus pig farms Ihan, Nemščak (Ižakovci) and Jezera (Rakičan). The farm Podgrad already has well designed WWTP, which is not working satisfactorily due to breakage of the equipment - it needs to get new heavy-duty equipment.

8. Development of national pollution Reduction Program and Investment Portfolio (3 pages)

8.1 Project identification, description and cost estimation

Actually retained and new proposed projects for pollution reduction (Summary Table and Annex)

The first elaboration of hot spots was done by Slovenian task force in Slovenian "SAP for Danube Catchment 1995-2005, approved 28 October, 1994 at Bled (Slovenia) on a national scale and 6 December 1994 in Bukaresti (Romania) by ministers on an international scale. The indentified hot spots were 13, as shown in the Annex IV, Table 1, of them 9 were ranked into 1st priority, and 4 into the second priority. Majority of identified hot spots were municipal WWTP.

In a few years after the compilation of the first list of hot spots, some major changes in industry have changed the priority list. In meantime, the harmonization with EU practice and legislation has thrown new light on the extent of the environmental problems. So, already in 1996 a new list was elaborated, reflecting more the international problems, or "incremental costs", and leaving national priorities to be dealt with national resources (e.g., taxation, ECO-Fund) as much as possible. Twelve hot spots - projects have been identified as suitable for international demo projects and at the same time representing trans-boundary effects, which gave rise to claims for additional, i.e. "incremental costs". The later shall be coverd through the GEF programme. The list of projects is given in Annex IV, Table 2.

The third list is the one presented in this Summary Report, and in the National Reports A through D. It is closely (but not completely) coordinated with the (fourth) list of projects of national importance, which is going to be disclosed in the fortcoming NPEP (only latest draft version was available to the national experts team during preparation of this Report).

In main lines, also national priorities are harmonized with EU legislation (UWWTD, eutrophication zones, bathing waters, etc.), so there is no conceptual disagreement between NPEP and our Report. Just some WWTP's are in our report given more stress (importance)

due to transboundary effects. On the other side, NPEP will cover all necessarry WWTP's above 2000 PE, whereas we have choosen bigger plants for GEF funding, in first place. In fact, all projects listed in our Report are also contained in the NPEP.

The list of retained, or new projects from the first and the second list is given in the Annex III (Tables 1, 2, and 3) and Annex IV (Tables 1 and 2), and is indicated in the last column of these tables under Status.

Investment portfolio for priority projects (hot spot ranking) with indication of national funding sources and complementary funding needs (Summary Table and Annex)

N/A at present time.

A special questionnaire was prepared in the frame of this and some other projects running on the MoEPP, which was sent to all municipalities. The results of this inquiry are not satisfactory, as a lot of crucial information was not given. So, we will have to collect the needed data by personal contacts and with the lot of help of the MoEPP. The resulted portfolio data will thus have to be included in an appendix to the final versions of our National Reports and this Summary Report.

8.2 Institutional planning capacities in public and private sectors

To assure best available technique

We give a short list of most important capacities:

- governmental institutions (ministries, administrations, inspectorates, etc.)
- professional institutions (consultant, design, construction, etc. companies, incl. university and research institutes)
- financial institutions
- international tendering and competition
- public hearings, public opinion

To assure best environmental practice

We give a short list of most important capacities:

- governmental institutions (ministries, administrations, inspectorates, farmers' advising service, etc.)
- professional institutions (consultant, design, construction, etc. companies, incl. university and research institutes)
- financial institutions
- international tendering and competition
- public hearings, public opinion, international pressure

8.3 Implementation capacities in public and private sectors

National construction companies

- In Slovenia there exist at least 5 strong ingeneering and/or constructional companies which are capable of international tendering and competition

Cooperation with foreign companies

- There are various engineering and consultancy arrangements with foreign companies
- A lot of representatives of foreign companies have their offices in Slovenia
- There are some joint-venture companies with Slovenian and foreign partners

Procurement of equipment and materials

Most of the equipment and materials can be purchased in Slovenia. We also anticipate further reduction of import fees for the goods imported from EU, in line with the accession strategy of Slovenia to EU.

- There are also electric and/or machinery companies which can provide necessary machinery and electric equipment and installations
- Monitoring and automation can also be covered by national companies
- Only special sampling probes and laboratory equipment cannot be produced in country

Political engagement and ability for implementation of policies and control of legal measures

- The accession strategy of Slovenia to EU
- Monitoring by EU
- Domestic and EU legislation

APPENDICES

ANNEX I

LIST ON ONGOING AND PLANNED PROJECTS

1.0 ONGOING PROJECTS

- 74 municipality sewer systems
- 36 municipal waste water treatment plants
- 14 industrial waste water treatment plants

2.0 PLANNED PROJECTS

SEWAGE TREATMENT PLANTS FOR MUNICIPAL WASTE WATER:

LONG TERM

Waste water treatment plant	Capacity P.E.	Status	Description of receiving water
SAVA river basin			
BRESTANICA-SENOVO	15,000	NEW	Brestanica, Sava
BREŽICE	10,000	NEW	Sava
CELJE	75,000	NEW	Savinja, Sava
CERKNICA	5,000	UPGRADING	Cerkniščica river flows to lake, sinks, then to Unec, Ljubljanica and Sava rivers
DOMŽALE KAMNIK	200,000	UPGRADING	Kamniška Bistrica, Sava
GROSUPLJE	15,000	UPGRADING	Bičje, Krka
HRASTNIK	10,000	NEW	Sava
IVANČNA GORICA	15,000	COMPLETION	Višnjica, Krka
KOČEVJE	50,000	UPGRADING	Rinža river sinks, appears mostly into Kolpa river and partly into Krka
KOSTANJEVICA	5,000	NEW	Krka, Sava
KRANJ	60,000	COMPLETION	Sava
KRANJSKA GORA	8,000	NEW	spring of Sava river
KRŠKO	20,000	NEW	Sava
JESENICE	30,000	UPGRADING	Sava Dolinka, Sava
LAŠKO	75,000	NEW	Savinja, Sava
LITIJA	25,000	NEW	Sava
LJUBLJANA	200,000	UPGRADING	Ljubljanica, Sava
METLIKA	20,000	UPGRADING	Sušica, Kolpa, Sava
MIRNA NA DOLENJ.	40,000	UPGRADING	Mirna, Sava
NOVO MESTO	50,000	UPGRADING	Krka, Sava
RADEČE	7,000	COMPLETION	Sava
RADOVLJICA	38,000	NEW	Sava Bohinjka, Sava
ROGAŠKA SLATINA	30,000	NEW	Sotla, Sava
RIBNICA	10,000	UPGRADING	Bistrica, Ribnica river sinks, flows to Rinža, Kolpa, partly to Krka
SEVNICA	10,000	NEW	Sava

ŠENTJERNEJ	6,000	NEW	Krka, Sava -
ŠENTJUR PRI CELJU	15,000	NEW	Voglajna, Savinja, Sava
ŠKOFJA LOKA	80,000	UPGRADING	Sora, Sava
ŠMARJE PRI JELŠAH	5,000	NEW	Sotla, Sava
TRBOVLJE	30,000	NEW	Sava
TREBNJE	6,000	UPGRADING	Temenica river sinks and appears into Krka river
TRŽIČ	25,000	NEW	Tržiška Bistrica, Sava
VELENJE	70,000	UPGRADING	Paka, Savinja, Sava
VRHNIKA	150,000	UPGRADING	Močilnik, Ljubljanica, Sava
ZAGORJE	9,000	NEW	Sava
ŽALEC	20,000	UPGRADING	Savinja, Sava
ŽELEZNIKI	5,000	UPGRADING	Selška Sora, Sora, Sava
ŽIRI	10,000	UPGRADING	Sovra, Poljanska Sora, Sora, Sava
∑	1,454,000		
DRAVA river basin			
DRAVOGRAD IN OTIŠKI VRH	14,000	NEW	Drava
LENART	6,000	UPGRADING	Velka, Pesnica, Drava
MARIBOR	100,000	NEW	Drava
MEŽICA	10,000	NEW	Meža, Drava
PESNICA	8,000	NEW	Pesnica, Drava
PTUJ	110,000	COMPLETION	Drava
ORMOŽ	5,000	COMPLETION	Drava
RADLJE OB DRAVI	5,000	UPGRADING	Drava
RAVNE,PREVALJE, KOTLJE	24,000	NEW	Meža, Drava
RUŠE	10,000	NEW	Drava
SLOVENJ GRADEC	25,000	NEW	Mislinja, Drava
SLOVENSKA BISTRICA	25,000	NEW	Ložnica, Dravinja, Drava
SLOVENSKE KONJICE	38,000	NEW	Dravinja, Drava
∑	380,000		
MURA river basin			
GORNJA RADGONA	15000	NEW	Mura
LENDAVA	15,000	NEW	Ledava, Mura
LJUTOMER	20,000	NEW	Ščavnica, Mura
MURSKA SOBOTA	42,000	UPGRADING	Ledava, Mura
RADENCI	6,000	COMPLETION	Mura
∑	98,000		
SUM Slovenia (Danube catchment area)	1,932,000		

SHORT TERM

Waste water treatment plant	**Capacity**
SAVA river basin, including Kolpa and Sotla (bordering rivers)	
Rogaška Slatina (Sotla)	30,000
Novo Mesto (reconstruction of municipal and industrial WWTP) (Krka)	50,000
Grosuplje (Bičje, Krka)	15,000
Trebnje (Temenica, Krka)	6,000
Vrhnika (Ljubljanica, Sava)	10,000
Ljubljana (Ljubljanica, Sava)	600,000
Ivančna Gorica (upgrading, 3rd stage) (Višnjica, Krka)	30,000
Velenje (reconstruction, upgrading)(Paka)	40,000
Trbovlje (Trboveljščica, Sava)	30,000
Stična (farma) (Višnjica, Krka)	
Podgrad	
farma Kočevje – maybe to municipal WWTPKočevje 50.000 PE	
Σ Sava	811,000
DRAVA river basin	
Slovenske Konjice (Dravinja)	25,000
Slovenj Gradec (Mislinja)	25,000
Slovenska Bistrica (Ložnica, Dravinja)	25,100
Lenart (Velka)	5,000
Maribor (derivation channel HEPP Zlatoličje, Drava)	200,000
Σ Drava	280,100
MURA river basin	
Murska Sobota (Ledava)	45,000
Lendava (Ledava)	15,000
Σ Mura	60,000
Σ Slovenia (Danube catchment area)	941,100

ANNEX II

Identified priority toxic substances (pollutants) and their effect on water and sediment quality for total contributing watershed of Slovenia to River Danube at SI/CRO border

Effects of pollution on water quality			
Pollutants in tonnes/year	enters SI	leaves SI	contribution of SI
1. N	17,880	41,197	23,317
2. P	413	2,927	2,514
3. Oil			
4. Metals			
	26.9	57.5	30.6
	21.1	28.7	7.6
	164.8	400.1	235.3
	325.1	665.3	340.2
	308.2	559.7	251.5
	1,343.4	4,000.5	2,657.1
	134.4	330.7	196.3
5. Micropollutants			
5.1			
	0.013	0.029	0.016
	0.013	0.144	0.131
	0.030	0.081	0.051
	0.394	0.368	-0.026
	< 0.658	2.037	1.379
	< 0.516	0.231	-0.285
5.2			
	0	< 0.038	0.038
6. Pathogenic bacteria + viruses			
7. BOD	31,978	98,539	66,561
8. COD (Cr)	144,243	387,967	243,724

Effect of pollution on sediment quality			
Pollutants	enters SI	leaves SI	contribution of SI
1. Metals			
	3.1	1.0	
	0.05	0.06	
	32.8	18.8	
	21.3	51.4	
	119.8	98.3	
	491.8	288.7	
	18.7	22.9	
	NA		
5. Micropollutants			
5.1	NA		
5.2	NA		

(1) .. All other pesticides are bellow detection limit.

ANNEX III

MUNICIPAL WWTP's

No.	Waste-Water Treatment Plant	Status
1	Waste-water Treatment Plant Ljubljana (3rd phase)	retained
2	Waste-water Treatment Plant Maribor (3rd phase))	retained
3	Waste-water Treatment Plant Celje (3rd phase)	retained
4	Waste-water Treatment Plant Murska Sobota (3rd phase)	retained
5	Waste-water Treatment Plant Lendava	new
6	Waste-water Treatment Plant Rogaška Slatina	retained
7	Waste-water Treatment Plant Sevnica	new
8	Waste-water Treatment Plant Krško	retained
9	Waste-water Treatment Plant Brežice	new
10	Waste-water Treatment Plant Črnomelj (3rd phase)	new
11	Waste-water Treatment Plant Metlika	new
12	Waste-water Treatment Plant Novo Mesto	new
13	Waste-water Treatment Plant Ljutomer	retained
14	Waste-water Treatment Plant Vrhnika	new
15	Waste-water Treatment Plant Trbovlje (added from NPEP)	retained
16	Waste-water Treatment Plant Velenje (added from NPEP)	new
17	WWTP Domžale (3rd phase) (added from NPEP)	new

INDUSTRIAL WWTP's

No.	Waste-Water Treatment Plant	Status
1	Pivovarna Union Ljubljana Brewery Union Ljubljana	new
2	Pivovarna Laško Brewery Laško	retained
3	Tovarna papirja Paloma Pulp and paper plant Paloma	new
4	Tovarna papirja ICEC Krško Paper Factory ICEC Krško	retained
5	Industrija usnja Vrhnika Leather Industry Vrhnika	new
6	Ljubljanske mlekarne Dairy Factory Ljubljana	new
7	Radeče papir Paper ind. Radeče	new
8	Pomurka Murska Sobota / food ind.	new
9	Mariborske mlekarne Dairy Factory Maribor	new

AGRICULTURAL (FARMS) WWTP's

No.	Waste-Water Treatment Plant	Status
1	Farma Ihan / Farm Ihan	new
2	Farma Jezera - Rakičan / Farm Jezera - Rakičan	new
3	Farma Nemščak – Ižakovci / Farm Nemščak - Ižakovci	retained
4	Farma Podgrad / Farm Podgrad	retained

ANNEX IV

Table 1: Priority hot spots as defined in SAP of 1994 (listed alphabetically)

Location	River	Type	Description	Costs(1)	Prior.	Status
Celje	Savinja/ Sava	Municipal WWTP	80,000 PE	N/A	1	ret.
Krško	Sava	Municipal WWTP + paper mill ind.	250,000 PE	N/A	1	ret.
Laško	Savinja/ Sava	Municipal WWTP	70,000 PE combined with brewery WW	N/A	1	ret. ind.
Ljubljana	Ljubljanica/ Sava	Municipal WWTP	720,000 PE	N/A	1	ret.
Ljutomer	Mura	Municipal WWTP	20,000 PE; 21% sewered	N/A	2	ret.
Maribor	Drava	Municipal WWTP	360,000 PE; 156,000 inh.; 51% sewered	37 MUSD	1	ret.
Maribor	Drava	municipal solid waste	landfill, 20 years @ 325,000	500 kUSD	1	out
Maribor, Ptuj, Ormož	Drava	municipal drinking water supply	N/A	N/A	2	out
Metava/ Maribor	Drava	dangerous substances	leachate controll	N/A	2	out
Murska Sobota	Ledava/ Mura	Municipal WWTP	reconstruction to 100,000 PE, 64 000 inh; 22% sewered	6 MUSD	1	ret.
Rače	Drava	old landfill	pecticides leaching	N/A	2	OK
Rogaška Slatina	Sotla/ Sava	Municipal WWTP	20,000 PE, cross-border (Croatia); tourism, health-resort	N/A	1	ret.
Trbovlje	Sava	Municipal WWTP	30,000 PE	N/A	1	ret.

(1) Costs as listed in the SAP (1994)

Status (in view of this report): ret. = retained, out = dropped out, OK = ongoing, or already constructed

Table 2: Priority hot spots as defined in Slovenian SIP of 1996
(listed by "umbrella", defined by PCU)
source: Information/Report by M. Gorišek of 12.03.1998

Code	River	Title	Costs in XEU[1]	Status
S1	Sava	Sava Catchment Management Plan	420,000	approved by PHARE; waiting PHARE funds; start possibly in 1999; Moste reservoir ongoing
S2	Sotla/Sava	Multi-purpose Management of the Sotla River	200,000	approved by PHARE; waiting PHARE funds; start possibly in 1999; Rogaška Slatina WWTP ongoing and listed in this Report
S6	Sava	Moste Reservoir Restoration Project - Environmental Management Master Plan and Restoration Preliminary Design for the Moste Reservoir in the Upper Sava River Basin	1,000,000 10 M [2]	approved by PHARE; waiting PHARE funds; start possibly in 1999; Moste reservoir ongoing, not listed in this Report
D1	Drava	Cost-Effective Nature Management of the Drava River Basin	420,000	approved by PHARE; waiting PHARE funds; start possibly in 1999; not listed in this Report
D2	Drava + Mura	Conflict Resolution among Users with Competing Interests	195,000	approved by PHARE; TOR untill end Sept. '98; start possibly in Nov. '98; not listed in this Report
D3	Mura	Management of Waste from Pig-Farms in Slovenia	220,000	ongoing; 11-14 May '98 national workshop; ongoing Podgrad, Nemščak
D4	Drava + Mura	Contaminated Sediments in Quarry Lakes	363,000	approved by PHARE; waiting PHARE funds; start possibly in 1999; not listed in this Report
D5	Drava + Mura	Encouraging Co-operation between Small Communities for Water Services	114,000	approved by PHARE; TOR untill end Sept. '98; start possibly in Nov. '98; not listed in this Report
D6	Mura	Improvement of Biodiversity in a Regulated River	90,000	approved by PHARE; TOR untill end May '98; start possibly in Sept. '98; not listed in this Report
D7	Mura	Ecologically Sustainable Manure Disposal and Smell Abatment for Pig-Farm Podgrad	1,100,000	linked to D3; ongoing; 11-14 May '98 national workshop; listed in this Report
D8	Mura	Wetlands on the Mura River	377,500	linked to D1, D6;

			+ 377,500 (SI + A)	TOR untill end May '98; start possibly in Sept. '98; not listed in this Report (primary funding not known)
D9	Mura + Drava	Groundwater Protection Model for the Arable Regions	830.000	approved by PHARE; TOR untill end Sept. '98; start possibly in Nov. '98; not listed in this Report (primary funding not known)

(1) project proposals (costs of preparation work only)
(2) EPR p. 60, total costs of the project