

3.6 ENVIRONMENTAL MONITORING PROGRAMME

3.6.1 INTRODUCTION

In 1992, the Government of the Slovak Republic introduced a major monitoring programme for the whole of the country, together with an integrated environmental information system (see Section 3.5), under Government Order No. 449/1992. This includes investigative operations by the Ministries of Environment, Agriculture and Health, covering 13 areas of environmental features, under a major environmental monitoring system entitled the Partial Monitoring Programme (PMP). The system, co-ordinated and managed by SAZP, includes the following facets together with their respective PMP managers:

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|---------------------------|--|
| • Air | Slovak Hydrometeorological Institute (SHMU); |
| • Water | SHMU; |
| • Biota (Fauna and Flora) | Slovak Environment Agency (SAZP); |
| • Waste | SAZP; |
| • Settlement | SAZP; |
| • Land Use | SAZP; |
| • Geological Features | Geological Survey of the Slovak Republic (GSSR); |
| • Soils | Soil Source and Conservation Research Institute (VUPOP); |
| • Forests | Forest Research Institute (LVU); |
| • Food Standards | Food Research Institute; |
| • Pollution Effects | State of Health Institute (SZU); |
| • Radiation Effects | SZU; |
| • Meteorology and Climate | SHMU. |

The SAZP are responsible for the control of four of the monitoring programmes together with the overall co-ordination of the data that are produced by the PMPs. They are also charged with the creation of the information system and to create a programme for monitoring the PMPs. The latter proposal, however, has still not been formally approved.

The PMPs together constitute the basic source of data on the condition of the environment in Slovakia and the factors affecting it. The data are collated and presented by SAZP in GIS format, with access being afforded to members of the PMP data gatherers, regional, district and local authorities, government bodies and the public. It is noted that no one PMP member has access to all databases, access to data being restricted to the area that is of direct interest to the investigators, according to SAZP sources. There is legislation that should theoretically permit access to environmental information for the public, but it is thought unlikely that such regulations are operative or effective.

The data are made available through a Web-site system that is being developed, the first stage of creation of Web-pages having been completed. The managers of the PMPs are linked to

the PMP-Web, with information being provided by a dedicated Web-server. Data that have been accessed can then be processed, using the Web facilities, but SAZP (CEEV) in Banská Bystrica plays no role in the collation or interpretation of any of the information; they merely act as the provider. Theoretically, there are supposed to be co-ordinators who have access to all data sets, but this does not occur in reality, according to SAZP sources.

3.6.2 MONITORING PROGRAMMES

The range of issues covered is given in detail in several SR publications, including 'The Environment of the Slovak Republic' and SAZP documents on the PMP system. It is therefore unnecessary to reproduce detailed review of the full monitoring programme. Specific monitoring requirements are also addressed within each specialist area. However, for information purposes, the most significant aspects of the system are presented below.

(1) Air Quality Monitoring

Air quality is monitored by SHMU on both a local and regional basis. Five of the 32 automatic stations in the national network were located in the Study Area (1998). Parameters monitored include SO₂, NO_x, TSP, O₃ and CO. SHMU operates one regional air quality station in the area, although it is not part of the trans-European atmospheric mixing layer monitoring that forms part of the Environmental Monitoring and Evaluation Programme (EMEP). In addition, the SZU and the LVU both monitor for different types of pollutants.

An inventory of air pollution emissions and resources – REZZO – provides information on the specific characteristics of individual industrial sources. The data are used to make overall estimates of national yearly emissions of SO₂, NO_x, CO and particulates. The Slovak Environmental Inspectorate (SIZP) also uses the data, together with municipal and district authorities, to monitor and control specific industrial operations.

The number of sampling points is insufficient to provide a clear picture of air quality in the Study Area, for example from traffic and domestic heating units, so that modelling is utilised to try to provide a clearer interpretation of the existing conditions. There is also suggestion (SAZP pers comm) that some of the automatic monitoring stations may be closed in the future, due to lack of funding. Occasional 'spot sampling' is undertaken, but this is insufficient to identify all major pollution sources and also to build up a picture of ambient air quality for the major urban areas.

(2) Water Quality Monitoring

Surface water sampling is undertaken by or on behalf of SHMU at 23 locations (1997) in the Study Area, reduced from 27 (1991). The data collected are used to classify stretches of the Hron River, as they are for other river systems in Slovakia. A range of parameters are analysed, the most significant being organic pollution (BOD₅), bacteriology (faecal and total coliforms), metals and nutrients. There is presently no monitoring of aquatic macroinvertebrates to complement the physico-chemical sampling programmes. Povodie Hrona carry out some of the sampling of surface waters, on behalf of SHMU, and their laboratory facilities are also contracted to undertake analyses of such samples. They are also reported to undertake limited sampling for their own research purposes, but the data are not supplied to the PMP system

SHMU test 66 sites for groundwater quality, 97 boreholes for groundwater levels and 16 for spring rates. Unfortunately, these locations do not necessarily correspond with sites originally examined by the GSSR Geochemical Atlas project in the early '90s, which undertook a one-off assessment of 1 965 groundwater samples.

The result is that SHMU does not investigate all those areas, shown by the GSSR project, to have high levels of metals. Consequently, there is no way of telling if the originally detected high levels of pollutants in groundwater are still evident.

Potable water from households locations and drinking water sources are analysed by the SZU and StVak / ZsVak respectively. However the collated data do not appear to be included in the PMP system, nor are they readily available to the public or investigators, such as the REMP Study Team.

(3) Waste

Waste statistics that are reported in the PMP system are restricted to quantity data of wastes arising, categories of wastes and disposal methods to which such wastes are subjected. There is considerable uncertainty about the validity of data arising from the existing system, due to the fact that the classification of waste types is both large and complex. There are also two different organisations collecting the data, each requesting different details from the waste producers. SAZP collects data on Special and Hazardous wastes from local authorities, whilst the Statistical Office of the Slovak Republic (SOSR) also collects data on 'Other Wastes' as well as the first two waste categories, but utilising a network of over 7 000 waste producers. The result is that neither set of data is complete, nor reliable.

Changes to the classification of waste types have further complicated the situation, with some materials that are readily reused, eg manures, no longer being identified as a waste. Consequently, there is no medium term record to provide accurate data on trends in waste generation.

There is a legal requirement for recently licensed municipal landfill sites to undertake chemical analysis of groundwater samples from upstream and downstream of the facility, the data being supplied to the municipality and Okres, as a check on the performance of the sites integrity. These data are supplied to SIZP for review on performance, who will then take random samples themselves, to ensure performance figures are valid. These data are not readily available to the public.

Old licensed landfills and OELs do not require to be monitored, so there is a considerable gap in the understanding of the status and potential environmental risks associated with these sites.

(4) Soils

VUPOP are responsible for checking soil quality, with around 20 samples being taken in the Study Area. These appear to be part of the **basic network** of sites that are analysed at 5 year intervals. It is not clear if there are any of the **key monitoring** sites in the Study Area (21 in Slovakia) which are sampled annually. Agricultural plots are also evaluated, possibly by the Central Controlling and Testing Institute, Zvolen, (UKSUP), for a range of contaminants. These include heavy metals, polycyclic aromatic hydrocarbons, trace elements and the nutrient status of soils.

SAZP makes use of UKSUP heavy metal and PCB data (SAZP pers comm) but it is not clear if and how these data are presented in the PMP. Data are supplied on the basis of data-sharing with the LVU, to investigate the condition of soils in forest areas.

(5) Biota

Data for this topic area are collected by SAZP, particularly in connection with National Parks and Protected Landscape areas. LVU is responsible for assessing the ecological condition of forests in the Study Area, covering nearly 49% of Banská Bystrica Kraj and nearly 40% for the Study Area. There is no ecological monitoring of the water courses in Slovakia, either to determine general condition or as part of an overall water quality assessment programme.

(6) Forestry

LVU are responsible for monitoring a number of sites throughout Slovakia, to assess the condition of growth, effects of acidification, soil issues such as nutrient status and heavy metals. There are also 4 sites in the Study Area where ozone (O₃) is analysed, together with other parameters and meteorological data, as part of a European network of intensive monitoring sites. Data are additionally provided regarding the forestry value of the main species including evaluation of the economic status (girth, height and crown) for relevant tree species.

VUPOP (soil data), GSSR (weathering and erosion) and SAZP (land use) provide information through the data-sharing system that operates between PMPs. SHMU also have an interest in the acid rain deposition investigations, but it is understood that there is no significant interplay between the organisation and the LVU (LVU pers comm).

(7) Other Aspects

Although all PMP managers do not have access to all the elements of the PMP system, there is interaction regarding the sharing of data, to facilitate a thorough evaluation of environmental systems that comprise more than one feature. A major example of this is Forestry, with the LVU obtaining data on air and water (SHMU), soil (VUPOP), geological features (GSSR) and land use (SAZP).

Other examples include monitoring of issues relating to pollutant loading on human populations (SZU), which makes use of data on air and water (SHMU), radiation and noise (SZU) and foodstuffs (Food Research Institute). This last group obtains information from forestry, air, water and soils (VUPOP) for its work on monitoring heterogeneous substances in food and fodder, whilst the GSSR obtains information from water, and a variety of data on several meteorological and climatology monitoring programmes, when considering geological factors.

The SZU has responsibility for a number of areas, including ionising and non-ionising radiation and noise, but budgetary restrictions limit the extent to which the organisation is able to complete its tasks. There is a suggestion from SAZP that ionising radiation monitoring may be removed from their programme, due to the financial shortfalls.

Land use and settlements are presently undertaken by SAZP, but this monitoring role is soon to be removed from the PMP system and transferred to local authority control (Benko pers comm).

As can be seen, the monitoring programmes are extensive in their range and comprehensive in the parameters that they wish to provide data about. However, it was not appreciated when established, just how expensive the PMPs would prove to be, so that central government has been obliged to remove some of the financial support for the programmes. This has led to the PMP project managers looking to find ways to cut costs, inevitably leading to a reduction in the amount of monitoring that can be undertaken.

The need for such rationalisation is recognised and requires to be the subject of more detailed consideration by all the PMP member organisations, as well as the Ministry of Environment.

3.7 ENVIRONMENTAL INFORMATION SYSTEM

The "Framework for Environmental Monitoring" (Government decree no. 449/26.5.1992) and the "Framework for an Integrated Information System" (Government decree no. 620/7.9.1993) were prepared by the Government of Slovakia as base documents for the establishment of monitoring and information systems of the environment.

In accordance to the "Framework for an Integrated Information System," the Minister of the Environment was appointed to establish ministerial and other government agreements with:

- the Ministry of Agriculture,
- the Ministry of Transportation,
- the Ministry of Economic Affairs,
- the Ministry of Health,
- the Ministry of Interior Affairs,
- the Ministry of Education,
- the Statistical Office of Slovak Republic, and
- the Institute of Geodesy, Cartography and Land Register of Slovak Republic on providing information for the Environmental Information System.

The Ministry of Environment selected the Slovak Environmental Agency (SAZP) as the responsible organisation to prepare and implement the concept of the Information System of Environment (ISZP).

3.7.1 CONCEPTION OF ENVIRONMENTAL INFORMATION SYSTEM

Two documents are published regularly (updated every 2 years) by the Ministry of Environment about the status and future plans for the establishment and operation of the Systems. These reports are:

- the Information System for the Departments of Environment of Kraj and Okres Offices ISOZP (Ref. 7 - 5), and
- the Framework for Departments forming the State Information System of MZP (Ref. 7 - 6).

(The most recent version of the documents were not available during the study period, therefore the reports published in 1997 were used.)

The following sections provide a general overview of the general framework of the IS maintained by the government of SR and on the concepts and proposals of the ISZP, that is one of the sub-systems of the overall IS.

(1) State Information System

The Act No. 261/ 1995 on the State Information System (SIS) defines and regulates the development and operation of the information system of the Government of the Slovak Republic, as well as the duties of government organisations that form the SIS.

SIS is defined by the Act as a system of information and related activities that supports the work of state administration. In principle all information and related activities should be included in the SIS if funds from the state budget were used in their formation.

The SIS is built upon information systems that are developed and maintained by different government institutions playing either general, sector or geographic area specific roles.

In 1991 the Statistical Office developed a proposal for the structure of the information system (IS) of governmental organisations. The framework defines the following cross-sectoral information systems:

- IS of administrative activities (RISA)
- IS of economic and financial activities (RISHS)
- IS of expert activities (RISOC)
- IS of scientific and technical activities (RISVTEI)

These information systems are formed in each state organisation. Therefore a uniform IS structure results in essential compatibility between the organisations. The IS is a component of the SIS.

(2) Information System of the Ministry of Environment

The IS operated by the Ministry of Environment, as a part of the SIS, is referred to as the Information System of the Ministry of Environment (RIS MZP). According to the duties of MZP, the system incorporates the following, often referred to as inter-departmental, components:

- IS of Monitoring (ISM),
- IS of the Environment (ISZP),
- IS for Departments of the Environment – of kraj and okres offices (ISOZP)
- IS of Territorial and Regional Planning (ISU)

The organisations under the authority of the MZP established their own IS. Each IS of the organisations has their own cross-sectional IS in accordance with the proposal of the Statistical Office in 1991. Regarding to its organisations, the following IS are part of RIS MZP:

- IS of Slovak Hydrometeorological Institute (IS SHMU),
- IS of Slovak Environmental Agency (IS SAZP),

- IS of Geological Survey (IS GS),
- IS of National Parks Administration (IS SNP),
- IS of Slovak Caves Administration (IS SSJ),
- IS of Slovak Environmental Inspection (IS SIZP),
- IS of State Fund of the Environment of SR (IS SFZP),
- Internal IS of MZP SR. (VIS).

(3) Characteristics of Environmental Information System

MZP assigned to the Slovak Environmental Agency (SAZP) the responsibility for developing and managing the inter-departmental IS (ISM, ISZP, ISOZP, ISU referred to in the previous section) those that fall within the activities and responsibilities of the Ministry. ISU and ISM can be considered as the part of ISZP. In the followings only the main concepts of the ISZP is introduced in further details.

1) Basic concepts of ISZP

ISZP, just like other information systems, is formed by a combination of

- information and data sources,
- computer environment (hardware, software and communication/ networking equipment),
- institutional and administrative environment (organisational, operational and legislative regulations),
- expert activities (scientific and technical).

The main aim of the system is to provide information on the environment for the users described below. The target groups of users are:

- decision-makers (state administration, municipalities, etc.)
- scientists, researchers (research institutes, schools, etc.)
- the public (general public, NGOs, etc.)

The information should be available in digital form, whenever is possible. Furthermore, the system should play a screening function ("cleaning house") for data and information on the actual state of the environment. It provides a certain guarantee for the quality and reliability of the information, since all information should be checked before being placed into the system.

The defined main system requirements of ISZP are:

- ISZP to be an open system, which means connectivity with other systems.

Furthermore, its structure can be considered open as well. It is built to facilitate further development in a flexible way. When new requirements become known, the system should be capable of meeting the new demand either by combining its existing components or by introducing new components to the existing system.

- ISZP to be a distributed (decentralised) system due to the characteristics and variety of information and data sources, as well as the various groups of users that should be incorporated into the system. Instead of a complex central database it is built upon the connection (referred to as an open system) between the data and information providers.
- ISZP to be Geographic Information System - GIS oriented. The system is orientated toward technologies of GIS due to most of the information and data being time dependent and spatially distributed. GIS technologies enable various kinds of spatial analysis techniques and the syntheses of data and information using structured information layers, with data about the individual components of the environment.

2) Databases

The driving principle in developing the database for the ISZP is that the data should be readily available with the originator, and that the originator should provide regular updates of the data. This places clear responsibilities on the data providers, and avoids a giant centralised database where data management and updates are less evident.

The basic sources of data for the ISZP are the data and information obtained from monitoring as well as from the expert activities of respective organisations that are part of the IS. A description of monitoring activities can be found in Section 3.6 (Environmental Monitoring System).

In addition to the organisations under the control of MZP, the following state organisations are providing basic data and information for the system:

- Ministry of Agriculture of SR, information about soils, forests and contaminating substances in the food chain,
- Ministry of Health of SR, information about radiation and other physical fields, and the load on inhabitants caused by environmental factors,
- Statistical Institute of SR, statistical data about the environment,
- Institute of Geodesy, Cartography and Land Register of SR, data about cadaster units, and
- other Ministries, such as, Transportation, Economic Affairs, Health, Internal Affairs, and Education.

Furthermore, data and information are obtained from private companies as well (eg waste production, emissions, effluents, etc.)

In accordance to the Act on Access to Information about Environment, ISZP provides access

to information about the environment for experts as well as for the public.

3.7.2 PROGRESS WITH ISZP DEVELOPMENT

The development of ISZP can be divided into three main parts:

- the development of computer infrastructure that is the essential technical base for the system,
- the development of databases that are the main resources of the system, and
- the development of know-how that is required for the maintenance, and further on, for the optimal utilisation of the system.

(1) Infrastructure Development

The development of the technical infrastructure of ISZP can be considered as a continuous process due to the rapid development of the computer industry. However, it is essential for the proper functioning of the system that it has a core computer environment.

In the following sections a short summary is given about the existing computer environment of the ISZP. It has to be highlighted that this computer infrastructure serves several tasks, and that their level of development can be different, due to the fact that they are the part of several interconnected and/or inter-departmental IS referred to in earlier chapters.

1) Hardware

The most common computer type is the IBM compatible desktop personal computer, equipped with 486 Mhz or Pentium processors. Older versions such as 286 and 386 PC as well as PC XTs are also available but their use was drastically reduced due to the high system requirements of recent operating systems (ie Windows).

IBM compatible Laptop and Notebook computers are also available but much less in number.

Workstations are used for expert activities as well as for networking. The most commonly used workstations are SUN, HP, and DEC.

Other hardware support includes mostly printers of laser, ink jet and dot matrix types.

Special peripheral units are the scanners (B&W and colour, sizes varying from A4 to A0 full scale) and digitizer tablets (sizes are from A4 to A0 formats) that are used mainly for GIS related works.

2) Software

This section does not aim to prepare a complete list of the type of software used by the organisations, but to provide a general overview on the most commonly used software. There are several kinds and types of software available at the offices, but the tendency is to reduce the variety of software.

The most widely used operating systems are Windows 95 or NT, however Windows 3.1x versions are also available.

Microsoft products (MS Word, MS Excel of different versions) are commonly used as software support for office applications, such as word processing and spreadsheets. For presentation purposes, MS PowerPoint is used. Older types of word processor such as T602 (which is a special Slovak text editor) were used in many offices; thus reports and tables in this format still exist.

Drawing and image processing software include CorelDraw, Adobe PhotoShop, etc., but much less in number than those of office software.

Application software support, such as database management systems/ software (DBMS) and GIS software are mainly used by experts to fulfil special tasks. Database systems used in the organisations are ranging from workstation based Oracle to PC based systems, such as Informix, Ingres, FoxPro, dBASE, MS Access, etc.

The broadly available GIS software are the ESRI Company developed products, such as ArcView, PC and workstation versions of Arc/Info. Some copies of MapInfo and IDRISI are also available, as well as the Czech GIS software TOPOL.

Recently, client-server type multi-user software applications are installed at SAZP, in addition to traditional type remote access to programs. The Centre offers ArcView user accounts through WinFrame server. The server can provide access to a number (limited by the number of licences) of users at the same time. Remote access to computer programs are still possible, such as to run Arc/Info workstation version from a remote location through the network by using the eXceed program (or other terminal emulator program) installed on a PC computer.

3) Networking

SAZP was entrusted with the task of developing and operating the Environmental Network. The Environmental Network is the technical infrastructure between the member organisations

that connects the various IS maintained by those organisations.

ISZP is connected to the Government Network (GOVNET) that is the core network of the State Information System and its sub-systems.

Local Area Networks (LAN) function as the communication technology to connect IS and the sub-systems located in the same place (building complex). LANs are installed and not only connects the PCs of different workspaces, but also enables them to access and utilise the services offered by servers being connected to the network.

The servers provide links to higher level communication networks (INTERNET, SANET and EUnet) as well. The well known services offered when establishing inter-network (Internet) connections are: e-mails, discussion groups, file transfer protocols (FTP), interactive connections between computers (TELNET), network file systems (NFS), and the services of World Wide Web (WWW).

(2) Database Development

The structure of this section follows the main areas that a database can be characterised from, namely: data sources and formats; data processes and validation; and data accessibility and dissemination.

1) Data sources and formats

The main source of data for the ISZP is the Partial Monitoring System that has been already described in Section 3.6 (Environmental Monitoring System). In the followings only the investigated data sources relevant to the REMP will be described.

Since the preparation of REMP greatly depends on the availability of environmental data and information, the Study Team carried out a full-scale survey of existing databases. This process was referred as the confirmation of available environmental data and the collection of existing data during the study. The Team employed two different approaches: a questionnaire survey and personal interviews.

In the first case, a GIS database questionnaire was prepared and sent to the Counterpart organisations that are the core organisations of ISZP. The questionnaire included 35 questions about GIS data sets and databases of monitoring networks. The responses, filled in questionnaires, characterised the available digital environmental data in ISZP.

The purpose of personal interviews was twofold: to clarify the contents of ISZP databases

(databases owned by counterpart organisations) and to identify other sources (state institutes, universities, private companies) of environmental data already available but not yet incorporated to ISZP. This was a continuous process with the aim to provide updated information during the Study.

As a result, an environmental database was prepared during the study. It includes both raw data and analysed, processed data as well. This database, accompanied by the details (eg sources and contact persons where and whom the data could be obtained, etc.) of digital data sets acquired by the Study Team (Annex O.1 of the Supporting Report), can be considered as the presently available digital environmental data for the Hron River Basin.

Both digital and hard copy (paper) data is present in the ISZP. The formats of digital data are determined by the software, computer program used to store and manipulate the raw data. Raw data can be derived directly from monitoring through data loggers or digitised from written filed survey records. The software used can be wide ranging from various DBMS and GIS to simple word processors and spreadsheets. In Annex O.1 the formats, the data available in, are presented as well.

Hard copy data and information are in the form of reports, books, paper maps, and other conventional forms of data recording media. The full list of printed materials available for the Study is presented in Annex A – Bibliography of the Supporting Report.

2) Data processing and validation

In most cases the data owner carries out data processing and validation. However in some cases, eg surface water quality, the agency actually doing the monitoring (Povodie Hrona) is different from the one developing the database (SHMU). Basic data processing steps are based on well established principles, guidelines and, when available, standards. Higher level data processing, such as indicators and indices, is less common and most cases serve only research interests. SAZP is responsible for the preparation of the State of the Environment of SK reports that includes the development of national scale indicators and indices about the state of the environment. Thus SAZP processes and evaluates selected indicators of the state of the environment and ensures their compatibility with the indicators applied in the EU and OECD countries.

3) Data accessibility and dissemination

Data and information is distributed in both printed and digital forms. Some information is already available through computer networks (Internet); some has to be requested from the

data source directly. In this later case, data will be provided in either hard copy or digital form.

The information about a specific data as well as the location of the data where it can be found is referred to as metadata. The summary list of metadata is called the metadata catalogue. The main purpose of metadata catalogue is to inform the users of ISZP about the existence, types and amount of information about the environment that available from state authorities and organisations.

Therefore metadata catalogue includes information about the organisations owning environmental data and information, their expert activities, available databases and documents, as well as the name and contact addresses of responsible persons, and the ways and prices of provision of data/information. SAZP is responsible for the formation and maintenance of the metadata catalogue system. The metadata catalogue can be found as a Web page at SAZP Internet site (<http://www.sazp.sk>).

(3) Expertise

The functioning of ISZP requires trained personnel in both technical and expert activities.

The Centre for Environmental Policy and Environmental Education (CEEV) of SAZP is responsible for the maintenance of ISZP and related activities including the task to provide up-to-date information about recent computer technologies for both data providers and users of ISZP.

CEEV established a training-application centre that offers GIS training focusing on ArcInfo and ArcView use. The training room equipped with high tech hardware and software support providing direct access to the computer environment for each trainee.

The training are held regularly and offered not only for the employee of SAZP and organisations under the authority of MZP, but also for Okres and Kraj officies on request. The centre welcomes all interested persons from students to experts.

Experts of other fields or organisations not participating in the training programs of CEEV depend on self-education or the high price training offered by application software producers/dealers. The state of environmental education was introduced earlier in chapter 3.5.

3.7.3 ANALYSIS OF ISSUES RELATED TO ISZP DEVELOPMENT

This chapter aims at highlighting recent issues of ISZP development through the results of

analysis that is focused on the state of the system (previous section) and prevailing activities and processes affecting the development.

Based on the identified problems and questions (issues) the proposed solutions (recommended measures) to handle the problems are incorporated and presented in the Environmental Information Network Plan (Section 6.3.4).

It is important to note, that although the availability of financial resources greatly influences the progress in developing the ISZP, thus it can be considered as one of the major issue, this topic is not covered by the following sections. It is due to the lack of information on financial strategies and resources related to ISZP development.

(1) Infrastructure Development

Instead of a robust hierarchical system, ISZP is based on the inter-connection of individual sub-systems and components located at the same or distant locations. These characteristics greatly determine the way on how the technical infrastructure of the system could be developed, such as the infrastructure have to enable open connections to various IS systems, and in addition, it has to fulfil the wide ranging requirements of different groups of users.

1) Hardware

Purchasing hardware for the system is a never lasting process. A high-tech computer environment today will be outdated few years later, if not even within a year.

Presently some office lack the basic PC (desktop) environment that would be useful for their work. It is common that the main office of a specific organisation is well equipped, each employee has its own PC, however in contrast, in the branch offices of the same organisation more people have to share a PC. In addition, many of the computers can be characterised by low hard disc capacity and memory.

An efficient technique to utilise these computers could be the conversion from stand-alone versions to network computer type ones. Terminal based use lowers the requirements against the client's computer. Although the server must be a powerful PC or PC workstation, the system development could be expected economically more feasible compared to stand-alone machines.

Specialised groups, teams of organisations where computers are essential in their everyday work, such as GIS specialists, database managers, etc., are kept in track easier with the rapid development. Resources for obtaining new models and upgrading older equipment are found

easier due to the broadly acknowledged technical requirements of their work. A good example is the CEEV where a high-tech computer environment with the necessary peripherals is available.

2) Software

The issues of hardware support are also relevant to software. However, due to the broader variety of software products and, in many cases, the lower compatibility level offered, software purchasing requires more careful investigations.

For PC operating systems as well as for office applications Microsoft products are the most dominant commercial software products. Their use provides high level compatibility, if recent tendency of one way compatibility between newly released version is not considered. However, they are still the most widely accepted and used products.

Compatibility is the main issue for application software. These computer programs cover one or more specific areas. Therefore their purchase are driven mainly by the specific tasks they are going to be used for. The purchasing of commercial software instead of in-house development is more feasible for routine works concerning both money and time.

Client-server type multi-user support of software is becoming more and more popular. These services are offered not only for office products but for application software as well. CEEV introduced WinFrame server based ArcView support. The further development of similar systems is scheduled in ISZP.

3) Networking

The ISZP can not operate without adequate network and network connections.

Presently, the organisations of ISZP already established connection to the Environmental Network. Direct network connections are common in head offices. Several branch offices are connected through modem only, or left without any connections.

In recent years the Ministry of Interior Affairs completed the establishment of its internal network that provides direct network connections for all Kraj and Okres offices. In relation to ISZP the Departments of Environment of Kraj and Okres offices are in charge. However, the physical link between ISZP and IS of these offices has not been fully completed yet. As a result some offices has to rely on dial-up network connection.

At present time dial-up networking is slower and less reliable than direct network type

connections. Client-server type software application requires fast and reliable network, in other case its advantages cannot be truly utilised, thus this service would not be a helpful tool for the user but only a time consuming and inconvenient solution.

(2) Database Development

The outline of this section follows the structure of previous sections. The analysis is carried out in the same order and the main topics are grouped into the same categories that were presented earlier.

1) Data sources

One of the main issue of ISZP development is to obtain data and information for the system. SAZP is responsible for the formation and maintenance of ISZP. However, referring to SAZP sources, the environmental legislation does not facilitate fully its realisation. In addition, as derived from the corresponding laws, SAZP carries out a limited number of monitoring activities (refer to Chapter 3.6), as well as, it is the co-ordinating Agency for the ISM.

For the ISZP to be of value in addressing environmental problems, monitoring data alone is not sufficient. Data on surface water and groundwater quality can inform the ISZP user that there is an environmental problem, but not necessarily the origin / cause of pollution and how to solve that problem. Reliable data from other sources are also required eg from SIZP, StVak, municipalities, Statistics Offices - in relation to industries, infrastructure (water and wastewater), population.

Furthermore, although the conditions already established for data exchange between the organisations of ISZP, data collection takes much time. These inconveniences are caused by the lack of operative co-operation between the organisations participating in developing ISZP.

2) Data formats

ISZP consists of a number of databases developed and maintained by various organisations. The most important data parameters of the system are the input and output formats. Data formats ensure data exchange between IS of organisations as well as between applications.

Software developers offer wide range of commercial applications. In general, older products had much less export-import function than recent programs, thus data transfers were based on

mainly ASCII and raw binary formats that unfortunately limited full data transfer.

Several data are available in file formats that were used by older software products. Programs such as TOPOL GIS software or T602 text editor, that are country specific products of (Czech) Slovakia, are not used anymore, or if so, then only in very limited purposes.

Recent software products offer higher level compatibility, but it can be easily observed that the programs have more import than export options in selecting data formats. This problem is tackled in ISZP by employing interchangeable file formats and lowering the variety of GIS, DBMS and other application software used. Based on this principle, MZP selected ESRI market leading products for GIS applications. It results basic GIS data compatibility between the institutions. In addition, technical support is provided and further developments of software products are expected from the provider.

3) Data processing and validation

In relation to REMP it was recognised that the processing and validation of data are sometimes incomplete and uncritical eg waste data. Closer examination indicates that some of the raw data cannot be valid. SAZP and users must not assume that monitoring and other digital data are correct, data validation should be given more attention.

(Further reference on the issues of data processing and analysis can be made to the corresponding sections of Chapter 5.)

4) Data accessibility and dissemination

The metadata catalogue being developed by CEEV guides user among existing data sets of ISZP. The catalogue is not yet completed, it was filled with digital data available at SAZP CEEV only. Other organisations should also co-operate in formulating and updating the catalogue. Information about environmental data are available from the organisations, but these data lists are not integrated into a central catalogue system neither in digital (eg Web page) nor in printed (eg booklets) form.

The way how the data incorporated into ISZP determines the accessibility of data. It is not common to place digital data on servers (Web servers) that could be easily accessed by the public. CEEV maintains a home page where displaying some map data is possible in an interactive mode. The Centre provides limited access for the direct use of GIS data. Data located on servers can be accessed from remote location if a pre-requested user account is

prepared. This strict regulation limits the access and use of data to a small number of users. Other organisations pay less attention for open data sharing systems.

(3) Expertise

Trained personnel are vital for the success of ISZP. Information technology specialists are required to maintain the technical infrastructure of the system. Experts of various fields (eg water quality specialists, ecologists, etc.) with skills of computer technology are needed to develop databases.

CEEV provides GIS training for experts of both GIS and other field specialists mainly belonging to the organisations of MZP. In recent years training courses were offered and held for experts working in the Department of Environment in Okres offices, as well.

The courses are successful in terms of transferring knowledge and skills to participants during the course period. This is monitored easily after the training. However, this knowledge can vanish soon, if the participants are not using the obtained knowledge in their practical work. Unfortunately, some participants do not have access to the basic computer infrastructure needed to carry on with GIS related works. Other groups of trainee may have difficulties to adopt the course content to his/her own specific field (eg waste management). Therefore the success of the training from a distance is more questionable in terms of practical usage of GIS.

Another closely related question is what to use GIS for. Since GIS technology become popular only in recent years there is many doubt and misbelieve about its potential use. GIS specialists are often led to a dead-end communication with experts because although they are using the same terms the words often associated with different meanings for the parties. The terminology of GIS is very easy to learn, but it should accompany a technical knowledge on how a geographic information system works. One should be aware what the real advantages and disadvantages, capabilities and limits of GIS are.

3.7.4 PROCUREMENT OF EQUIPMENT AS PART OF JICA TECHNICAL ASSISTANCE

In 1997 the JICA sent a preparatory study team to investigate the proposed study area and to set up the basis of the Study. During this time the state of the Environmental Information System was investigated as well. In addition, the proposed counterpart organisations listed and prioritised the most urgently needed equipment for implementing the planned Study. The pieces of equipment were related to both monitoring and environmental information (mainly in the field of geographic information systems - GIS) systems.

After the study was set up by JICA, the Study Team in co-operation with the counterpart organisations prepared the final list of equipment needed to implement the Study. Following, JICA (in the frame of technical assistance) purchased these pieces of equipment. The list of equipment purchased and other means of technical assistance including monitoring equipment are introduced in the following sections.

(1) Infrastructure development

The GIS equipment purchased by JICA and the Study Team for the implementation of the Study can be considered as the infrastructure development of the environmental information system both in terms of hardware and software. Although all hardware included a network card that makes possible the establishment of network connections, network specific equipment was not obtained during the project. The summary list of purchased GIS equipment is given in Table 3.7 – 1 below.

Table 3.7 –1 List of JICA Purchased GIS Related Equipment

Organisation	Items of hardware
LVU	SUN Ultra Enterprise 450
	Desktop Computer GAMO Station 610
GSSR	PC Server and Components (UPS, Scanner, Tablet, CD-RW)
SAZP	HDD for SPARC Storage Array Model 766AR4
	Full Scale Scanner FSS 8300DPS
	Desktop Computer GAMO Station 310
VUPOP	Laser Printer HP LJ 6L, A4,
	Laser Printer HP LJ 6L, A4
	Notebook Computer TOSHIBA S300CDS
	Desktop Computer GAMO Station 310
	DIGITAL Server 5205 Wind NT
	Colour Printer EPSON, STYLUS Colour 3000
	Laser Printer HP LJ 6L, A4
Desktop Computer GAMO Station 340, Desktop Computer GAMO Station 310	

Organisation	Items of software
GSSR	GIS Software Map info 4.5 and modules
SAZP	Database Software ORACLE – Web Developer Suit
	LANDSAT Thematic Map 188-26
VUPOP	GIS Software ArcView 3.0 and modules
SHMI	Database Software Ingres 2.0, Vision Pro-Run Time
	GIS Software ArcView 3.0 and modules

(2) Database development

In co-operation with counterpart and other organisations the following digital data sets were prepared during the Study period:

digital Geological, Hydrogeological and Tectonics maps (digitisation and interpretation by GSSR)

- preparation of Land Cover Map (LANDSAT satellite images purchased by JICA, image processing carried out by SAZP Remote Sensing Laboratory, supervised classification was done by Slovak Academy of Science on request by SAZP CEEV)
- preparation of Forest Health Condition Map (calculations by LVU using JICA purchased Landsat image)
- digitalisation of Hydro-Ecological Plan prepared in 1993 (Study Team in co-operation with Landscape Ecological Laboratory, Matej Bel University, Banska Bystrica)
- digitalisation of Banska Bystrica Territorial Plan (Study Team in co-operation with SAZP CEEV)
- other work by the Study team includes: digitising the maps of Bird Migration routes, Endemic Species and Tourist sites (Annex J of the Supporting Report).

The above listed new digital data sets were incorporated into the GIS environmental database that is summarised in Annex O.1.

In addition to the content of GIS database that could be considered as the collection of existing and preparation of new digital data sets, the following environmental information was obtained during the Study:

- monitoring data and result of analysis of field measurements (Annex F.1)
- responses and evaluation results of the questionnaire survey (Annex L)
- the project library that is the collection of printed material relevant to the Study (description is the Bibliography - Annex A)

(3) Monitoring System Development

The necessary development of the environmental monitoring system was helped by the JICA technical assistance as well. The equipment purchased in the frame of the Study is summarised in Table 3.7-2.

Table 3.7 -2 List of JICA Purchased Monitoring Equipment

Organisation	Items of monitoring equipment
LVU	Wet / Dry Precipitation Collector, Model AM 301
	Photometric Ozone Analyser, Model MLU 400
SAZP	GPS Receiver TOPCON Turbo G1
VUPOP	GPS Receiver TOPCON Turbo G1
SHMI	Ozone Analyser TEI, model 49 C
	Measuring Station, Model MARS 3
	Automatic Meteorological Station, Model MILOS 500

CHAPTER 4
POLICY AND PLANNING FRAMEWORK AND FUNDING FOR
ENVIRONMENTAL MANAGEMENT

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4.1 INTRODUCTION

It is important that the Regional Environmental Management Plan for the Hron River Basin takes account of national policies, programmes and priorities with respect to both development and to environmental management.

Slovakia is seeking a membership of the European Union, and in the early stage of adopting the massive body of EU legislation known as *Acquis Communautaire*.

The existing environmental policies, strategies and programmes for Slovakia and the Hron Basin have been prepared in the light of the knowledge of a large number of Slovak specialists. Recent efforts in updating these policies, strategies and programmes are directed towards fulfilment of the requirements of the integration into the EU. The National Programme for Adoption of the Acquis (NPAA) is currently under way.

A REMP for a River Basin does not yet have a place in the overall framework of environmental management planning in Slovakia. So, as a 'pilot' planning study, it will be appropriate for the REMP for the Hron River Basin to make proposals as to how it might be incorporated into the national, regional, district and local planning system and then implemented.

Therefore, to provide a basis for the recommendations that will be made in the REMP, a review of relevant national and regional policies, plans and proposals has been made. This includes a description/review of the types of environmental planning being undertaken in Slovakia and of the financial systems available for implementation of environmental management programmes.

4.2 TERRITORIAL DEVELOPMENT POLICIES AND STRATEGIES

4.2.1 NATIONAL

The first draft of "National Spatial Development Conception of Slovakia," which is the basis of the current national territorial plan, was issued in 1994 (Ref. 5-4). Its objectives, principles, and areas of development policies are as follows.

(1) Objectives

- 1) From "Eastern States" to the "Western States"
- 2) The gradual incorporation of SR into European structure.
- 3) The economic incorporation into the European Union.

(2) Principles

- 1) Creation of a relatively homogeneous poly-central settlement system
- 2) Support of spatial and settlement links between the regions
- 3) Construction of hierarchy networks nation-wide to get better access to European destinations
- 4) Support for gradual development of supranational links (international conceptions of spatial development and trans-European infrastructure networks)
- 5) Boosting national regional centers with the aim of creating a counter-balance/partnership with European agglomerations.

(3) Policies

An outline of the policies for development of the Slovak territory are presented in Annex C.2.2 of the Supporting Report.

The current territorial development policies and strategies of the state has been issued in 1999 as "2nd Draft of Slovakia Spatial Development" by MZP. This material is a basis for the regulation of the development of all activities accompanied by land-spatial manifestations of the state, and is summarised in a document titled "Slovakia Spatial Development Perspective - abridged - Bratislava 1999" (Ref. 5 - 27), which contains the following:

- 1) General requirements for Slovakia Spatial Development Perspective
- 2) Settlements structure
- 3) Landscape structure
- 4) Sectoral policies and their spatial impact

- a) agriculture
- b) forestry management
- c) water management
- d) industry
- e) social infrastructure
- f) recreation and tourism industry development
- g) transportation infrastructure
- h) power industry

An outline of the above document is presented in Annex C.2.1 of the Supporting Report.

4.2.2 REGIONAL

Both Kraj Offices of Banska Bystrica and Nitra issued the territorial development plans as follows:

- Territorial Development Plan for Banska Bystrica Kraj, September 1998, Consultant URKEA (Ref. 5 - 23)
- Territorial Development Plan for Nitra Kraj, January 1998, Consultant AUREX (Ref. 5 - 6)

These are comprehensive documents on the policies and strategies for land-spatial development of the regions, including the following sectoral plans:

- 1) social and welfare infrastructure
- 2) nature protection
- 3) recreation and tourism
- 4) environmental issues (air, water, soil, noise, waste)
- 5) landscape
- 6) transportation
- 7) hydrogeology
- 8) energy

Outlines of these documents are presented in Annex C.2.3 of the Supporting Report.

4.3 NATIONAL ENVIRONMENTAL POLICIES AND STRATEGIES

4.3.1 NATIONAL ENVIRONMENTAL POLICY

(1) Introduction

The strategy, principles and priorities of the national environmental policy are documented in "National Environmental Policy" (NEP) which was approved by the Government in September 1993 (Government Resolution No. 619/1993) and by the National Council in November 1993 (Council Resolution No. 339/1993).

This document is divided into three main sections. The first section describes the background for the NEP. The second section describes the Strategy in terms of Priorities, Principles, Objectives, and Financial aspects of the NEP. The third section is entitled the "Care of the Environment - integral part of development."

The NEP incorporates the principles of the conclusions of the UN Conference on the Environment and Development, and aims at reaching permanently sustainable development.

The strategy of the NEP was derived from the analysis and evaluation of the actual state of the environment in Slovakia, and it is summarized below (Ref. 1-10).

(2) Priorities of the NEP

The 5 priorities of the NEP are as follows:

- I. Global environmental security and protection of the atmosphere against pollutants
- II. An adequate supply of drinking water and reduction of water pollution to acceptable levels.
- III. Soil conservation and the purity of foodstuffs and other products
- IV. Proper disposal or utilization of waste and minimizing its production
- V. Preservation of biodiversity, conservation and rational use of natural resources, and optimization of land use

The above priorities are comparable to those of Hungary, Poland and other developed countries.

(3) Principles of the NEP

The following 10 principles are adopted in the NEP:

- 1) Precedence of preventive measures over corrective measures
- 2) Implementation of the NEP in all areas of the economy and in the service sector especially

- 3) An understanding of the resolution of the environmental problems as the resolution of economic problems of the society
- 4) An awareness that the present generation bears a responsibility to future generations for the environment
- 5) Resolution of complex environmental problems through systematic elimination of the synergetic effects of existing and newly-produced pollutants and other negative factors
- 6) Polluter-pay principle
- 7) Assessment of the effects and impacts of modifying the environment on human health, the landscape, individual components of the environment and endangered species, and consideration of the priceless value of the natural and cultural heritage and its nonrenewable natural resources
- 8) An understanding of environmental conservation as a fundamental condition for halting the unfavorable trends in the state of the public health
- 9) A new approach to forests as the primary factor of ecological stability in the landscape and to soil as a component of the environment which is conditional for biodiversity, nutrition, and the existence of life
- 10) Respect for life in all its forms and for all natural and cultural values

(4) Objectives of the NEP

Objectives of the NEP are classified into long-term, medium-term (year 2000 - 2010), and short-term.

The long-term objectives comprise 8 general long-term strategic objectives and 25 partial long-term strategic objectives; the former being more conceptual and the latter being more specific and quantitative.

A number of the medium-term and the short-term objectives are grouped into the following 6 sections:

- a) air protection
- b) protection and rational use of water
- c) waste management
- d) soil and forest conservation
- e) preservation of nature and countryside
- f) whole environment

The short-term objectives are the preconditions for achievement of the long-term and the medium-term objectives.

(5) Financial Aspects of the NEP

The strategy for financing implementation of the NEP consists of the following 3 lines:

The first line concentrates on key environmental protection issues in the resolution of problems of national significance and carries out key projects requiring financial outlays exceeding regional or business capacities; these should be financed primarily by the State Environmental Fund to preserve effectiveness of expenditure and the return of investment.

The second line focuses on the environmental problems of commercial enterprises, with finances drawn predominantly from commercial environmental funds.

The third line is concerned with the principle issues of environmental care at the regional level and resolution of problems of regional significance exceeding both municipal and business capacities (the primary source of financing), mainly by pooling regional, commercial, and state funds resources.

Vertical and horizontal linkages are required to connect the three levels involved: national, regional, and business. Self-financing by business and region will be the basic principle, responsibility being transferable to a higher level only in the case of insufficient resources.

4.3.2 NATIONAL BIODIVERSITY STRATEGY

Among five priorities of the NEP, Number V is relevant to ecology and biodiversity:

- V. Preservation of biodiversity, conservation and rational use of natural resources, and optimisation of land use.

Ten principles of policy identified in the NEP are all relevant to the Fifth Priority. Under the framework of the NEP, the National Biodiversity Strategy was approved by the Government on 1st April 1997 by Resolution No. 231 and endorsed by the NCSR on 2nd July 1997. The strategy has five Guiding Principles and 24 Strategic Goals as follows (Ref. 4 - 50):

(1) Guiding Principles

- 1) All biodiversity is to be conserved - preferably *in situ*;
- 2) Induced loss of biodiversity has to be compensated to the highest possible extent;
- 3) Diversified landscape has to be maintained in order to sustain the variety of life forms at all levels;
- 4) Biological resources have always to be used in a sustainable way;
- 5) Everyone must share responsibility for conservation and sustainable use of biodiversity.

(2) Strategic Goals

- 1) Identify the status of biological diversity components;
- 2) Manage threatening processes;
- 3) Strengthen *in-situ* conservation of biodiversity;
- 4) Strengthen conservation of genetic diversity;
- 5) Strengthen national *ex-situ* protection capabilities;
- 6) Build up a comprehensive system for the monitoring of changes in biodiversity on all levels;
- 7) Ensure ecologically sustainable forestry;
- 8) Gradually replace inappropriate agricultural practices with ecologically sustainable ones;
- 9) Complement biodiversity conservation by introducing sustainable fisheries management practices;
- 10) Ensure that wildlife harvest considers the long-term viability of the species concerned;
- 11) Promote ecologically sustainable tourism concepts;
- 12) Increase safety in biotechnologies and promote access to biotechnologies and/or benefits resulting from them;
- 13) Reform existing policies to achieve compatibility between biodiversity conservation and resources use;
- 14) Evolve appropriate legislative tools to support the implementation of the International Convention on Biological Diversity;
- 15) Encourage cooperation among all stakeholders to prevent duplication of activities and to provide for more effective conservation of biodiversity and sustainable exploration of biological resources;
- 16) Develop a widely applicable system of incentives for the conservation and sustainable use of biodiversity;
- 17) Incorporate strong biodiversity considerations into territorial planning;
- 18) Encourage research aimed at conservation and sustainable resource use;
- 19) Promote building of national human and institutional capacities for the conservation and sustainable use of biodiversity;
- 20) Promote all forms of education and awareness on the conservation of biodiversity and sustainable use of its components;
- 21) Strengthen biodiversity principles within the Environmental Impact Assessment procedures;
- 22) Establish a relevant national biodiversity clearing-house mechanism;
- 23) Strengthen the support to financial mechanisms for the conservation and sustainable use of biodiversity at the national level.

4.4 ENVIRONMENTAL ACTION PROGRAMMES AND THEIR CURRENT STATUS

4.4.1 THE NATIONAL ENVIRONMENTAL ACTION PROGRAMME

The National Environmental Action Programme (NEAP) was developed considerably based on documents provided by individual state departments and Okres and in compliance with the Slovak Republic National Council Resolution No.339/1993 and Slovak Republic Governmental Resolution No.531/1994 where the Slovak Republic Minister of Environment was committed to ensure the elaboration of the National Environmental Policy (NEP). The NEAP is the first plan document for the environmental care at the national level. It concerned above all the previous 38 first proposals for district conceptions of environmental care, completed in 1995. In addition to the district administration authorities (Okres), also municipalities and enterprises along with NGOs participated in the preparatory works of these conceptions.

Files of these projects are to be updated yearly to involve all necessary knowledge to improve solution of different environmental problems. It is reported that the NEAP has been updated by MoE and submitted to the Government just recently (November 1999). The following description, however, is based on the first version of the NEAP.

Projects lists which have been sent to the MoE Department of Environment Projects are evaluated by corresponding departments, and according to their recommendation the projects are submitted to the Council of MoE for Environmental Projects for endorsement. By this way a project file of the "Environmental Care Programme" is created. MoE as a central body of state environmental administration is supporting these projects which are implemented according to available funds.

Project Financing : Projects are financed through the MoE budget, State Environmental Fund (SZU), and through budgets within the bilateral and multilateral co-operation such as the EU Programme PHARE, etc.

The total required cost to implement the NEAP amounts to approximately 102 billion SK (state administration: 42.5%, municipalities: 13.2%, and enterprises: 44.3%). This cost does not include foreign assistance and some costs are not specified, mostly in the legislative area.

The number of projects included in the NEAP are summarized in Table 4.4 - 1. By the end of the year 1998, 1 043 projects requiring 33 billion SK were scheduled to be implemented.

Table 4.4 - 1 The number of projects in NEAP

Sector	Total	1998	2000	2005	2015
A. Air	311	234	67	4	6
B. Water	419	342	67	9	1
C. Waste	236	177	29	15	15
D. Risk	48	44	3	0	1
E. Nature	166	133	17	7	9
F. Forest	69	47	13	2	2
G. Economy	25	22	1	1	1
H. Information	10	6	2	2	0
I. Education	20	16	4	0	0
J. Management	24	22	2	0	0
Total	1 328	1 043	205	40	40

Note: the number of projects to be assisted by the international organization is 23.
 Source: MoE, The National Environmental Action Programme, 1997. (Ref. 1-11)

The projects relevant to the Hron River basin are shown in the Supporting Report (Annex D.1).

The NEAP is divided into 10 sectors as described below (Ref. 1-11).

(1) Sector-A: Protection of the Air and Ozone Layer

This sector aims to reduce the volumes of air polluting substances (SO₂, NO_x, C_xH_y, solid emissions), volatile organic compounds (VOCs), persistent organic substances (POPs), heavy metals, CO₂ and other gases causing the green house effect to the level in compliance with international conventions. The total required cost to implement these measures amounts to 42 billion SK. The major fields of investment are:

- a) Desulphurization of the power plants,
- b) Replacement of boilers,
- c) Implementation of steam-gas cycle in the boiler houses,
- d) Gas distribution to significant air polluting sources,
- e) Introduction of the combustion process of heating oil, and
- f) Gas distribution to seriously polluted communities.

(2) Sector-B: Protection and Rational Use of Water

This sector has 2 main objectives as follows:

- a) Reduction of pollutants in discharged waste water up to admissible rates, especially by building up the waste water treatment plants and sewage networks.
- b) Rationalization of the use of surface water and groundwater, collection and deceleration of run off from the "Roof of Europe".

The total required cost to implement these measures amounts to 20 billion SK (State administration represents 15.8%, production sector 36.4% and municipalities 47.8%).

(3) Sector-C: Waste Management

This sector aims to lower the production volumes of waste and to dispose and neutralize it, especially hazardous waste. This is connected with establishing hazardous waste recycling centres, with introducing a separated collection of secondary raw materials, with developing a network of regulated and monitored landfills and incinerating plants to liquidate useless waste.

The principal measures in this sector include "Construction of a landfill for solid industrial waste including hazardous waste from Z SNP a.s. Ziar nad Hronom" and "Restoration of the dump of goudron from Petrochema Dubova." The total required cost for the sector amounts to 9 billion SK (state administration: 24.8%, municipality: 39.8%, enterprises: 35.4%).

(4) Sector-D: Risk Factors and Nuclear Safety

This sector is focused to issue a list of chemical products, recording of these substances and carry on their controls, to regulate and assess their possible risk on the environment, including the development and completion of a system of legal regulations. The required costs of this sector amount to 2 billion SK, out of which over 1 billion SK is for measures on procedures of handling radioactive waste.

(5) Sector-E: Nature and Landscape Protection and Territorial Development

This will establish the regional territorial system of ecological stability. Long-term and high volumes of cost requiring measures include "The programmes of eliminating damages caused by antropogenic activities, mainly by emissions on forest ecosystems." This sector also includes measures on improving the quality of environment in communal and rural landscape and developing the territorial planning documentation for large territorial units (Kraj). The required costs of this sector amount to 12 billion SK (state administration: 95.9%, municipality: 0.9%, enterprises: 3.2%).

(6) Sector-F: Protection and Rational Use of Mineral Environment, Land and Forests

This sector aims to reduce the area of heavily affected and threatened lands (by erosion and land use modifications), to implement the national forestry policy and strategy. Furthermore, it intends to elaborate and implement measures on the ore and non-ore mining industry and to

develop a global system on the protection of mineral environment, rational use of power and natural resources along with economically efficient use of geothermal power. The total required cost of this sector amounts 17 billion SK.

(7) Sector-G: Economy of the Environment

This sector is focused to implement the applicable economic tools designed to solve environmental problems, to develop financial policy measures applicable to the environment, interconnecting the socio-economic and environmental interests. The total required costs is 38 million SK.

(8) Sector-H: Environmental Information and Monitoring

This sector is oriented to building up a global monitoring and information system of environment of the SR, including the development of a legal regulation of accessing the environmental information, at a cost of 16 million SK.

(9) Sector-I: Environmental Education, Training and Promotion

This sector is to encourage environmental education and training at schools and non-school facilities, especially for youth. The programme contains gradual development of a system of education trails, locations and information centres, especially in tourist sites and protected areas, the development and implementation of a system of judgement and evaluation of environmentally active communities, towns and persons, improvement in the promotion of the world heritage sites, etc. The total required cost is 33 million SK.

(10) Sector-J: Environmental Management, Organization and Performance

This sector aims, among others, to improve the quality of the state environmental administration for environment and outputs of the supervisory system - especially of the Slovak Environmental Inspectorate with its responsibilities expanded to include inspection of nature and landscape protection. The required cost in this sector is 15 million SK.

4.4.2 REGIONAL AND DISTRICT ENVIRONMENTAL ACTION PROGRAMMES

In 1996 the MoE instructed Kraj and Okres offices to prepare their environmental action programmes for the aim of updating proposed projects included in the NEAP. Consequently the regional and district offices began preparation of Kraj Environmental Action Programme

(KEAP) and Okres Environmental Action Programme (OEAP). Some of them have been completed by now including those of the Banska Bystrica and Nitra Kraj and most of Okres relevant to the Hron River basin. These documents have the same structure as that of the NEAP consisting of priorities, objectives and proposed projects classified by the 10 sectors (A to J).

The proposed projects relevant to the Study Area included in the KEAPs of Banska Bystrica and Nitra are also shown in Annex D.1 of the Supporting Report.

4.4.3 CURRENT STATUS OF OKRES ENVIRONMENTAL ACTION PROGRAMMES

The Study Team visited to Okres offices relevant to the Study Area to have interviews with the officials of the Environment Department concerning territorial development plans and OEAP (Okres Environmental Action Programme) in each Okres territory. Most of the latest OEAPs were prepared in 1997 as shown below:

- 1) Banska Bystrica Okres EAP, 1997
- 2) Brezno Okres EAP, 1996
- 3) Detva Okres EAP, 1997
- 4) Zvolen Okres EAP, 1994
- 5) Ziar nad Hronom Okres EAP, 1997
- 6) Revuca Okres EAP, 1997
- 7) Levice Okres EAP, 1997
- 8) Nove Zamky Okres EAP, 1997
- 9) Zlate Moravce Okres EAP, 1997
- 10) Zarnovca Okres has no format report, but they have list of EAP

Table 4.4-1 shows the priority sectors of EAP in 8 Okres for which analyses of data were completed. It can be seen from the Table that most of the Okres are most concerned with the sector of "Protection of Water Quality and Drinking Water" among all the sectors.

Table 4.4 - 2 Priority Sectors in the EAP by Okres

Sector	A	B		C	D	E	I
	Air and gas supply	Water quality and drinking water	Wastewater treatment	Solidwaste Management	Soil Protection	Nature protection	Environmental education
Name of Okres							
Brezno			●	●			●
Revuca		●			●	●	
Banska Bystrica	●	●	●			●	
Detva		●	●	●			
Banska Stiavnica	●	●				●	
Ziar nad Hronom	●	●			●		
Levice		●		●	●		
Nove Zamky	●	●	●				
Zvolen	(n.a.)						
Zarnovca	(n.a.)						
Zlate Moravce	(n.a.)						

Note: (n.a.) not available during the interview.

Source: Interview to the Officials in the Environment Department in each Okres by the Study Team

Table 4.4-3 shows the number of projects in OEAP relevant to the Study Area by Okres and sectors. The total number of projects, which are mostly planned to be implemented by the end of 1999, i.e. priority projects in 10 Okres are 516 within the Study Area. Of which, 32 % is in Sector B (Water) and 29 % is in Sector A (Air), followed by 16 % in Sector E (Nature/Landscape and Territorial Development) and 12% in Sector C (Waste Management).

Table 4.4-4 shows the achievement ratio of EAP by Okres and sectors. The achievement ratio is quite low. Among 4 dominant sectors above, the ratio in Sector C (Waste) is highest at 34 %, followed by Sector E (Nature/Landscape and Territorial Development) at 30 %, Sector B (Water) at 28 %, and Sector A (Air) at 20 %. The achievement ratio is higher in Okres Levice (95 %) and Revuca (83 %), while it is lower in Okres Detva (25 %), Banska Stiavnica (29 %) and Ziar nad Hronom (31 %). The average achievement ratio of EAP implementation among 9 Okres in the Study Area is only 24 %.

Table 4.4 - 3 Number of Projects in the Study Area in EAP of Okres and Sectors

	Sector A	Sector B	Sector C	Sector D	Sector E	Sector F	Sector G	Sector H	Sector I	Sector J	Total
	Air	Water	Waste	Risk	Nature / Lands'p / Terri'l	Mineral / Forest	Economy	Info'n / Monitor'g	Edu'n / Training	Manag't / Org.	
Brezno	27	15	12	12	11	0	0	0	0	0	65
Revuca	1	1	1	0	3	0	0	0	0	0	6
Banska Bystrica	3	8	0	0	0	0	0	0	0	0	11
Zvolen	7	13	12	0	9	2	0	0	1	1	45
Detva	42	67	19	19	33	14	1	5	14	2	202
Banska Stiavnica	3	3	0	0	0	0	0	0	0	0	3
Ziar had Hronom	32	38	0	0	0	0	0	0	0	0	70
Zarnovca	16	8	7	0	4	0	0	0	0	0	35
Levice	5	7	4	0	3	0	0	0	0	1	20
Nove Zamky	19	11	5	0	19	3	1	2	2	4	66
Total	155	171	61	61	82	19	2	7	17	8	527
Share	29%	32%	12%	12%	16%	4%	0%	1%	3%	2%	100%

Note: The data of Okres Banska Bystrica and Zlate Moravce are not sufficient/available.

Source: Interviews to the officials in the Environmental Department of each Okres by JICA Study Team.

Table 4.4 - 4 Achievement Ratio of EAP by Okres and Sectors in the Study Area

	Sector A	Sector B	Sector C	Sector D	Sector E	Sector F	Sector G	Sector H	Sector I	Sector J	Total
	Air	Water	Waste	Risk	Nature / Lands'p / Terri'l	Mineral / Forest	Economy	Info'n / Monitor'g	Edu'n / Training	Manag't / Org.	
Brezno	70 %	87 %	50 %	-	100 %	-	-	-	-	-	75 %
Revuca	0 %	100 %	100 %	-	100 %	-	-	-	-	-	83 %
Zvolen	0 %	54 %	58 %	-	33 %	50 %	-	-	100 %	100 %	44 %
Detva	36 %	16 %	21 %	0%	30 %	0 %	100 %	40%	50 %	0 %	25 %
Banska Stiavnica	0 %	67 %	0 %	-	-	-	-	-	-	-	67 %
Ziar had Hronom	28 %	34 %	-	-	-	-	-	-	-	-	31 %
Zarnovca	38 %	75 %	86 %	-	75 %	-	-	-	-	-	60 %
Levice	80 %	100 %	100 %	-	100 %	-	-	-	-	100 %	95 %
Nove Zamky	58 %	82 %	60 %	-	68 %	0 %	0 %	0 %	0 %	25 %	56 %
Sub-total	20 %	28 %	34 %	-	30 %	5 %	0 %	0 %	6 %	38 %	24 %

Note; The data of Okres Banska Bystrica and Zlate Moravce are not sufficient/available.

Source; Interviews to the officials in the Environmental Department of each Okres by JICA Study Team.

The detailed information on the status of OEAP are shown by Okres in Annex D.2 of the Supporting Report. The information includes the profiles of the present Environment Department of the Okres offices and their current priority projects in the Study Area. The priority projects are classified into the following categories:

- 1) The territorial development projects, related to the environment sector, which have been approved by the State Government as “Compulsory Part of Territorial Plans for both Kraj as binding regulations of functional and spatial territorial configurations and Public Utility Works” in 1998.
- 2) The EAP projects, which are identified as priority projects in the Environment Department of the Okres. These projects are further classified as follows:
 - a) The projects, which are not proceeded yet
 - b) The projects, which are under construction
 - c) The projects, which are already completed

4.5 FINANCIAL SYSTEM FOR ENVIRONMENTAL MANAGEMENT

4.5.1 STATE FUNDS

(1) State Environmental Fund (SFZP)

The major financial source of the environment sector is the State Environmental Fund (SFZP), which is an organization under the Ministry of Environment and was established by the Act of the SNC No.128/1991 Col. The purpose of the SFZP is to raise, allocate and provide financial resources and their proper use in environmental protection.

(2) Other State Funds

Other financial sources of the state include the following:

- 1) State Fund for improvement of the Forests of the SR(since 1991)
- 2) State Water Management Fund(since 1991)
- 3) State Fund for the Protection and Improvement of Agricultural Land in the SR (since 1992)
- 4) State Fund for Pro Slovakia (since 1991)
- 5) State Fund for the Liquidation of Nuclear-Energy Facilities and Disposal of Burnt Nuclear Fuel and Radioactive Waste(since 1994)
- 6) State Health Fund (since 1992)

(3) Revenues

Revenues allocated for the state financial sources include taxes, payments for pollution and utilisation of natural resources, and penalties.

Taxes used for financial instruments in the environmental sector are:

- a) Value added tax
- b) Consumption tax
- c) Consumption tax from carbon-hydrogen fuels and lubricants
- d) Income tax
- e) Property tax
- f) Road tax

The revenues from the payments and penalties are shown in Tables 4.5 - 1 and 4.5 - 2, respectively.

Table 4.5 - 1 Revenues According to Selected Economic Instruments (Million SK)

Type of payment	1995	1996	Difference	Recipient
1. Payments for pollution				
1) Tax for air pollution	388	412	+24	MZP/SFZP
2) Reward for waste water discharge	206	234	+28	MZP/SFZP
3) Tax for waste disposal	148	220	+72	MZP/SFZP
2. Payments for utilisation of natural resources				
1) Reward for ground water extraction	17	n.a.		MZP, SVF (State Water Management Fund)
2) Reward for surface water extraction	893	n.a.		watershed administration
3) Reward for water extraction from public water supply	2,207	n.a.		water supply and sewerage administration
4) Charges for agricultural land utilization	248	567	+319	SF OZPPF (State Fund for Agriculture)
5) Charge for forest land utilization	48	125	-77	SFZL (State Forestry Fund)
6) Reimbursement for excavated mining deposits	174	126	-48	SR SR (State Budget for SR)

Source: MZP, Environment of the Slovak Republic, 1998. (Ref. 1-7)

Table 4.5 - 2 Penalties Imposed by the State Environmental Authorities as Revenues for the State Environmental Fund (Million SK)

Sections	1995	1996	Difference
1. Air protection	3.5	6.3	+2.8
2. Water protection	10.2	9.7	-0.4
3. Waste protection	17.5	15.1	-2.4
4. Nature protection	1.1	8.5	+7.3
Total	32.3	39.6	+7.2

Source: MZP, Environment of the Slovak Republic, 1998. (Ref. 1-7)

(4) Expenditures

Government funding to the environment including SFZP has declined significantly over the past 6 years (from 1.3% GDP in 1993 to just 0.2% GDP in 1998). This is considerably less than commitments made in other EU accession states. In addition, SFZP overspent its resources by 900 million SK (£60 million) in 1998 and will be unable to support any new projects until 2000 at the earliest.

Table 4.5 - 3 shows expenditures for environment protection and improvement by sub-sectors that were drawn from the State Environmental Fund.

Table 4.5 - 3 Expenditures for Environmental Projects Drawn from the State Environmental Fund

Sub-sector	1993			1996			1997		
	No.	Mill. SK	%	No.	Mill. SK	%	No.	Mill. SK	%
WWTP and sewerage	126	374	39	223	399	32	209	229	19
Water Supplies	156	149	16	182	222	18	252	365	31
Water Management	91	87	9	150	117	12	120	104	9
Air Protection	182	294	31	268	337	28	259	343	29
Others	60	47	5	200	119	10	197	144	12
Total	618	952	100	1,023	1,224	100	1,037	1,184	100
Subsidies from the state budget		360	38		297	24		240	20

Source: MZP, Environment of the Slovak Republic, 1998. (Ref. 1-7)

4.5.2 INTERNATIONAL ASSISTANCE TO THE ENVIRONMENT IN SLOVAKIA

(1) General

International financial assistance in the environmental sector in Slovakia has been mostly from EU and individual EU countries. Table 4.5 - 4 shows foreign financial assistance in the environmental sector of Slovakia between 1994 and 1997.

Table 4.5 - 4 Foreign Assistance in the Environmental Sector of Slovakia (1994 - 1997)
(Million US\$)

Donor	1994	1995	1996	1997	Total
GEF	0.21	1.14	0.38	0.23	1.96
EU-Phare	2.07	2.01	0.35	-	4.43
Individual countries in EU	1.85	1.27	4.26	3.87	11.25
Total from EU	3.92	3.28	4.61	3.87	15.68
Total	4.13	4.42	4.99	4.1	17.64

Source: MZP, Environment of the Slovak Republic, 1998. (Ref. 1-7)

USAID has supported a variety of environmental projects in Slovakia, including institutional strengthening of MZP. The US has also been the source of considerable financial assistance to the establishment and development of environmental NGOs.

A number of bilateral donors (including the Netherlands, Canada and Denmark) have also funded environment projects in Slovakia. Recently the Danish Environmental Protection Agency has agreed to provide 200,000 ecu towards revising the National Environmental Health

Action Plan. In January 1999, UNDP agreed to provide \$500,000 towards the preparation of the national strategy for sustainable development.

The UK has funded over 20 environment projects since 1993. This support has led to a close working relationship with MZP.

(2) Phare Programme

PHARE is a programme of the European Union to assist environmental improvement of the Central and Eastern European Countries (CEECs), providing the Phare National Programme, Phare Multi-country Programme, and the Phare Crossborder Co-operation.

Phare Programme is currently the main channel for the EU and technical cooperation with the CEECs. Phare's role in these countries is to help them prepare for EU membership, and its assistance takes the form of grants rather than loans.

Table 4.5 - 4 shows financial inputs to Phare projects in Slovakia during 1991 - 1996.

Table 4.5 - 5 Financial Inputs to Phare Projects in Slovakia
1991 - 1996 (1 000 SK)

	National	PHARE	EU countries	Non EU countries ¹⁾	Other ²⁾	Total
A. Air	18 490	42 110	102 071	9 624	65 320	237 615
B. Water	86 587	206 632	79 066	26 865	0	399 150
C. Waste	11 395	110 102	10 658	0	17	132 172
D. Risk	20 031	148 227	0	0	0	168 258
E. Nature	47 520	0	12 180	0	0	59 700
F. Forest	32 328	0	57 832	13 280	0	103 440
G. Economy	1 689	17 627	0	0	0	19 316
H. Information	0	³⁾ 10 000	0	0	0	0
I. Education	0	25 092	1 338	0	0	26 430
J. Management	0	22 916	2 088	0	0	25 004
Total	218 040	582 705	265 233	49 770	65 337	1 181 085

1) Non EU countries: Norway, Canada

2) Other: GEF (Global Environmental Facility)

3) Added to the original data

Source: MZP, Country Environmental Projects (1991 - 1996).

Phare has committed almost 50 million ecu towards environmental projects in Slovakia since 1993. This support has included strengthening the institutional capacity of the MZP and the development of the National Programme for Adoption of the *Acquis* (NPAA). In 1997, Phare provided 15 million ecu to support capital investment projects in sectors which directly facilitate compliance with the Accession Partnership. A further 15 million ecu was allocated

to environmental investments under the 1998 Phare Programme.

The current Phare projects relevant to the Study Area are as follows:

- a) Improvement of Water Quality in River Basin of Danube
- b) Long-term environment risks for soil, sediments and ground water in river Danube
- c) Hydroecological River Basin Plans
- d) Environmental Programme in River Basin of Danube
- e) EC/WAT/11 improving the Monitoring of Drinking Water Quality
- f) Ziar nad Hronom - Protection and rational use of water
- g) Rational Management and Land Exploitation in biosphere Reserve Pol'ana Based on
- h) Land Map and Soil Character in River Basin of Danube
- i) Slovakian District Heating and Geothermal Project
- j) EC / EDU / 19 Environmental Education and Public Awareness in Slovakia

(3) ISPA and SAPARD

Between the year 2000 and each country's date of EU accession, and beyond the targeted assistance available under Phare, two new instruments will be introduced by EU: Pre-accession Instrument for Structural Policies (ISPA), and the Special Accession Programme for Agriculture and Rural Development (SAPARD).

ISPA is similar to the Cohesion Fund as it operates today, and will have a budget of EURO 1 billion per year for the period 2000 - 2006. Assistance from this fund will be targeted to two areas: the environment, to help candidate countries meet the investment requirements needed to conform with EU Community legislation; and transport, to improve connections between the CEECs and the trans-European network, and their extension eastwards. ISPA's financial contribution can account for up to 85 % of public expenditure.

SAPARD will help CEECs deal with the structural adjustment in their agricultural sectors and rural areas, as well as the implementation of the *Acquis Communautaire* as it relates to the Common Agricultural Policy. SAPARD funds amount to EURO 500 million (at 1997 prices) each year. Allocation of this sum to each country will depend on objective criteria which include farming population, agricultural area, the level of GDP, and the specific territorial situation. SAPARD's contribution can account for up to 75 % of the total eligible cost of particular intervention measures. When a candidate country joins the EU, it becomes eligible for assistance under Community policies, and notably the Structural Funds. Its share of SAPARD funds would go to the remaining candidate countries still in the pre-accession stage.