

# NATIONAL ENVIRONMENTAL STRATEGY

## 1 INTRODUCTION

### 1.1 Content of the NES

The Constitution of the Republic of Serbia provides for the right to a healthy environment as one of the basic rights and freedoms of every citizen. Article 72 of the Constitution stipulates that the Republic is responsible for the environmental protection and the protection and enhancement of flora and fauna. The Law on Environmental Protection (The Official Gazette RS Nr. 135/04) requires that the National Environmental Strategy (hereinafter: NES) is developed for the period of at least ten years.

One of the key issues in a successful NES is building of understanding, consensus and ownership among different stakeholders of the NES, and an effective management structure that provides for an efficient management of the NES process. Much effort was put to address those issues. The Ministry of Science and Environmental protection – the Directorate for Environmental Protection and the Interministerial Committee for Sustainable Development provided the political driving force for the NES process. The NES Forum created the platform for wide stakeholder participation in the NES process (Appendix 1). Five two-day Forum meetings were convened between February 2004 and October 2004.

Apart from the NES Forum, a number of Working Groups was convened to provide technical input to the NES process including identification of environmental problems and their causes, setting up policy objectives and developing environmental policy reforms (see appendix 1 for composition of the NES working groups).

The National Environmental Strategy contains:

- Description and appraisal of the state of environment;
- Policy objectives, criteria for enforcement of environmental protection in general, by sectors and geographical areas indicating priority measures;
- Conditions for implementation of the most favorable economic, technical, technological and other measures for sustainable development and environmental protection;
- Long-term and short-term measures for prevention, mitigation and control of pollution;
- Implementing institutions and implementation plan;
- Financing plan.

The National Environmental Strategy is to be implemented through Action Plans and remediation plans adopted by the Government for the period of five years. In addition, the Government is to submit every two years the NES progress report to the Parliament. Individual action plans are developed by the ministry in charge of environmental protection in cooperation with the relevant sectoral ministry.

## 1.2 Purpose and structure of the NES

The Republic of Serbia faces significant challenges in improving its system of environmental protection while continuing profound socio-economic transformation to market economy and civil society. This process implies improvement of the traditional environmental policy by including all sectoral policies towards management of the environment and natural resources based on the principles of sustainable development.

The National Environmental Strategy was developed with the objective to guide the development of modern environmental policy in the Republic of Serbia over the next decade. The NES is followed by Environmental Action Plans that provides detailed implementation plan for the next five years. The NES is developed to enable improvement of the quality of the environment, and the quality of life for citizens of the Republic of Serbia. Furthermore, the NES facilitates the EU approximation process in Serbia.

The NES is a tool for addressing priority environmental problems through application of cost-effective solutions. It addresses the following considerations:

- What environmental problems do we face and why?
- What quality of environment/policy objectives are to be achieved?
- Which policy instruments are to be applied to achieve them?
- How the environmental infrastructure (e.g. waste water treatment plants, sanitary landfills, air pollution abatement technologies, transport network, etc.) should be modernized and extended?
- What are the costs and sources of funding?
- Can Serbia (the state budget, industry, households) afford it and in what time frames?
- How can the NES be implemented?

The National Environmental Strategy should not be seen as a document alone. It is crucial to consider the NES as one of three closely interrelated parts:

- The applied *policy process* with wide support of stakeholders was crucial in building ownership of the document and commitment to its implementation.
- The *National Environmental Strategy* (NES) document that stipulates the priority policy objectives in the short- (till end of 2010) and medium-term (till end of 2015), and the key policy reforms that are needed to implement those objectives. The NES can be considered as a road map that will guide the reforms of policy and legislative framework over the next decade. It will also facilitate integration of environmental considerations in other sectoral strategies and guide development of environmental programmes.
- The *National Environmental Action Plan* specifies packages of actions that are required to implement the NES policy objectives in the short-term horizon of 2006-2010, as well as presenting financial plan, implementation and progress monitoring arrangements. The Action Plan provides a direct link to project pipelines.

### 1.3 The NES process and approach

Preparation process of the National Environmental Strategy for Serbia followed broadly the strategic planning methodology applied to environmental policy making.

The process followed three general principles of effective policy making:

- Participation, ownership and commitment of stakeholders;
- Comprehensive and coordinated policy process;
- Targeting, resourcing and monitoring.

The gist of the methodology was to set policy goals and identify the means of achieving them. The Strategy making followed the view that it is not only the state that is responsible for good quality environment in Serbia but that various stakeholders have to take specific responsibilities for improving national environmental conditions. Finally, the Strategy sought to achieve a high level of integration with other national policies, strategies and programmes.

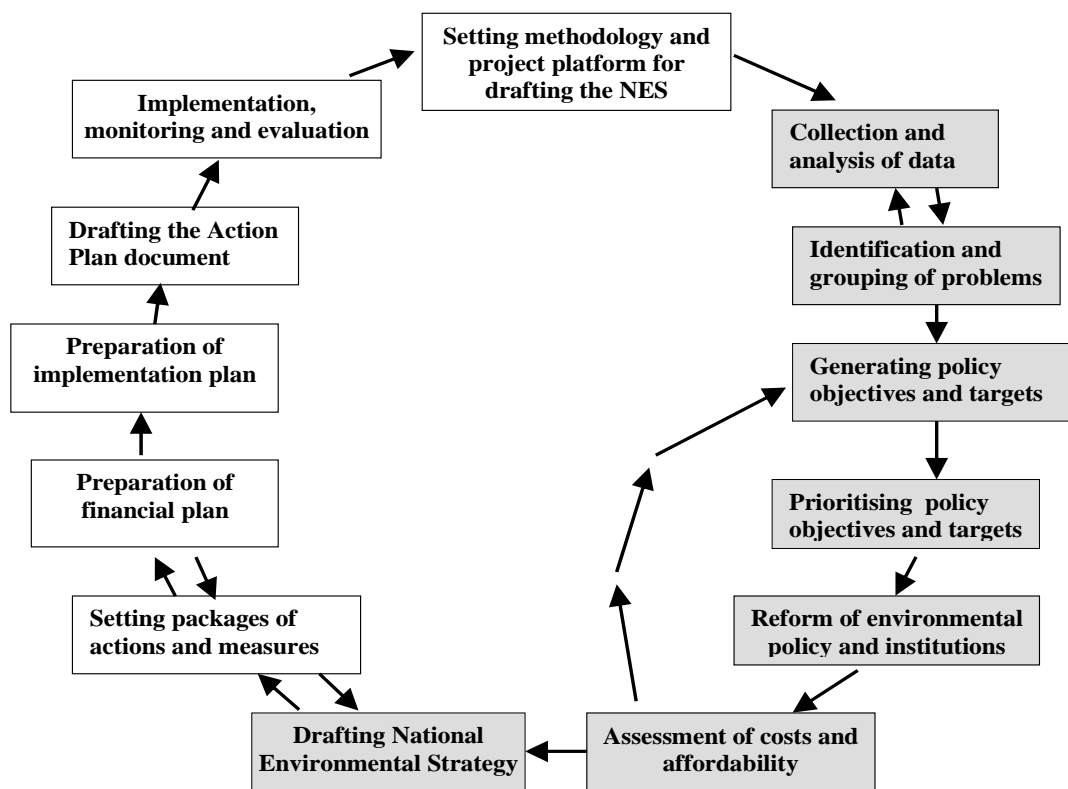


Figure 1.1. Illustration of the NES and NEAP process cycle applied in Serbia (the shading indicates the NES phase).

The NES is a cyclic process and most likely several NES cycles will need to be applied to achieve major environmental progress (figure 1.1). The starting point in this

first NES process cycle was setting the management structure (platform) for the NES, and agreeing on the methodology and outputs of the NES process. Then, collection and processing of data started, after which the key environmental problems were identified. Subsequently, the problems identified were converted into general environmental policy objectives and specific objectives for the next decade.

Emphasis was put on development of specific and measurable policy objectives addressing environmental problems. The relevant policy objectives from other sectoral strategies were included into the set of policy objectives, as well as requirements relevant to EU harmonization. Policy targets and objectives were prioritised. The next step was development of policy reforms to embrace all changes necessary to implement the policy objectives. Policy reform papers were prepared by working groups and addressed the regulatory policy instruments, the economic instruments, the environmental monitoring and reporting system, the environmental financing system, the institutional issues, and the environmental infrastructure needs.

Important parts of the NES include generic costing of the Strategy and affordability assessment, as well as list of legal acts in the environment sector (appendix 1) and list of multilateral environmental agreements (appendix 2).

#### **1.4 Abbreviations and expressions used in the NES**

Abbreviations used in the NES:

BAT	Best available technologies
BOD	Biological oxygen demand
BOT	Build Operate Transfer scheme
CENELEC	European Committee for Electrotechnical Standardisation
COD	Chemical oxygen demand
DEP	Directorate for Environmental Protection
DHS	District Heating System
EEA	European Environmental Agency
EIONET	European Environment Information and Observation Network
ELV	End-of-life vehicles
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe
EMS	Environmental management system
EMAS	Environmental Management and Audit Scheme
EPA	Environmental Protection Agency
EU	European Union
GDP	Gross Domestic Product
GLP	Good laboratory practice
GMO	Genetically modified organisms
IAEA	International Atomic Energy Agency
ICPF	International Cooperative Programme for Forests
IPPC	Integrated Pollution Prevention and Control
IRPA/INRI	International Radiation Protection Association
JUS	Yugoslav Standard
LEAP	Local Environmental Action Plan
MAC	Maximum Allowable Concentration
MAFWM	Ministry of Agriculture, Forestry and Water Management
NCSD	National Council for Sustainable Development
NEAP	National Environmental Action Plan
NGO	Non-governmental organization

ODS	Ozone depleting substances
PAH	Polyaromatic hydrocarbons
PCB	Poly-chlorinated biphenyls
PCDF	Polychlorinated di-benzo furans
PE	Public Enterprise
PM	Particulate matter
POPs	Persistent organic pollutants
PRTR	Pollution Release and Transfer Register
PUC	Public utility company
QA/QC	Quality assurance / quality control
RSSP	Republic of Serbia Spatial Plan
SWOT	Analysis of Strengths, Weaknesses, Opportunities, Threats
UNECE	United Nations Economic Commission for Europe
VOC	Volatile organic compounds
WHO	World Health Organisation
WWTP	Wastewater Treatment Plant

Selected terms applied in the NES have the following interpretation:

**Accident** is a sudden and uncontrolled event or a series of events, resulting from uncontrolled release, spillage or dissipation of hazardous substances during the production, trade, use, transport, processing, storage, disposal or long-term inadequate handling. This term does not include military plants, nuclear accidents, genetically modified organisms, transport of hazardous substances by pipelines, including pumping stations, accidents in the research and exploitation of minerals, dam damage; excluding consequences of industrial accidents resulting from such damage.

**Acquis communautaire** represents the legal foundation and legacy of the EU including (apart from the foundation documents) over 20.000 regulations at the level of secondary legislation and 4.000 court decisions.

**Best available technology** is the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing the basis for meeting the emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and impact on the environment.

**Biodiversity** (biological diversity) is the diversity of organisms within a species, among species and among ecosystems and it encompasses the overall diversity of genes, species and ecosystems at local, national, regional and global level.

**Cadastre of polluters** is a register of systematic information data concerning the polluters of environmental media with data of their location, production processes, characteristics, material balances with inputs and outputs of raw materials, semi-finished and finished products, treatment facilities, waste flows, pollutant and points of their discharge, treatment and disposal.

**Economic instruments** are a category of policy instruments intending to influence the behavior of economic actors by introducing financial incentives in order to improve cost-effectiveness in environmental management and management of natural resources.

**Emission** is discharge of pollutants or energy from individual and/or non-point sources to the environment and its media.

**Environmental capacity** is the capacity of the environment to absorb certain load of pollution without losing its equilibrium and bringing irreversible changes to ecosystem.

**Environmental infrastructure** includes physical structures and equipment for prevention and end of pipe treatment of pollution. It consists of facilities for waste water treatment, sanitary landfills, air pollution abatement facilities etc.

**Geodiversity** (geological diversity) is the presence or the spread of various components and forms of geological formations, geological structures and processes, geo-chronological units, rocks and minerals of different composition, origin, different paleoecosystems changing in space and geological time under the influence of external geodynamic factors.

**Imission** is concentration of pollutants and the level of energy in the ambient environment reflecting the quality of environment.

**Quality of environment** is the state of the environment as reflected by physical, chemical, biological, esthetic and other indicators.

**Regulatory instruments** are a category of environmental policy instruments whereby public authorities mandate the environmental performance to be achieved or the technologies to be used.

**Risk** is a measure of probability that an activity will, directly or indirectly, result in a threat to the environment, public life or health.

**Remediation** is a process of clean up or other methods used to remove or contain pollution or hazardous materials in a site to a level which is safe for future use.

## 2. PRINCIPLES OF THE NES

The development and implementation of the National Environmental Strategy is based on the following policy principles:

### **Principle of sustainable development**

The principle of sustainable development was defined at the United Nations Conferences on Environment and Development, held in Rio de Janeiro in 1992.

Sustainable development is development that meets the needs of the current generation without compromising the needs of future generations while living within the carrying capacity of the environment. This implies that sustainable development is a coordinated system that encompasses technological, economic and social activities in the overall development in which the natural resources and man-made capital of Serbia are used economically and reasonably with the objective to preserve and enhance the quality of the environment for the present and future generations.

Sustainable development is achieved through adoption and implementation of policies through which the interests of environmental protection and economic growth are harmonized.

Sustainable development is a long-term concept that encompasses and integrates the economic and social development, and environment. This implies continuing economic growth which includes: reducing poverty, equitable distribution of

wealth, improving health conditions and quality of life, while reducing the level of pollution to the carrying capacity of environmental media, prevention of future pollution and preservation of biodiversity.

Encompassing the sustainable development concept, the National Environmental Strategy will provide a roadmap to solve the key national environmental problems in harmony with economic and social development.

### **The principle of preservation of natural values**

The achievement of objectives of sustainable development requires respecting of the principle of sustainable use of natural resources and the substitution principle. Natural values are used under the conditions and in a manner ensuring the preservation of values of geological diversity, biodiversity, protected natural values and landscape. The exploitation of renewable resources is carried out under conditions enabling their continuous and efficient renewal and enhancement of their quality.

Non-renewable resources are exploited under conditions ensuring their long-term cost-effective and reasonable exploitation, including the imposing of limits on the exploitation of strategic or rare natural resources and their substitution with other available resources, composite or synthetic materials. The substitution of fossil fuels and non-renewable energy sources by renewable materials and materials/energy recovered from waste stream is specifically addressed by the substitution principle.

### **The principle of cross-sectoral integration**

The authorities of the state, autonomous province and units of local self-government provide for the integration of environmental protection and enhancement of environmental policy with all sectoral policies. This is achieved by implementing mutually adjusted plans and programs and by enforcement of legislation through strengthening of the permitting system, technical and other standards and norms, provision of funding, incentives and other environmental measures. This principle requires that environmental considerations are incorporated into sectoral policies such as industrial policy, agricultural policy, energy policy, transport policy, social policy etc. Environmental protection should be seen as an integral part of social and economic development.

### **The polluter pays principle**

This is one of the key principles that guided development of the NES. The polluter pays pollution charges if through his activities he causes or may cause pressure on the environment, or if he produces, uses or trades with raw materials, semi-finished products or products containing materials harmful to the environment. In line with legislation, the polluter covers full environmental costs including environmental risk and remediation of harm caused to the environment. The internalization of the costs of pollution damage creates strong incentives, especially for industry to reduce and prevent pollution.

### **The user pays principle**

This principle stipulates that anyone who uses natural resources should pay the realistic price for this use and should cover the costs of remediation.

### **The incentives principle**

The authorities of the state, autonomous province and units of local self-government introduce measures to reduce the environmental pressures by application of economic and other incentives, best available technologies, plant and equipment not causing excessive costs, and by the selection of products and services.

### **The principle of shared responsibility**

The pollution of environment requires that all parties affected and responsible for pollution should resolve the environmental problems.

### **The subsidiarity principle**

The subsidiarity principle calls for decentralization of decision making to the lowest possible level. Competencies and responsibilities should be increasingly transferred from the central level to the regional and local levels. However, the central government should hold the overriding responsibility for creating legal, policy and enforcement framework that enable achievement of its clearly stated objectives.

### **The prevention and precautionary principle**

The prevention principle promotes the prevention of environmental pollution. Prevention of pollution is more effective than tackling pollution problem when it occurs.

The precautionary principle stipulates that activities representing threats of harm to the environment or human health should be avoided. Each activity must be planned and implemented so as to:

- Cause the least possible change to the environment;
- Be the least risk to the environment and human health;
- Reduce the pressures on space and consumption of raw materials and energy in the construction, production, distribution and use;
- Include the potential for recycling;
- Prevent and limit the effects on the environment at the source of pollution.

The precautionary principle is implemented through the implementation of environmental impact assessments and the use of best available technologies. Lack of full scientific reliability cannot be the excuse for not undertaking measures to prevent the degradation of the environment in case of possible or existing significant environmental impacts.

### **The awareness raising principle**

This principle emphasizes the significance of environmental education in increasing the awareness and understanding of environmental issues by the public, and raises public interest in these issues. The quality of the environment can not be efficiently enhanced without the active cooperation of the whole society.

### **The access to information and public participation principle**



In practicing the right to a healthy environment everybody is entitled to be informed of the state of the environment and participate in environmental decision-making in matters that may have environmental impact. The data concerning the status of the environment are publicly available.

### **The principle of liability of polluter or his legal successor**

Legal or physical persons who, through their illegal or inadequate activities cause environmental pollution shall be liable in accordance with the law. The polluter is accountable for the state of the environment even in cases of liquidation or bankruptcy of enterprises or other legal entities, in line with the law. The polluter or his legal successor shall be liable to remove the cause of pollution and the effects of direct or indirect environmental pollution. Changing the ownership of enterprises and other legal entities and other forms of property restructuring shall as mandatory include environmental assessment and identifying environmental liability, as well as covering debts of the preceding owner for the pollution and/or harm caused to the environment.

### **The principle of the right to a healthy environment and access to justice**

A citizen or groups of citizens, their associations, professional and other organizations, shall practice their right to a healthy environment before the state authorities or courts, in line with the law.

### **The principle of the approximation with the EU environmental acquis**

The National Environmental Strategy and the action plan must reflect, above all, the objective of accession to the European Union, as well as harmonization of the environmental policy, legal and institutional framework in Serbia with the environmental *acquis* of the European Union.

The obligation to harmonize the legal framework of the Republic of Serbia with the EU *acquis* was mentioned for the first time in the Resolution on Accession to the EU, adopted by the National Assembly on 13 October 2004. This document stipulates that the harmonization of laws with the EU *acquis* will have priority in the work of the Parliament, accompanied by special procedures to increase efficiency of this process.

In July 2003 the Government of the Republic of Serbia adopted the Action Plan for harmonization of draft legislation with the laws of the EU, identifying the scope of laws that need to be adopted in line with the EU requirements. This Action Plan includes also justification for the need to adopt certain laws, the institutions in charge of implementation, and other elements of significance for the harmonization of the national legal system with the EU *acquis*.

Harmonization with the EU *acquis communautaire* is a voluminous and imperative task for a state which aspires for EU membership. The parts of the EU *acquis communautaire* relevant to the environment consists of more than two hundred legal provisions (framework directives, daughter directives, regulations and decisions) addressing water pollution and management of water resources, air pollution, waste management, management of chemicals, nature conservation, etc.

The EU approximation process consists of three key elements:

- Analysis and comparison of the EU and the existing national environmental legislation to determine the existing state of conformity and the appropriate

response to the EU legislation. It should be decided which laws should be introduced and which ones can be amended.

- When the legal transposition is carried out, environmental institutions need to be strengthened and financial resources should be provided to implement the new laws and regulations.
- The necessary monitoring, control and enforcement system need to be put in place to make sure that the laws are being fully and properly complied with.

Parts of the environmental *acquis*, which are relatively straightforward to implement and offer the highest benefit to cost ratio should be given priority. The most complex and costly parts of the *acquis* will require more time to implement. Experience from the new EU member states show that the most complex parts of the *acquis* include:

- The Water Framework Directive (institutional requirements, high investment costs);
- The Integrated Pollution Prevention Control (IPPC) Directive (institutional requirements);
- The Urban Wastewater Directive (high investment costs);
- The Landfill Directive (high investment costs).

### **3. BACKGROUND INFORMATION ABOUT THE REPUBLIC OF SERBIA**

#### **3.1 Economy and social situation**

The Republic of Serbia is located in southeastern Europe in the heart of the Balkan Peninsula, and covers the area of 88,361 km<sup>2</sup>. Within Serbia there are two autonomous provinces, Vojvodina (21,506 km<sup>2</sup>) in the north and Kosovo and Metohia (10,887 km<sup>2</sup>) in the south. Kosovo and Metohia is currently under provisional administration of the United Nations according to the UN Security Council Resolution 1244 and consequently it is not covered by the NES.

Serbia is bounded by seven countries: Albania, Bosnia and Herzegovina, Croatia, Hungary, Romania, Bulgaria, Macedonia and Montenegro. The main rivers of Serbia include the Danube, Sava, Drina, Morava and Tisa.

The population of Serbia is 7.5 million according to the 2002 Census. In 2000, 52% of the population lived in urban areas. The main cities are Belgrade, the capital of Serbia (pop. 1,280,639), Novi Sad (234,151), Nis (177,823), and Kragujevac (145,890).

The main contribution to Serbian GDP in 2002 was provided by industry (30.3%), agriculture, forestry and fishing (19.2%), wholesale and retail trade (18.6%), transport and telecommunication (12.4%), construction (5.7%), and electricity, gas and water supply (5.7%).

The most important agricultural areas are located in Vojvodina. Cattle, sheep, and pigs are intensively reared.

Serbia's large and heavy industries are primarily linked with mining. Consequently, there was a considerable development of industries such as melting, refining, metallurgical industries, chemical industries, machinery and vehicle production. Other important industrial production include cement and other building materials,

fertilizers, electrical equipment, sawmills, wooden furniture, paper products, leather and fur products, yarns and fabrics, rubber, textiles, food products and beverages.

The major decline in production and the gross domestic product occurred in 1990s (market disintegration, economic sanctions, impoverishment of the population, high unemployment, bombing of some major infrastructure and industrial facilities, etc.). The GDP per capita in the year 2000 was only about 50 % of its 1989 level.

The economy of the Republic of Serbia has showed positive results since 2000. GDP rose by 5.5% in 2001, 4 % in 2002, 3% in 2003, and 8.6% in 2004 in real terms. In 2001, this was achieved primarily by a rise in agricultural output (18%), after the dry year 2000, while since 2002 a rise in the service sector was also pronounced.

### **3.2 Natural resources**

Forests and woodland cover 28% of Serbia, 40% is arable land and 21% of land is used as permanent pastures. In terms of distribution of forest resources, the monoculture forests are predominant with 64.3% of total forest territory (59% deciduous species and 4.7% coniferous), followed by mixed forests with a share of 30.5% deciduous species and about 6% coniferous. Of the tree species, the most common are beech and oak. The standing volume is approximately 235 million m<sup>3</sup>, and the total annual increment is over 6 million m<sup>3</sup>. The Vojvodina region contains the most fertile agricultural land (83.5% of its area is in agricultural use). The main agricultural products are maize, wheat, barley, sunflower, soy bean, potatoes, tobacco, sugar beat and fruit.

Serbia has significant metal mineral resources (copper, lead and zinc, nickel and cobalt, bauxite, antimony, molybdenum, gold etc) energy resources (coal, oil, natural gas etc) and non-metal mineral resources (magnesites, dunites, dolomite, limestone, barite, quartz, phosphates, fire-resistant and ceramic clays, gypsum, asbestos, fluorites, feldspar, volastonite, diatomite, zeolite, etc).

The major deposits of metal ores are in the regions of Kopaonik, Šumadija, Podrinje and the region of Eastern Serbia with significant deposits of ferrous and non-ferrous ores included in the balances and also potential deposits.

The major coal basins in Serbia include Kolubara, Kovin and Kostolac basins (lignite); Sjenički, Lubnički, Rembas and Krepoljinski basins (coal); Ibarski basin (coal). Raw oil and natural gas are produced in Vojvodina and to a smaller degree in Stig. There is intensive exploitation of non-metal raw materials, especially the deposits of construction materials. Cement raw materials are mined in the wider region of Beočin, Kosjerić and Novi Popovac. There are numerous deposits of brick clay exploited in Vojvodina. Mineral deposits are exploited by open cast mining and underground mining. Major open cast mines (Kolubara and Kostolac coal basins and the Bor metal-bearing zone) cover great areas that have been changed by coal exploitation and processing. Large, unremediated excavations and tailings have been formed which present great risk of soil, water and air pollution.

All rivers in Serbia belong to three sea basins: the Black Sea, the Adriatic Sea and the Aegean Sea. The Black Sea water shed contains 176 billion m<sup>3</sup> of water, the Adriatic around 2 billion m<sup>3</sup>, and the Aegean Sea about 0.5 billion m<sup>3</sup>. About 92% of the available water resources originate outside of Serbia. The inland water flow in Serbia reaches approximately 16x10<sup>9</sup> m<sup>3</sup> annually, which amounts on average to about 5.7 l/s/km<sup>2</sup> or 1,500 l/inhabitant per year. Transit waters are significant and amount to about

162·10<sup>9</sup> m<sup>3</sup>/annually (5,163 m<sup>3</sup>/s). Transit waters may be used subject to their quality, availability during dry seasons, and the deteriorating regimes of international rivers.

The territory of the Republic of Serbia abounds with numerous sources of mineral and thermal water. The most significant groundwater aquifers are located in the alluvial, neogenic and karst basins. The total capacity of existing groundwater sources for water supply in central Serbia and Vojvodina is about 21,000 l/sec. The estimated potential volumes of groundwater are estimated between 60,000 l/sec and 90,000 l/sec. More than 1,200 sources of mineral, thermal and thermal-mineral water have been registered. The total yield of sources of thermal-mineral and thermal water in central Serbia with temperature exceeding 20°C is about 1,800 l/sec.

### **3.3 Legal and institutional framework for environmental management**

The legal/legislative and institutional framework is founded in the *Constitution of the Republic of Serbia*, stipulating the right to a healthy environment and the duty of all, in line with the law, to protect and enhance the environment. The Republic of Serbia prescribes and provides the system of environmental protection and enhancement, the protection and enhancement of flora and fauna by adopting laws which enable sustainable management of natural resources, protection and enhancement of the environment, and provision of healthy environment.

The body of environmental legislation in Serbia consists of a large number of laws and regulations (more than 100; Appendix 1). Legislative, executive and judicial powers are mostly practiced through the legally prescribed scope of competencies of the republic's authorities. According to the law, certain competences are delegated to the autonomous province and the local government.

Environmental legislation includes laws and regulations on: planning and construction, mining, geological survey, water, soil and forest protection, flora and fauna, national parks, fishery, hunting, waste management, production and trade of chemicals, trade and transport of explosive and hazardous materials, protection of ionizing and non ionizing radiation, nuclear safety etc.

The new legal framework for environmental protection was introduced in 2004 in the Republic of Serbia by the Law on Environmental Protection, Law on Strategic Environmental Assessment, Law on Environmental Impact Assessment and Law on Integrated Prevention and Pollution Control. The most significant issues addressed by the Law on Environmental Protection include: main principles of environmental protection, management and protection of natural resources, measures and conditions of environmental protection, environmental programs and plans, industrial accidents, public participation, monitoring and information system, clearly identified competences of the Environmental Protection Agency, reporting, financing of environmental protection, inspection services and fines. The new laws are harmonized with the EU Directives on Environmental Impact Assessment (85/337/EEC), Strategic Impact Assessment (2001/43/EC), IPPC (96/61/EC) and Public Participation (2003/35/EC).

The Ministry of Science and Environmental Protection – Directorate for Environmental Protection (DEP) has the key responsibility in the field of environmental protection.

The Directorate for Environmental Protection (DEP) is an authority within the Ministry for Science and Environment and has a wide range of responsibilities identified in the Law on Ministries (The Official Gazette R Serbia Nr 19/04 and 84/04) including:

- Environmental protection systems and sustainable use of natural resources (air, water, land, minerals, forests, fish, and wild flora and fauna species);
- Preparation of strategic documents, plans and programmes. Research in the field of sustainable use of natural resources and renewable energy sources;
- Estimation of groundwater reserves and preparation of standards for geological maps;
- Preparation of programs for geological investigations aimed at sustainable use of natural resources and groundwater;
- Provision of resources for implementation of geological investigation programs;
- System for protection and improvement of environment;
- Provision of basic conditions for environmental protection;
- Nature conservation;
- Protection of ozone layer;
- Climate change;
- Transboundary pollution of air and water;
- Identification and protection of natural areas of significance to the Republic;
- Environmental protection measures in the process of spatial planning and construction;
- Early warning system against accidents;
- Protection from noise and vibration;
- Protection from ionizing and non-ionizing radiation;
- Protection from chemical and hazardous substances in production and trade;
- Management of chemicals;
- Waste management except for radioactive waste;
- Trans-boundary waste movement, and trans-boundary movement of protected flora and fauna;
- Environmental and sustainable development related inspection;
- Environmental inspection on the state borders.

The Environmental Protection Agency (EPA) was established in 2004 as an institution within the Ministry for Science and Environment. The main functions of the EPA include:

- Development, harmonisation and management of the national environmental information system (especially regarding conditions of environmental media) and development of the cadastre of polluters;
- Collection, processing and unification of environmental data, reporting on environmental conditions and environmental policy implementation;
- Development of procedures for processing and assessment of environmental data;
- Updating data on the Best Available Technologies and practices and their introduction;
- Cooperation with the European Environmental Agency and the EIONET.

The Directorate for Water being part of the Ministry of Agriculture, Water Management and Forestry, is specifically responsible for development of water management policy, multiple consumption of water resources, provision of water supply (excluding distribution), flood protection, provision of measures for water protection and rational consumption of waters, monitoring and maintenance of national and transboundary water flows and other tasks defined by the law. The public water

management enterprise 'Srbijavode' was set up to manage water resources in Serbia. Certain responsibilities regarding water management were transferred to AP Voivodina by establishing public water management enterprise 'Vode Vojvodine'. These enterprises are in charge of management of water resources including water catchment and water supply installations.

Other ministries and directorates with competences for the environment include: Ministry of Agriculture, Forestry and Water Management – Directorate for Forests, (forests, livestock farm waste, etc.), Directorate for Plant Protection (control of production, import, trade, storage and application of plant protection agents), Veterinary Directorate, Ministry of the Economy (industry); Ministry of Health (enforcement of sanitary regulations relevant to the environment); Ministry for Capital Investments (urban planning, construction permits, road, air, rail and water traffic); Ministry for Mining and Energy (energy efficiency, permits for extraction of mineral resources, except for groundwater, renewable energy sources); Ministry of Trade, Tourism and Services, etc. At the level of the autonomous province, the key responsibility lies with the Provincial Directorate for Environmental Protection and Sustainable Development.

The Institute for Nature Protection is responsible for protection of nature and protected areas, such as parks, nature reserves, wild flora and fauna habitats, and is also responsible for supervision of these natural values.

There are several institutions responsible for environmental monitoring. The Republic's Hydro-Meteorological Institute is a specialised institution performing the functions of a hydro-meteorological service in the territory of the Republic of Serbia, including monitoring environmental quality. The statutory activities of the Hydro-Meteorological Institute include: planning, establishing, maintenance and developing the state network of meteorological and hydrological stations; systematic quantitative and qualitative monitoring of the state of the atmosphere, surface and groundwater; planning, establishing, maintenance and development of the system for collection, processing, archiving and dissemination of meteorological and hydrological data as well as data regarding the air and water quality; maintenance and development of the meteorological and hydrological forecasting system; development of the weather and water forecasts; issuing warnings concerning weather and hydrological disasters and emergencies related to air and water pollution; provision of meteorological and hydrological data, analyses and studies needed for the planning and design of facilities and systems; performing international obligations in the field of meteorology and hydrology.

The Public Health Institutes cover monitoring of local air quality in large urban areas, surface water quality in urban areas, drinking water quality and noise. The Institutes measure air quality in 28 cities (60 monitoring points). The Environmental Inspectorate covers compliance monitoring and monitoring of emissions but these tasks are insufficiently addressed. Self monitoring by industry and other polluters is non-existent.

The Recycling Agency, which is a government institution not subordinated to the Ministry for Science and Environment, is tasked with responsibilities for waste management – especially recycling and recovery of waste. It monitors the use of secondary waste materials and issues the waste category certificates.

In 2002 certain environmental competences were transferred to the Autonomous Province of Vojvodina under the Law on Competences of Autonomous Province of Vojvodina (The Official Gazette of RS 6/02). The Provincial Secretariat for

Environmental Protection and Sustainable Development provides for the execution of functions concerning: development of environmental and sustainable development programmes for the autonomous province and provides measures for their implementation, monitoring and information sub-system, approval of EIA, approval of environmental protection programmes and programs for enhancement of the flora and fauna, forests, water, construction and agricultural land, and approvals of urban plans for national parks in its territory; inspection services for all environmental media except hazardous substances and bio-diversity, as well as other issues of interest for the province, in line with the law. The Province is also in charge of strategic assessment of plans and programs and issuing of integrated permits for facilities and activities in its territory.

Municipalities/cities have competences in the field of urban planning, environmental protection and improvement of the environment, and public utilities. At the local level, Secretariats for Environmental protection have limited competences for environmental management including air quality protection, noise protection, management of communal waste, urban planning, construction permits for smaller facilities, and strategic assessment of plans and programmes, EIA and integrated permits within their statutory tasks.

## **4. STATE OF THE ENVIRONMENT**

### **4.1 Water**

#### **4.1.1 Current state in water supply and water pollution**

The Republic of Serbia possesses sufficient quantities of water to meet its water needs, but only if they are used in a rational way, protected from pollution, and if necessary facilities are constructed to enable distribution of uneven flows in space and time.

Less than 8% (about 500 m<sup>3</sup>/s) of all available water resources originates within the territory of the state. The remaining 92% are transit waters entering the country through the Danube, Sava, Tisa, and other watercourses.

Surface- and groundwater is used for public water supply. Surface water is abstracted from the watercourses and artificial reservoirs (total capacity of all water sources is 250 million m<sup>3</sup>/y). The groundwater resources are of great importance for Serbia. The capacity of groundwater resources is about 714 million m<sup>3</sup>/y. The most important are alluvial aquifers (about 390 million m<sup>3</sup>/y). Based on the 1991 data, the abstracted quantity of groundwater aquifers was at the level of 80% of the recharging capacity, while the surface water resources were used up to 66% of the recharging capacity. About 820 million m<sup>3</sup>/y of water is abstracted to satisfy the needs of water supply to households and industry that uses drinking water. It should be emphasised that about 28% of water for industrial purposes in Vojvodina, and about 18% of water for industrial purposes in central Serbia is abstracted from the groundwater aquifers. This should be considered as unsustainable use of resources, as groundwater should be conserved for the water supply to households. Water is supplied to a large part of Vojvodina by over abstraction of the groundwater from the basic aquifers. Serbia is rich with mineral and thermal springs. There are over 350 registered natural springs and sites where thermal-mineral water is abstracted.

At present, there are 153 public water supply systems serving about 60% of the country's population, while additional 15% of population possess some sort of water supply. Although the coverage is very high, many systems do not function properly, resulting in losses of water in the distribution networks higher than acceptable. The 2000 UNICEF report reveals that 48% of surveyed households reported regular or temporary interruptions of water supply.

Untreated industrial and municipal wastewater, agricultural run-off, discharges from dumpsites as well as pollution caused by river navigation and thermal power stations are the key sources of water pollution in Serbia. Only 13% of municipal wastewater is treated prior to discharge. The Sava River Basin receives about 80% of the country's industrial wastewater.

Non-point source pollution contributes to more than 50% of the total water pollution. These sources produce over 80% of total nitrogen, 50% of total phosphorus, and 90% of faecal and total coliform bacteria.

According to the data from the Water Master Plan of the Republic of Serbia (year 2002)<sup>1</sup>, it is estimated that the total quantity of suspended solids in the water courses amounted to 1,549,531 kg/day, while the population equivalent (PE) was 12,301,223. The total quantity of nitrogen was 111,374 kg/day, and the total quantity of phosphorus was 36,764 kg/day (Table 4.1).

Table 4.1. Total pollution discharges by type of wastewater in Serbia

Type of wastewater	Wastewater discharge (000 m <sup>3</sup> /d)	Suspended solids (kg/d)	Population equivalent [PE]	Total Nitrogen (kg/d)	Total Phosphorus (kg/d)
Municipal sewage	1,016	269,242	4,874,209	48,663	14,623
Industrial (BOD dominated)	997	802,846	6,814,743	16,918	5,377
Industrial (inorganically dominated)	1,096	477,443	612,285	45,793	16,764
TOTAL	3,110	1,549,531	12,301,223	111,374	36,764

Source: Water Master Plan of the Republic of Serbia 2002.

Dumpsites in Serbia are estimated to produce 890,000 m<sup>3</sup> of leachate containing about 41,590 tones of COD, 389 tones of nitrogen and 426 tones of phosphorus, as well as heavy metals including copper, zinc, nickel and chromium.

#### 4.1.2 Water quality problems

Water quality in watercourses in Serbia is generally low and it is further deteriorating. Examples of very clean water - Class I and I/II - are very rare, and are found in mountainous regions, for example along the Djetinja, Rzav, Studenica, Moravica and Mlava rivers in central Serbia. The most polluted watercourses include the Stari and Plovni Begej, Vrbas-Bečej Canal, Toplica, Veliki Lug, Lugomir, Crni Timok and the Borska River. The water quality suffers especially from eutrophication caused by nutrients and organic pollutants (due to discharge of untreated sewage and agricultural

<sup>1</sup> Available data on water pollution date from 1991. It is considered that the pollution has been reduced since 1991 due to a considerable drop in industrial plant operations.



run-off) and along large cities (Belgrade, Novi Sad etc.). The deterioration of water quality is partially attributed to transboundary pollution of the waters entering Serbia. The Tisa River enters the territory of Serbia as class III river, and the Begej River is class IV upon entering Serbia. The transboundary rivers are contaminated with nutrients, petroleum/oil, heavy metals, and organic components.

Despite large pollution load, the quality of the Danube remains in class II-III mainly due to large dilution capacity. Construction of the Hydroelectric Plant System HEPS Djerdap, particularly the dam and the reservoirs, caused number of negative impacts to the environment, such as deposition of sediments. Each year the Danube River tributaries deposit about 20 million m<sup>3</sup> of sediment into these reservoirs. Toxic pollutants discharged from large industrial centres (Novi Sad, Pančevo, Smederevo, Belgrade) and wastewaters from the upstream countries loaded both with organic pollution and heavy metals are trapped in the artificial lake Djerdap.

The Danube-Tisa-Danube Canal and the secondary irrigation and transportation canals in Vojvodina are highly polluted due to the uncontrolled discharge of untreated industrial and municipal wastewater and agricultural run-off.

Quality of drinking water in Serbia is generally unsatisfactory. According to the findings of the Public Health Institute of the Republic of Serbia, 29% of samples from the water supply systems did not satisfy physical, chemical or bacteriological standards in 2001. There are significant regional differences in the drinking water quality between central Serbia and Vojvodina. The main problem in central Serbia is that more than 40% of samples were bacteriologically contaminated and did not satisfy the quality criteria. In Vojvodina the primary problems with physical and chemical water quality parameters are turbidity, iron, arsenic, nitrates and naturally elevated content of manganese. In many areas, the groundwater can not be used for drinking purposes without previous treatment. Most drinking water sources are not sufficiently protected from point and non-point pollution; hence there is a significant risk of epidemic outbreaks.

Systematic monitoring of surface water quantity and quality is not adequate, while monitoring of groundwater quantity and quality is limited both in time and space, especially for deep groundwater aquifers. The government of Republic of Serbia is responsible for approval of the Systematic monitoring programme, and Republic Meteorological Services Institute for its implementation.

#### Problems:

- Considerable contamination of watercourses by point and non-point pollution sources
- Increased concentration of nitrates in areas sensitive to nitrate pollution caused by non-point agricultural pollution
- Frequent floods causing high damages
- Contamination of groundwater aquifers
- Pressure on the environment and natural resources in areas of the hydropower reservoir impact including: deposition of bed load and suspended solid, change of water regime in the riparian zone, impact on biodiversity etc.
- Inadequate monitoring of water

#### 4.1.3 Causes of water pollution

Water pollution in Serbia is caused by activities in different sectors of the economy (industry, energy generation, agriculture, traffic etc.).

The existing water quality legislation relevant to drinking water and bathing/recreation water does not comply with European standards. The lack of effluent standards is a major problem. Implemented standards are based on ambient water quality, which is ineffective and difficult to monitor and control.

Competences with respect to water were divided in the recent years among different government institutions, while their cooperation and contacts are quite limited. These conditions significantly slow down application of the principle of integrated water resources management. Protection of water is still not based on water basin management principle.

It is worthwhile to point out inconsistent implementation of the “polluter pays” and “user pays” principles, and full cost recovery for water usage and water treatment. Consequently, the collected revenues do not cover the following categories of costs stipulated by the EU Water Framework Directive: (1) financial (operational, maintenance and investment), (2) environmental and (3) cost of resources.

Drinking water treatment in many locations is not adequate. The water supply distribution networks are old, with very high percentage of leakage in the system. Consequently, and due to the lack of incentives for rational water consumption; excessive water demand and over-exploitation of resources are observed.

One of the most significant causes of water pollution is inadequate sewerage infrastructure for wastewater collection and treatment.

The network of sewerage systems covers only about 33% of the country's population (45% in the urban areas of Vojvodina, 55% in central Serbia, and about 85% in Belgrade) which is insufficient for adequate protection of water quality. About 87% of the total volume of municipal sewage is discharged untreated into the receiving waters.

Inadequate, insufficient maintenance and investment during the past years resulted in considerable deterioration of majority of the sewerage infrastructure. The especially critical (vulnerable) places are the main collector pipes and pumping stations. Frequent defects and disruption of operation are evident, while discharge of untreated wastewater presents human health hazard. The usage of permeable septic tanks for sanitation purposes prevails in the rural areas.

Only 28 towns in Serbia possess municipal and industrial wastewater treatment plants (WWTP). The largest towns of the country, Belgrade, Novi Sad and Niš discharge untreated wastewater into receiving waters. Some of the existing WWTP's are abandoned, some only provide primary (mechanical) treatment and most are not continually operated, due to poor maintenance and lack of financial resources. The result is incomplete use of the existing capacities.

Agricultural activities, water transport, floods, and transboundary pollution also have negative effects (deterioration) on water quality in Serbia.

The early warning system of industrial accidents does not exist. Action plans in the event of pollution due to industrial accidents exist; the procurement of relevant equipment is under way. The public water resources company JVP Srbijavode is in charge of these activities.

#### Causes of problems:

- Insufficient enforcement of the existing legislation and incompatibility of standards with the EU directives
- Lack of standards for effluent quality discharged to receiving waters
- Unclear distribution of competencies between the state institutions in the field of water management
- Inconsistent implementation of the “polluter pays” and “user pays” principles and the system of charges for water use and water pollution
- Low water tariffs
- Inadequate protection of water (groundwater, surface water, reservoirs and watercourses)
- Insufficient and inadequate treatment of drinking water
- Poor condition of drinking water distribution network and high water losses
- Insufficient development of sewerage network
- Extremely low level of treatment of municipal and industrial wastewater
- Inadequate landfilling of municipal and industrial waste
- Uncontrolled use of fertilizers
- Trans-boundary pollution
- Inland water transport
- Over-exploitation of groundwater resources
- Insufficiently developed flood protection system and inadequate maintenance of flood protection facilities

## **4.2 Air and climate change**

### **4.2.1 Emissions to air**

The main sources of air pollution in Serbia include: the energy sector (thermo power plants), district heating plants, oil refineries, chemical industry, fuel combustion in households, industry, individual heating boiler plants, traffic, construction industry, inadequate storage of raw materials, waste dumpsites etc.

The major air pollution results from combustion of low quality lignite (thermo power plants in Obranovac, Lazarevac and Kostolac), and engine fuel. The lignite has low calorific value, high moisture content and its combustion produces high quantities of fly ash, sulfur and nitrogen oxides. Thermo-power plants are equipped only with electrostatic precipitators. The desulfurisation and denoxification facilities are not installed. Also, low prices of energy, irrational and inefficient energy consumption, inefficient combustion technologies, inadequate maintenance of industrial plants and the obsolete vehicle fleet increase the emission despite the reduced industrial and economic outputs.

Important sources of air pollution are the oil refineries in Pančevo and Novi Sad, the cement factories in Popovac, Kosjerić and Beočin, as well as chemical plants and metallurgical complexes located in Pančevo, Kruševac, Šabac and Smederevo. The main causes of pollution include: obsolete technologies, lack of flue gas treatment or low efficiency of filters, low raw materials and energy efficiency, and inadequate

operation and maintenance. A significant amount of air pollution results from inadequate storage and disposal of by-products, such as ash from power plants and tailings from the open cast coal mines.

The old vehicle fleet, much of which was recently imported, still uses leaded fuel and low-quality motor fuels (diesel fuel with high sulfur content). There are no plans in place to introduce systems of vehicle control in traffic to improve their maintenance or discharge of leaded fuel. Pollution resulting from traffic is increasing, including soot concentrations, especially in major towns.

There is no inventory of polychlorinated di-benzo furans and dioxins (PCDF/D) which needs to be compiled as an integral part of the National Plan for the Implementation of the Stockholm Convention. Potential sources of PCDF/D result from uncontrolled combustion in waste dumpsites, from metallurgical plants etc.

It is estimated that the total annual damage due to air pollution and greenhouse effects in Serbia amounts to 447.2 million Euros – 1,370.1 million Euros, which is equal to 1.8% - 5.5% of GDP.

#### **4.2.2 Problems of Air Quality**

The poor quality of ambient air in a number of areas and towns in Serbia results from emissions of SO<sub>2</sub>, NO<sub>x</sub>, CO, soot, particular matter etc, originating from energy generating and industrial plants (Obrenovac, Lazarevac, Belgrade, Kostolac, Pančevo, Bor, Smederevo, Novi Sad, Šabac, etc) and from the heating plants and fuel combustion from households, traffic, etc. The air quality deteriorates particularly during calm weather conditions and during the heating season.

Systematic monitoring of air quality is performed through a network of measuring points in the territory of the Republic. Monitoring results during the year 2002 indicated that the average annual concentration of SO<sub>2</sub> exceeded the limit values (MAC) in Bor, Smederevo, and Kragujevac. The concentration was exceptionally high in Bor (117 µg/m<sup>3</sup> compared to the MAC of 50 µg/m<sup>3</sup>). The maximum daily allowable concentration (MAC) was exceeded in Bor during 123 days, indicating that over 34% of all measurements were 10% above the MAC.

In 2002 the daily MAC of soot was exceeded in single measuring points during 100 days in Smederevo, 92 days in Belgrade, 68 days in Šabac, 160 days in Leskovac, 141 days in Čačak, and 69 days in Pančevo. On the other hand, the NO<sub>2</sub> levels recorded in the settlements were at or below the average annual limit value of 40 µg/m<sup>3</sup> in all monitored cities. The MAC daily concentration of NO<sub>2</sub> was exceeded in 2002 only in Belgrade during 19 days. Air quality in large cities deteriorates also during hot summer days due to high ozone concentration caused by photochemical effect. The ozone concentration in ambient air was found to be exceeded during 20 days in the summer period (June – August 2001) in Belgrade.

##### Problems:

- Air pollution in areas with power generating and industrial plants (Obrenovac, Lazarevac, Beograd, Kostolac, Pančevo, Bor, Šabac, Novi Sad, Smederevo, Čačak, Lučani, etc.) caused by industrial emissions (SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>2</sub>, PAH, particulate matter, soot, etc.)

- Air pollution in urban areas (Belgrade, Novi Sad, Niš) caused by traffic (NO<sub>x</sub>, SO<sub>2</sub>, ozone, lead, particulate matter, CO)
- High concentrations of soot in urban areas during the heating season caused by emissions from individual heating installations
- Air pollution caused by uncontrolled spontaneous combustion at waste dumpsites, burning of harvesting waste (PCDF/D and other emission)
- Contribution to global warming through emissions of greenhouse gases
- Cumulative pollution resulting from concentrated petrochemical, oil refinery and nitrogen industry in confined areas

#### 4.2.3 Causes of air pollution

The principle cause of air pollution from point sources in Serbia is outdated technology and lack of pollution abatement installations, low energy efficiency of the existing obsolete facilities in the energy and industry sector, as well as poor quality heating fuel in household installations. The main causes of the mobile air pollution include poor quality of engine fuel (leaded petrol), out-of-date vehicles and generally poor technical standards of the vehicle fleet. Lack of national inventory of greenhouse gas emissions and emissions of ozone depleting substances, and lack of incentives for emission reduction of these gases cause high emissions of greenhouse gases and ozone depleting substances. The existing emission and imission regulations are not harmonized with the EU, and insufficient monitoring and enforcement contribute to building an unrealistic image of the state of air pollution in Serbia.

##### Causes of problems:

- Lack of emission and imission regulation harmonized with EU standards
- Outdated and inadequate technology, low energy efficiency or lack of pollution abatement technology in industry and energy sectors
- Combustion of poor quality heating fuel
- Spatial concentration of lignite-based thermo power plants
- Poor quality of engine fuel
- Inadequate maintenance of vehicles and widespread use of old vehicles without catalytic converters
- Lack of national inventory of greenhouse gases
- Lack of national inventory of air polluters
- Insufficient network of ambient air quality monitoring
- Lack of inventory of PCDF/D
- Lack of incentive to reduce emissions to air

#### 4.3 Nature and biodiversity

##### 4.3.1 Current situation

The great scope of biological diversity in Serbia is caused by the biogeographical position, the openness of the territory to other surrounding regions and the past processes of flora and fauna genesis. Except for the flat parts of the Pannonian

plain in the North, Serbia is situated mostly in the Balkan Peninsula, which is one of the centers of biodiversity in Europe.

The territory of Serbia includes three biomes: sub-Mediterranean (as part of the Mediterranean), Middle-European and Pontian-Southsiberian; and thanks to the high zoning of eco-systems in the mountains, there are elements of boreal, middle-European mountainous (including Arctic-Alpine) and southern-European mountainous biomes.

It is estimated that there are about 1,000 flora communities in Serbia. The Balkan endemites make up 8.06% of the flora in Serbia (287 taxons), and local endemites make up 1.5% (59 species). The number and diversity of fauna is also very high. The total number of mammals, nesting birds, reptiles and amphibians living in Serbia is 43.3% of these animals living in Europe. Numerous species are tertiary, glaciary, boreal, xerothermic or steppe relicts, while gorges and canyons of Eastern and Western Serbia are the most significant refugial areas of tertiary vegetation in the Balkans. Among the flora species, about 600 are endangered species in Serbia, while among the fauna there are about 500 endangered species of mammals, birds, reptiles, amphibian and fish.

The total area of protected areas is about 6.5% of the total land area in Serbia. Apart from national parks (5), nature reserves (98), landscape protected areas (16), nature monuments (296) and nature parks (24), there are also 215 plant species and 426 fauna species which fall under the category of protected natural rarities. International status of nature protected areas according to the Ramsar Convention criteria is assigned to Laduško Lake, Obedska Bara, Stari Begej – Carska Bara, and Slano Kopovo. According to the Convention on Natural and Cultural Heritage, the Golija-Studenica is declared biosphere reserve.

#### **4.3.2 Pressure on nature and biodiversity**

Pressure on biodiversity in Serbia is most strongly reflected by the status of forest eco-systems and sensitive eco-systems (aquatic eco-systems, humid and wetlands, steppe and forest-steppe, sand eco-systems, continental marshes, high-mountain habitats, etc.) and they cause loss of biodiversity. The impacts of uncontrolled tourism, illegal construction activities, transport and forest management on nature protected areas is of particular concern.

##### Problems:

- Fragmentation of ecosystems and natural habitats
- Degradation and change of land use, especially at the expense of forests, swamps and marshes, etc.
- Intensive exploitation of forests, hunting and fishing fauna
- Collection of wild flora, fauna and fungi for commercial purposes without ensuring adequate protection measures
- Use of inappropriate methods and chemicals for pest control
- Use of obsolete technologies and inefficient use of non-renewable energy and mineral resources (for instance lignite and copper open cast mines, etc.) without ensuring adequate protection measures
- Intended or unintended introduction of allochthonous invasive species of flora and fauna
- Air, water and soil pollution from industry, energy, agriculture and traffic

- Urbanization and intensive tourism in areas of sensitive ecosystems and protected natural areas (waste water, communal solid waste, exceeded capacity of infrastructure and number of tourists, etc.)
- Development of traffic infrastructure, land irrigation, construction of water reservoirs etc.)
- Climate changes, fires, natural disasters (draughts, floods), accidental pollution, etc.

#### **4.3.3 Causes of stress on nature and biodiversity**

The stress on biodiversity in Serbia is inflicted by a number of factors including institutional, financial, economic and others. The system of laws and bylaws addressing biodiversity and nature conservation is inconsistent and requires revision and approximation with the EU Directives. Serbia does not have a comprehensive National Biodiversity Strategy. The inventory of biodiversity in Serbia has not been prepared, which is particularly important in relation to endangered species and habitats.

Management of protected areas is inadequate and suffers from unclear competencies, underdeveloped information system, ineffective supervision of economic activities within the protected areas. Although most protected areas have developed management plans, their implementation is inadequate. The control over the introduction of invasive species is inadequate and leads to pressure on the autochthonous species and habitats.

#### Causes of pressure on biodiversity

- Lack of National Strategy and Action Plans for the protection of biodiversity
- Insufficient implementation of environmental and nature protection legislation
- Lack of integral information system and system of indicators for biodiversity monitoring
- Inadequate spatial planning system and inefficient implementation of spatial planning and urbanisation system
- Lack of efficient inter-sectoral cooperation in the field of protection of biodiversity and lack of integration of biodiversity protection in sectoral development policies
- Inefficient system and mechanisms for management of national parks, Ramsar areas, biosphere reserves and other protected areas
- Inadequate management of forest ecosystems and protected areas
- Ineffective management system for collection and trading of wild flora, fauna and fungi
- Lack of adequate economic and financial instruments for nature protection and management of protected areas

## **4.4 Forests**

### **4.4.1 Current situation**

Forests and woodland cover 28 % of the total territory of Serbia (forests alone cover nearly 26 %). The forest cover in Serbia after the World War II was 19.3 %. The ratio of private forests to state-owned forests is approximately 50:50 (based on the 1979

data). The condition of forests is characterized by their unfavourable structure. State-owned sprout forests cover 23.5 %, underbush and shrubs about 10 %. The share of sprout forests and low-productive forests is more than 55 %. For the above reason and due to unfavourable age structure, the utilisation of habitat potential is low. The considerable share of low-productivity forests in the total forest resources is very significant from both the economic point of view, as well as the CO<sub>2</sub> absorption capacity which is in synergy with the production of wood mass.

The geographical position, diversity of climatic, habitat conditions in Serbia, enabled the presence of a great number of different forest phytocenoses, indicating ample biodiversity in the forests of Serbia.

About 18% of the total area covered by forests and woodland is designated for special purposes such as various regimes of protection. Within this number, about 90 % is state-owned. Hence, nearly 35 % of the state-owned forests are under protection according to the Environmental Law. About 48 % of all state-owned forests have the priority protection function, while the remaining forests have the priority productive function.

#### 4.4.2 Pressure on forests

- Insufficient level of forest cover
- Low level of usage of habitat potentials
- The process of global defoliation
- Forest fires
- Illegal felling
- Conversion of woodland into construction land

#### 4.4.3 Causes of stress on forests

- Difficult economic conditions and increased demand for wood products and services
- Lack of strategic planning documents regarding forest management
- Small average size of privately-owned forest plots (approx. 0.3 ha)
- Inadequate level of infrastructure allowing access to forests
- Inadequate forest monitoring
- Underdeveloped technology and institutions in forest management
- Restructuring of the public sector and public companies for forest management
- Industry, energy sector, traffic, use of pesticides and insecticides, etc.

### 4.5 Soil

#### 4.5.1 Soil quality

The occurrence and progress of erosion processes is one of the major causes of soil degradation and its deteriorated quality. It is estimated that the erosion processes (of various degrees) affect up to 80% of agricultural soil in Serbia. While in central regions and the hilly-mountainous regions the predominant type is water erosion, the predominant type in Vojvodina is eolic erosion (erosion processes caused by wind). In



Vojvodina, 85% of agricultural soils in affected by wind erosion with an annual loss of over 0.9 ton material per ha.

Soil is affected by exploitation of mineral resources, especially by open cast mining, causing loss of soil. This is highly evident in Kostolac and Kolubara basins where lignite is mined under high quality top soil. Soil quality is also affected by uncontrolled and inadequate dumping of waste.

Large land areas in the vicinity of industrial complexes (Bor, Pančevo, Novi Sad, Smederevo, Belgrade and Kragujevac) are contaminated with various pollutants discharged from industrial facilities.

Along roads, especially highways, the quality of soil is endangered by traffic related emissions i.e. pollutants from the exhaust gasses (lead and PAH).

Problems:

- Loss of agricultural land due to water and wind erosion
- Soil contamination resulting from industrial, mining, energy, agricultural and traffic activities

#### **4.5.2 Causes of soil degradation**

The main indirect cause of soil degradation in Serbia is the lack of adequate legislation for control of hazardous substances in agricultural soil. Quality of soil is affected by inadequate agricultural practices including uncontrolled and inadequate use of fertilizers and pesticides, and lack of control of quality of water used for irrigation (this water is usually considerably polluted). The widespread use of leaded petrol causes soil contamination by lead along the main roads. Poor management of waste and chemicals causes soil degradation (loss of space, infiltration of pollution into the soil profiles).

Causes of problems:

- Lack of legislation for control of hazardous substances in soil
- Low level of environmental awareness of agricultural producers
- Land use patterns encouraging soil erosion
- Widespread use of leaded petrol

## 5. NON-SECTOR SPECIFIC CAUSES OF ENVIRONMENTAL DEGRADATION

### 5.1. General causes of environmental stress

1. Poor integration of environmental policy with economic and other sectoral policies. Policy making in Serbia is still dominated by sectoralized planning with little horizontal integration. The existing sectoral policies are not sufficiently harmonized with environmental protection.
2. Insufficient institutional capacity. The institutional capacity is insufficient to carry out wide ranging reforms of environmental policy. Responsibilities for environmental policy and management are spread across several government institutions with weak coordination, both horizontal and vertical. There is an evident lack of capacity at local level, therefore, further division of competences in terms of decentralisation in implementing policy and regulations would require adequate capacity building.
3. Ineffective system of monitoring and reporting. Lack of adequate monitoring criteria and indicators. The environmental monitoring system is inadequate. It is reflected by lack of accredited laboratories, insufficient standardization and quality control of analyses. There is lack of integrated cadastre of polluters. The information and reporting system is insufficiently developed and provides limited support for decision making.
4. Inefficient environmental enforcement resulting from legal gaps and inconsistencies, insufficient institutional capacity, lack of inspection supervision and low level of fines as well as long court procedures. The legal framework is inconsistent with respect to competences and functioning of relevant bodies and organizations.
5. Ineffective system of environmental financing and lack of economic incentives. The level of environmental investments is low and the state budget remains the main source of funding. Earmarked funding is very limited and funding by industry and the private sector is very low due to lack of economic incentives and weak enforcement. Instruments of financial markets (loans, equity investment, municipal bonds etc) are nearly absent. System of economic instruments is underdeveloped and provides insufficient incentives to reduce pollution.
6. Low environmental awareness, insufficient environmental education and inadequate public participation in decision making. The general level of public environmental awareness in Serbia is low. There is an obvious lack of understanding the importance and urgency of addressing environmental issues in order to maintain the public health. Formal environmental education within the regular education curricula, from pre-school institutions to universities, is still not satisfactory. There is lack of qualified and trained teachers and teaching aids necessary for environmental education. Insufficient informal environmental education results from lack of adequate information and limited interest by the media. The participation of citizens in awareness raising programs is insufficient. There are no adequately developed mechanism to promote public participation in environmental decision making.

## 5.2. Waste management

The general state of waste management in Serbia is inadequate and it poses public health and environmental hazards. The most acute problem regards hazardous waste, which is not separately collected and dumped without processing in regular waste disposal sites.

Only about 60-70 percent of municipal solid waste is collected in Serbia (around 2.2 million tonnes per year). The collection is organized in urban areas; organized collection is missing in rural areas. Part of waste generated in the rural areas is used in backyard burning.

Average person generates approximately 290 kg of waste per annum. Households generate the majority of municipal waste (about 63 %), and 20 % is generated by businesses. At present there are 180 officially registered landfills for disposal of municipal waste in Serbia. The disposal sites generally do not meet the technical requirements of sanitary landfills. There are also hundreds of illegal dumpsites of different size in rural areas. Dumpsites are subject to uncontrolled burning producing harmful emissions of particulate matter, dioxins and PAH. Degradation of bio-degradable waste in dumpsites results in the emissions of landfill gas, containing CO<sub>2</sub> and methane, which may, due to inadequate handling, lead to explosions. The leachate from dumpsites pose a threat to groundwater, surface waters and soil due to the high organic and heavy metals content.

Landfilling is the primary waste disposal method. Municipal waste, including also hazardous waste generated by households, is usually disposed directly in landfills. It is uncommon for municipalities to share the same landfill, except for Belgrade where twelve municipalities (out of 17) dispose of waste at the biggest landfill site in Serbia, Vinča (1000 – 1200 tons/day). Although primary recycling is prescribed by law in Serbia, requiring segregation of paper, glass and metal packaging in specially marked containers, recycling is not functioning in practice. An exception is the waste sorting facility in Novi Sad and recycling yards (designated containers for collection of specific type of waste). The industrial processing capacity for recyclables and recovered materials is very limited. Serbia does not have waste incineration plants, and waste is not used as alternative fuel (e.g. in cement plants or steel mills).

There are no reliable data on the volumes of hazardous waste generated by industry. It is estimated that 460,000 t/year of hazardous industrial and medical waste is generated in Serbia including: waste motor oils 106,000 t/y, mixed organics/water emulsions 257,000 t/y, other hazardous waste (medical waste, organic and inorganic hazardous waste from industry, PCB waste etc.) 97,000 t/y. Vojvodina faces a problem with waste from oil rigs (the quantity is estimated to be about 600,000 m<sup>3</sup>). There are neither facilities for hazardous waste treatment and disposal (destruction or incineration), nor proper storage facilities for hazardous waste. Hazardous waste is disposed temporarily in inadequate storages (some of which operate for several decades).

It is estimated that the total annual damage caused by inadequate waste management in Serbia (including air emissions and leachate from landfills, emissions from backyard burning of waste, damage caused by inadequate disposal of hazardous waste, fly ash and loss of resources) range from 98 to 276 million Euros, which equals 0.4% to 1.1% of GDP.

Causes of problems:

- Highly inadequate waste treatment and disposal infrastructure
- Co-disposal of solid municipal waste and hazardous waste
- Insufficient inspection control and policy of penalties
- Lack of an organized system of collection, transport and disposal of waste in rural areas
- Lack of permitting system for collection, transport, treatment and disposal of solid waste
- Lack of data on the volume, composition and waste streams
- Limited capacity for processing of recyclable materials
- Lack of professional and institutional capacity for management of hazardous waste
- Insufficient number of labs for waste characterisation
- Lack of separate plants for storage, treatment and disposal of hazardous waste
- Lack of management system for separate waste streams (batteries and accumulators, waste oil, PCB, electronic and electric waste, end of life vehicles, waste tires, etc)
- Lack of separate collection and treatment of medical waste
- Lack of treatment of slaughterhouse waste
- Depreciated charges for collection and disposal of communal waste
- Inefficient public utilities
- Low level of public awareness regarding waste management

Environmental impacts:

- Pollution of surface and groundwater, and soil by leachate
- Air pollution caused by uncontrolled burning of dumpsites, harvesting wastes and gas emissions
- Emission of methane contributing to greenhouse effect
- Landscape degradation by improper waste disposal
- Contamination of soil and water by improper handling of special waste streams (waste oils, end of life vehicles, electronic waste, battery and accumulators, asbestos, TL tubes, etc).

### **5.3. Management of chemicals**

Chemicals are used in many branches of economy (chemical, pharmaceutical and food industry, lumber industry, metallurgy, leather industry, etc.). They are necessary in the production of fuel, plastic, dye and polish, rubber, insulating material, laundry and plant protection means, artificial fertilizers, etc.

There is no comprehensive data on all chemical management activities in the Republic of Serbia. Use and consumption patterns are drawn from interviews and questionnaires, and do not give an overall picture of the activities. Initial register of dangerous substances was prepared in 2000. There is no national computer network (including databases concerning the characteristics of chemicals) establishing links between all authorities relevant to specific components of chemical management.

The scope of chemicals is narrower than in the EU and focused on poisons. The legal procedures do not distinguish between the new and the existing substances. The existing assessment procedures for chemicals are comparable to risk assessment but they merely cover hazard assessment. Toxicological assessment cannot be prepared by manufacturer. Classification criteria, labeling and packaging of chemicals are comparable with the EC legislation.

There are no procedures for issuing permits based on prior information on chemical impact on public health and the environment (PIC procedure), stipulated in the Rotterdam Convention, which has not been ratified.

Also, the Stockholm Convention on Persistent Organic Chemicals (POPs) has not been ratified. There is no National Plan for the implementation of this Convention, which should include the preparation of preliminary inventory of twelve chemicals listed in the Convention and other chemicals listed in the POPs protocols to the Convention regarding long-range trans-boundary air pollution – the UNECE Convention, as well as Action plan for reduction of emission of certain POP-s, removal from use and disposal.

Cross-sectoral coordination with the ministries competent for occupational health and safety, plant protection, health, transport etc. is insufficient regarding the control of comprehensive life cycle of chemicals, from placing in the market until final disposal.

Causes of problems:

- The prevailing regulations on chemicals are not harmonized with the EU regulations
- Lack of legislation banning intended discharge of the ozone depleting substances
- Conventions relevant to chemicals management have not been ratified
- Lack of professional and institutional capacity for chemicals management
- Lack of databases and systematic monitoring of chemicals that are marketed in Serbia, and lack of computer links between authorities in charge of chemical management

Environmental impacts:

- Pollution of soil and water due to inadequate storage of unused chemicals etc.
- Pollution of air, water and soil due to uncontrolled and inadequate use of hazardous chemicals

#### **5.4. Chemical accidents**

Accidents involving hazardous substances during their production, usage, storage, transportation or disposal cause major point sources of pollution and risk to human health. Accidents result in release of toxic substances such as fuels, lubricants, cleaning fluids, solvents, PCBs etc to the environment. On average up to ten such accidents are recorded annually.

Chemical and petrochemical plants create the greatest risk of environmental accidents. Energy and industrial plants that potentially cause the greatest risk to environment in malfunction situations are located in the following locations:

- Subotica (Zorka-Holding – fertilizers, inorganic acids; Azotara – nitrogen and complex fertilizers);
- Pančevo (Refinery - oil products; HIP Azotara – fertilizers; HIP Petrohemija – petrochemicals and chlorine);
- Novi Sad (NIS – Oil industry, HINS – chemical industry);
- Belgrade (Prva iskra, Baric – primary chemicals);
- Šabac (HI Zorka – fertilizers, PVC, pesticides);
- Loznica (cellulose, synthetic fibers, and plastics);
- Sremska Mitrovica (“Matroz” pulp and paper);
- Bor (RTB Bor);
- Obrenovac, Kostolac, Lazarevac (thermal power plants).

The most important accidents reported in the recent years include:

- 200-300 l of 5% solution of HF and HCl acids was spilt in the thermal power plant Nikola Tesla near Obrenovac during the reconstruction and cleaning of the boiler and block 5 system (2004).
- Discharge of a large quantity of ash into the watercourse from the ash heap in the thermal power plant Kostolac (2002).
- Air pollution caused by the fly ash released during maloperation of the ash heap in the thermal power plant Nikola Tesla Obrenovac (2002).
- Fire of the transformer station (with subsequent release of PCBs) in the Lola Ribar foundry Železnik Belgrade (2002).
- Fire in the used tyre storage near Rakovica (2004).

Many accidents causing contamination are reported during transportation of hazardous materials. In the period 2002-2004 the following accidents were recorded in the railway transport of hazardous materials:

- Leakage of the motor oil caused by accidental derailing of locomotive in the shunting station in Vreoci (2003).
- Leakage of methanol from the rail tanker in the Belgrade railway station (2003).
- Leakage of concentrated NaOH from a rail tanker in the railway station Batajnica (2004).
- Fire of rail tankers in Lanište railway station (Jagodina) caused by derailment of 8 rail tankers carrying propane-butane (2002).
- Discharge of ammonium nitrate and ammonia from the rail tankers in the Lower Belgrade station (2002).
- Discharge of concentrated nitrogen acid from rail tankers in the Topčider railway station (2002).
- Spillage of ammonium hydroxide from the rail tanker in the Makiš railway station (2002).

The following accidents were recorded between 2002-2004 in the road transport of hazardous materials:

- Oil spillage caused by road tanker accident in Belgrade (2002).
- Spillage caused near Pančevo (the Belgrade Refinery Complex) by road tanker accident involving 8 to 9 tonnes of motor fuel spilled into the internal sewerage system of the refinery and into the drainage channel near Pančevo (Belgrade Refinery complex) (2004).

Spillages of oil and chemical substances by vessels on waterways are not uncommon but few of them have been reported.

Causes of problems:

- Poor enforcement of the accident risk management legislation
- Lack of risk management plans
- Insufficient cooperation between the risk management actors (industries, municipal authorities and state agencies and organizations)
- Improper storage of chemicals and hazardous waste
- Out of date industrial technologies
- Insufficient training and technological discipline
- Poor organization and implementation of preventive measures, negligence and inadequate handling of hazardous substances
- Poor state of transport infrastructure and vehicles

Environmental impacts:

- Contamination of soil and water by spillages of hydrocarbons, solvents, PCBs and other chemicals
- Pollution of air by releases of toxic substances

## 5.5. Noise

Data on noise pollution in Serbia are limited as systematic noise monitoring is carried out only in several larger towns (Belgrade, Novi Sad, Niš and Subotica). Results of systematic noise monitoring in Novi Sad and Subotica are difficult to interpret because the monitoring methodology is not harmonized with the prevailing regulations. Reliable data on noise emissions in other locations (including the vicinity of industrial sites, airports and major transport junctions) are not readily available.

The noise monitoring results in Belgrade (based on 18 monitoring points in 2000, and 27 monitoring points in 2002), performed according to the standard and extended procedures indicate that the communal noise originates mostly from traffic, while industry, small-scale business, construction industry and other activities are of minor significance. The levels of communal noise registered during 2002 exceed the permissible level in 23 monitoring points; the permissible noise levels are exceeded in daytime by 0-13 dB(A) and in nighttime by 0-118 dB(A), depending on the zone of use. On the average, greatest exceedence was measured in residential zones. The highest levels of noise were determined in the street Glavna in Zemun, with 74 dB (A) during day, and 68 dB(A) at night.

The statistical number of complaints by the citizens indicates that most noise annoyance was caused by specific local sources. Therefore, the noise annoyance can be defined as a local problem. Most complaints are related to close-by sources such as restaurants, pubs and crafts in the neighbourhood. However, this should not be neglected as the number of complaints is high. The noise of bigger industrial sites and

the traffic noise including noise from railway, airports and major traffic junctions are rare causes of complaints.

Vibrations have so far not been subject to any regulation. Hence, there are neither standards nor monitoring of vibration.

Causes of problems:

- Inadequate legislation and standards regarding noise
- Lack of vibration legislation
- Obsolete industrial technology and vehicles causing high noise emissions
- Inadequate and insufficient monitoring of noise in urban areas (Belgrade, Niš, Subotica, Novi Sad),
- Lack of systematic noise screening in noise emitting facilities
- Inadequate spatial planning regarding noise zoning in recreational areas
- Improper location of industrial facilities, craftsmen workshops and especially restaurants in urban areas
- Lack of noise protection projects
- Converting residential areas into commercial use without checking whether there is satisfactory noise protection in place adequate to the intended commercial use
- Insufficient control of noise emitted by motor vehicles
- Improper traffic management, in particular automatic regulation of traffic and synchronized traffic lights

Environmental impacts:

- Elevated noise level in the environment due to poor servicing and maintenance of facilities generating noise: elevators, sub-stations etc.
- Elevated noise levels in urban areas due to intensive traffic
- Reduced quality of life and reduced value of property in urban zones with excessive noise levels
- Impact of noise generated by airplanes, motor vehicles and construction activities on biodiversity and protected areas

## 5.6. Ionizing and non-ionizing radiation

**Ionizing radiation** is electromagnetic and particle radiation which may ionize matter and cause damages to cells of living organisms, with energy above 12.2 eV, wavelength less than 100 nm or frequency above  $3 \times 10^{15}$  Hz.

Within the total number of sources of ionizing radiation in use in the Republic of Serbia, about 80% are sources used in medical applications, while about 15% is in industry and 5% are other activities. The production, marketing and use of sources of ionizing radiation are subject to the Law on Protection from Ionizing Radiation ("The Official Gazette of FRY" Nr 46/96). Technical tasks in the field of protection from ionizing radiation (14 in total) may be performed only by authorized legal entities in compliance with the Law. There remain still a total of about 1.800 sources of ionizing radiation from radio-active lightning protection rods in the territory of Serbia.



Systematic monitoring of the content of radionuclides in the environment includes:

- Measuring the levels of absorption zone of gamma radiation in the air;
- Measuring the absorbed zone of gamma radiation in the air;
- Measuring the content of radionuclides in the air, solid and liquid precipitation, rivers, lakes, drinking water, foodstuffs and general purpose goods, livestock fodder, construction materials;
- Measuring the level of exposure to ionizing radiation in residential and working premises.

The monitoring is performed by the Institute for Professional Medicine and Radiological Protection "Dr Dragomir Karajović" of the Clinical Center of Serbia. The monitoring has been performed for the past 40 years, and since 1996 it is performed in compliance with the Decision on Systematic Monitoring of the Content of Radionuclides in the Environment ("The Official Gazette of FRY" Nr 45/97).

The main source of radiation in Serbia is radioactive waste stored in the Institute of Nuclear Sciences "Vinča" in two storage facilities for solid waste and one storage facility for liquid radioactive waste. One storage is designed for waste displaying low level of radiation, and another one for intermediate levels of radioactivity. The old storage facility contains about 3,500 metal barrels of 200 liters each and 300 30-liter plastic containers mostly of intermediate level of radiation. There are 1,500 200-litre drums stored in the new facilities. The remaining capacity of the new facility is approximately 200 drums of 200-litres capacity, which is sufficient for four to five years. In addition, there are four underground storage tanks, containing 330 m<sup>3</sup> of liquid low-radioactive waste. The storage of radioactive waste does not meet the legal requirements. The physico-chemical characteristics of the radioactive waste are not known. Neither intermediate nor low-level radioactive solid and liquid waste is pre-treated or treated.

After the NATO air-raids in 1999, four sites have been identified in the territory of the Republic of Serbia (excluding Kosovo and Metohia) which are contaminated by depleted uranium. Within the territory of the municipality Bujanovac two sites Bratoselce and Borovac, and in the municipality Preševo site Reljan and in the municipality Vranje site Pljačkovica. Rehabilitation of contaminated sites began in 2002 and two sites have been rehabilitated so far (Bratoselce and Pljačkovica). The radioactive waste and the contaminated soil collected during the remediation procedure are stored temporarily in the Institute of Nuclear Sciences "Vinča". The rehabilitation of the site Borovac was completed in 2005, and the Reljan in the following year.

Control of radioactivity of goods during import, export and transit is performed in an organized manner on border-crossing points of the Republic of Serbia since 2003. The maximum levels of radioactive contamination are prescribed by the Book of Regulations on Maximum Levels of Radioactive Contamination of the Environment and Decontamination Procedures (The Official gazette of FRY Nr. 9/99). During import and transit, the goods are subject to mandatory dozimetric control at the border crossing, while for certain types of goods it is also mandatory to perform gamma-spectrometric measurement.

**Non-ionizing radiation** is electro-magnetic radiation of photon energy exceeding 12.4 eV or wavelength less than 100 nm, and include: UV radiation, IR radiation, visible radiation, radio-frequency radiation of 10 kHz – 300 GHz, microwave radiation 300 MHz-300 GHz, low frequency electro-magnetic fields 0-10 kHz, laser radiation and ultrasound.

The sources are numerous: different UV radiation or treatment lamps, mercury vapour lamps, microwave ovens, radio and TV sets, radar transmitters, mobile phones, high voltage transmission lines of over 110 kV, transformer stations, and numerous devices in industry.

The field of non-ionizing radiation is not legally regulated. At present, the existing international and national standards are applied in practice (CENELEC, IRPA/INRI, WHO, JUS and others) but they do not have the capacity of laws and this obstructs the problems appearing during recent years regarding the installation and operation of mobile telephone base stations. Due to lack of legislation, the Republic of Serbia does not have authorized institutions for monitoring non-ionizing radiation. The control of sources of non-ionized radiation is not systematic and is performed only at the request of interested legal and physical persons.

Causes of problems:

- Lack of a regulatory body according to the EU regulation and standards and the International Atomic Energy Agency (IAEA)
- Lack of law and regulations for protection against non-ionizing radiation
- Inadequate radioactivity monitoring network
- Lack of database on sources of ionizing (RAIS program of IAEA) and non-ionizing radiation
- Improper use of sources of ionizing and non-ionizing radiation
- Inadequate border control of radioactivity of goods during import, export and transit, in particular lack of monitors for ionizing radiation
- Not all sources of ionizing radiation from lightning rods have been removed
- Incomplete control of radon concentrations indoors and lack of radon mapping
- Lack of capacity for safe permanent storage of radioactive waste
- Lack of early warning systems for accidents and lack of emergency action plan
- Lack of plan for protection from ionizing radiation

Problems:

- Local contamination caused by inadequate storage of radioactive waste
- Depleted uranium soil contamination caused by NATO air-raids in municipalities Bujanovac (Bratoselce, Borovac), Preševo (Reljan) and Vranje (Pljačkovica)

### **5.7. Impact of environmental degradation on health**

The link between environmental quality and human health is not straightforward to determine due to plethora of other factors affecting human health. Linking mortality, invalidity and morbidity with specific environmental degradation or pollution is very complex. However, certain conditions are known to correlate well with air and water pollution e.g. asthma or infections of digestive system. The existing health data show that more than half of death cases are caused by cardiovascular diseases (56.7% in central Serbia and 58.4% in Vojvodina) and about 17% are caused by malign diseases. The third most common cause of mortality are insufficiently defined illnesses and

conditions, followed by injuries, traumas and consequences of external factors (including environmental pollution). The high percentage of cardiovascular and malign diseases responsible for mortality cases indicates prevalence of behavioral risk factors (smoking, alcoholism, poor diet and insufficient physical activity) as well as external environmental factors (air and water pollution, food contamination).

Pollution of air, contamination of water and food, noise and radiation are the main environmental causes of health deterioration. Air pollution can affect human health by damaging the respiratory system and by entering the blood or lymph systems. A strong correlation is usually found between increases of daily mortality rates and acute episodes of air pollution. Most air pollutants have negative impact on human health, in particular nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs), ozone, particulate matter and sulphur dioxide. Population of large urban and industrial areas is particularly exposed to these pollutants. Of particular concern are smog situations during the calm winter and calm summer weather when the concentration of pollutants and their impact on health are excessively high. The summer smog caused largely by tropospheric ozone pollution may cause serious respiratory disorders especially amongst children, asthmatics and the elderly population. These include: reducing lung function (coughing, irritation of airways, rapid or shallow breathing); inflammation and damaging of the lung lining, aggravation of asthma, reduced immunity etc. Certain VOC's (e.g. benzene) are strongly carcinogenic.

Very important air pollutant in Serbia is lead due to its widespread use as gasoline additive. Infants and young children are especially sensitive to even low concentrations of lead. Effects of lead pollution on health include: damage to organs (kidneys, liver, brain, etc.); damage to brain and nervous system (seizures, mental retardation, behavioral disorder, memory problems etc.); heart and cardiovascular system (high blood pressure, heart failures) etc. Monitoring data from 2003 show that the lead concentration in the ambient air in Belgrade was 5.6 times higher than the maximum allowed concentration value. Elevated concentration of lead can also enter the food chain through contamination of soil and agricultural crops along the main transport routes.

Poor quality of drinking water (bacteriological contamination and chemical contamination by e.g. pesticides or heavy metals) leads to the spread of digestive disorders, chronic and infectious diseases. Low quality of surface water poses threats to human health when used for recreational functions (bathing water). Especially blue-green algae present in eutrophic waters can cause serious irritation of skin and eyes.

Poor waste management affects human health. It creates epidemiological risk (especially from medical and other hazardous waste), contamination of water supply sources and emission of highly carcinogenic dioxins from low-temperature burning of dumpsites.

Summary of environmental impacts on human health:

- Chronic respiratory diseases caused by summer and winter smog in large urban and industrial areas
- Increased levels of lead in the human body caused by emissions from traffic
- Health damage to children and other risk groups caused by high lead concentration in air, soil and food
- Incidence of acute and chronic respiratory and carcinogenic diseases caused by industrial air pollution

- |  |
|--|
| <ul style="list-style-type: none"><li>▪ Occasional waterborne epidemic and diseases caused by poor drinking water quality</li><li>▪ Epidemic risk to population due to contamination of groundwater and scavenging at dumpsites</li><li>▪ Threat to human health (stress, hypertension, insomnia, loss of productivity) in urban and industrial centers caused by traffic noise during work</li><li>▪ Acute and chronic diseases caused by ionizing and non-ionizing radiation</li></ul> |
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## **6 ECONOMIC SECTORS AND THEIR IMPACT ON THE ENVIRONMENT**

### **6.1. Industry**

According to the classification of activities adopted in Serbia in 2001, industry covers three sectors, specifically: B – ore and stone exploitation, G – processing industry and D – generation and supply of electrical energy, gas and water. Sectors B and G are covered in Sections 6.2. Mining and 6.3. Energy generation, while this Section presents the Sector G – Processing Industry.

Processing industry is the main industrial branch in Serbia and represents 30.3% of the gross domestic product, according to data for 2002. According to quantified data for industrial products for 2003, the main branches of processing industry include food processing and beverages, chemicals and chemical products, metal processing, oil derivatives, products of non-metal minerals, machines and devices, electrical devices and apparatus, etc.

The share of industrial enterprises representing the processing industry in the gross domestic product, according to form of ownership, is as follows: mixed ownership 45.52%, private ownership 27.39%, socially owned 26.35%, state owned 0.65%, and cooperatives 0.09%. The privatization process is slow, and most of the privatised enterprises come from the sectors of food processing and beverages, cement plants, steel and tobacco industries.

There is generally poor state of industrial facilities. Old technologies, low energy and raw materials efficiency, low technological discipline and high level of waste generation are factors contributing to industrial pollution. There is general lack of industrial pollution abatement facilities (particularly sewage treatment plants, scrubbers and flue gas desulphurisation plants). Some industrial plants (heavy industries, for example steelworks, metallurgical industries, chemical industries) operated previously basic pollution abatement installations but most of these have been out of proper operation in the past fifteen years. Consequently, nearly 90% of industrial wastewater is discharged untreated.

The major industrial plants that cause most significant air pollution include:

- Chemical and metallurgical industries: Petrohemija and Azotara (both in Pančevo), US Steel (Smederevo), FOM (Belgrade), Agrohema (Novi Sad), Zorka and Azotara (both in Subotica), FSK (Elemir), RTB (Bor) and IHP (Prahovo); HK Zorka Šabac, Viskoza Loznica, Župa Kruševac, Lead smelter Zajača;
- Cement factories: BFC (Lafarge, Beočin), Novi Popovac-Holcim (Paraćin) and Titan (Kosjerić);

- Construction materials and building components industries: Thermo-insulation material factory Magnohrom (Kraljevo), Šamot Arandjelovac, lime factory Jelen Do and Toza Marković (Kikinda); and
- Paper mills: Matroz (Sremska Mitrovica) and Božo Tomić (Čačak).

Causes of problems:

- Low energy and raw materials efficiency, and disproportional high level of industrial waste generation by unit of production
- Lack of standards for effluents discharged to receiving waters
- Insufficient and inadequate monitoring of industrial air emissions
- Obsolete technology, outdated industrial plant and poor environmental management in industrial facilities particularly in Pančevo, Novi Sad, Šabac and Belgrade (Rakovica, Prva Iskra Barič)
- Lack of adequate industrial pollution abatement technology and facilities
- Lack of strategy and insufficient incentive measures encouraging companies to introduce cleaner production technology
- Insufficient incentive measures to curb industrial pollution
- Negligible number of companies have introduced and implemented environmental management system
- Lack of mechanisms in the privatization process to address the historical pollution, damages caused to the environment and non-compliance with environmental protection
- Inadequate industrial and hazardous waste management and storage
- Inadequate handling of chemicals
- NATO air raids on industrial facilities in Pančevo, Bor, Novi Sad, Kragujevac etc.

Environmental impacts:

- Excessive industrial emissions of SO<sub>2</sub>, NO<sub>x</sub>, VOC, PAH and other pollutants in hot spots of Bor, Šabac, Pančevo, Novi Sad, Smederevo etc.
- Contamination of soil, watercourses and groundwater by hazardous chemicals in hot spots of Bor, Pančevo, Novi Sad, Smederevo, Belgrade, Kragujevac etc.
- Pollution of surface waters by untreated industrial sewage
- Contamination of soil, watercourses and groundwater caused by NATO air raids, especially hydrocarbons (Novi Sad), PCB (Kragujevac, Bor), dichloroethane and mercury (Pančevo), nickel and chromium (Kragujevac) etc.

## 6.2. Mining

Several mineral resources are extracted in Serbia. The most intensive mining activities relate to lignite, which is mined at the Kolubara and Kostolac open cast mines. Sulphur content in lignite varies from 0.5% in the Kolubara mine to 1.3% in the Kostolac mine. The lignite is of low calorific value. The economic reserves of lignite in the Kolubara and Kostolac mines are sufficient for about 50 years.

Intensive copper mining activities concentrate in the Bor district. The average copper content in the open cast mines and in the underground mines reaches 0.35%

and 0.7% respectively. Apart from copper also silver, gold, platinum and palladium are recovered. The remaining economic reserves are substantial but require underground mining techniques.

Small-scale extraction of crude oil and gas concentrates in the northern province of Vojvodina. The extraction of building materials, such as cement raw materials (limestone and marl) is dominant near Beocin, Kosjerić and Novi Popovac, and technical stone quarrying (carbonate and volcanic rocks) near Arandjelovac, Lazarevac, Topola, Jelen Do, Krupanj, Novi Pazar etc., while architectural stones (marble, granite, trachite etc.) are exploited near Arandjelovac, Rapočevo, Kosjerić, Novi Pazar etc. Clay for brick production is exploited mostly in Vojvodina near Kanjiža, Kikinda, Novi Bečej, etc. The production volumes have increased significantly since 2000.

The mining basins in Serbia are characterized by many years of massive exploitation. Intensive exploitation of minerals, apart from depleting the non-renewable natural resources and polluting the water, air and soil, has led to significant degradation of soil. Most of the soil has been degraded through open cast mining of copper and coal. Huge areas are covered with tailings (in most cases, disposed off in inadequate dumping sites). It is estimated that the landfills in Serbia contain:

- 1.4 to 1.7 billion tonnes of tailings and top soil;
- About 700 million tones of flotation and separation tailings.

Open cast mines and tailings ponds in major mining basins have resulted in degradation of about 40 thousand hectares of soil. Less than 20% of this area is covered by natural recultivation (so far only landscaping). Until the end of 1991, about 1,800 hectares of soil degraded through lignite mining was recultivated. The recultivation program was suspended in 1992.

The most frequent type of pollution in the vicinity of coal mines is air pollution resulting from higher level of dust caused by exploitation and transport in open cast mines, exhaust gases, spontaneous self-ignition of coal, etc.

Water pollution in mining basins most frequently result from erosion of uncontrolled tailings. There have been cases when over 100 million tones of flotation tailings flooded an area due to failure breaks of flotation dams.

Causes of problems:

- Inability to enforce regulations of emission limit values for SO<sub>2</sub>, PM, VOC and NO<sub>x</sub>
- Obsolete mining technologies and outdated facilities in exploitation and processing of minerals
- Insufficient and inadequate recultivation of land degraded by mining activities
- Poor environmental management
- Improper storage of mining waste
- Impact on flora and fauna in the vicinity of mines
- Lack of treatment of wastewater

Environmental impacts:

- Air and water pollution caused by mining tailings and open cast mines (particulate matter, heavy metals, SO<sub>2</sub>) particularly in the hot spot of the Bor district
- Lowering of groundwater table
- Degradation and contamination of soil
- Degradation of nature protected areas
- Risk of accidental pollution from poorly contained tailings
- Pollution of soil and water by extraction wastes from oil exploration bores

### 6.3. Energy sector

Lignite-fired power plants, oil and oil derivatives industry are among the most significant polluters in Serbia. Environmental pollution may practically result from any activity within a power plant: in coal production, as well as in the production, transmission and distribution of electricity. Similarly, also in the oil and gas sector, pollution can result starting from exploration, exploitation, and especially in processing and transport of oil and its derivatives.

In 2002, Serbia produced 62% of its electricity from lignite fired power plants, 37% from hydropower plants, and 1% from combined plants. Except for hydropower and to a limited extent geothermal energy, other renewable energy sources are not used in Serbia. Energy losses reach 3.2% in transmission and 7% in the distribution system due to poor maintenance and obsolete technology (distribution network and transformer stations). Some transformer stations still use PCB as cooling medium. The obsolete technology of the energy system not only causes low energy efficiency (0.78 koe/GDP in 1999) but poses also serious environmental risk.

The total installed power in Serbia is about 7,120 MW, of which about 2,831 comes from hydropower plants. The main polluters are thermal power plants located in the lignite basins of Kolubara and Kostolac. The Kolubara basin (thermo power plants Nikola Tesla A and B, and Kolubara A), with 3,936 MW of installed power, emit 160,000 to 190,000 tons of SO<sub>2</sub>, 38,280 tons of NO<sub>x</sub> and about 50,000 tons of particles a year. The Kostolac power plant with 1,007 MW capacity, releases 150,000 – 160,000 tons of SO<sub>2</sub>, 8,770 tons of NO<sub>x</sub> and about 12,000 tons of particles a year.

The total installed processing capacity of oil refineries in Serbia is about 7.8 mln tones per year (4.8 mln tones in Pančevo and 3 mln tones in Novi Sad). The current operating capacity is reduced to 6.6 mln tones (4.8 mln tones in Pančevo and 1.8 mln tones in Novi Sad) due to the NATO air raids. The oil pipeline network is 420km long.

Air pollution from power generating facilities comes directly from stacks and from active cells of ash landfills (eolic erosion). The efficiency of PM removal for the power plant Nikola Tesla A is very low ranging from 96.3% to 99.0%, while for the power plant Nikola Tesla B it reaches 98.5% - 99.6%. In the power plant Kolubara A the PM removal efficiency is exceptionally low (98.32 – 98.50%). There is no systematic measurement of emission in all facilities (power plants and utility plants).

Thermo power plants generate also more than 5.5 million tons of fly ash, which is stored improperly (covering the area of about 1,800 ha), causing uncontrolled secondary emissions. Ash heaps are located close to watercourses. In case of accidents, ash spills over to watercourses, causing soil and groundwater pollution. Hence, the population of the nearby settlements is unable to use local water sources. It is estimated that disposal sites in Serbia contain about 170 million tones of ash from power plants.

Apart from power plants, energy is generated in boiler houses, combined heat and power plants and industrial boiler houses. Most boilers in these utility plants combust gas which accounts for 56% of fuel consumption, followed by 24% liquid fuel (heavy oil) and 20% coal. About 14% of households in Serbia use district heating as primary heating source, 33% use electricity, 39% coal, 7% wood and 7% natural gas. Coal and wood heating locally produce high emissions of soot, SO<sub>2</sub>, NO<sub>x</sub>, CO and particulate matter resulting from poor quality of fuel and incomplete combustion. There are 45 towns with district heating systems (DHS) with the installed capacity of 6.000 MJ/s. The efficiency of centralised heat production and distribution is low (losses exceed 20%). About 1,200 local boiler houses in Belgrade were connected to the district heating system, which resulted in reduced pollution load (soot, particulate matter, CO, SO<sub>2</sub>, NO<sub>x</sub>) within the city. The boiler houses and utility plants do not have PM removal systems or they are not maintained adequately, so particulate matter emission often exceeds the MAC values.

The oil processing causes significant air pollution due to emissions of VOC and other aromatic hydrocarbons. Sludge from oil refineries poses risk to the environment. The NATO air raids of the Novi Sad oil refinery endangered the water abstraction points of Novi Sad.

Causes of problems:

- Poor enforcement of emission limit values for SO<sub>2</sub>, PM, VOC and NO<sub>x</sub>
- Low energy efficiency of the economy
- Low energy efficiency in energy generation and distribution
- Low energy efficiency of oil exploitation and processing
- Low energy efficiency of buildings
- High energy losses in the heating distribution network
- Obsolete energy generation technology and distribution network
- Lack of abatement technologies for desulphurization and denoxification of flue gasses, especially in the thermo power plants and oil refineries
- Lack of wastewater treatment plants
- Insufficient use of alternative and renewable energy sources
- Excessive use of fossil fuels
- Lack of standards for effluents discharged to receiving waters
- Insufficient and inadequate monitoring of industrial air emissions
- Lack of strategy and insufficient incentive measures encouraging companies to introduce cleaner production technology
- Insufficient incentive measures to curb industrial pollution
- Negligible number of companies have introduced and implemented environmental management system
- Lack of mechanisms in the privatization process to address the historical pollution, damages caused to the environment and non-compliance with environmental protection
- Inadequate industrial and hazardous waste management and storage
- NATO air raids of oil refineries in Pančevo and Novi Sad
- Poor management and disposal of fly ash
- Lack of technology for production of unleaded petrol according to EU standards
- Insufficient environmental management in oil refineries
- Insufficient enforcement of protection measures in the hydropower plants



#### Environmental impacts:

- Air pollution by SO<sub>2</sub>, NO<sub>x</sub> and CO<sub>2</sub> from the energy sector
- Contribution to the greenhouse effect through CO<sub>2</sub> emission
- Air and water pollution caused by ash heaps
- Risk of accidental spillages from ash heaps
- Soil degradation near thermo power plants caused by fly ash and heavy metals
- Forest die out caused by acid rain
- Surface, groundwater and soil pollution caused by hydrocarbons emitted by the oil refineries
- Cooling water from power plants is discharged directly into watercourses increasing the ambient water temperature
- Accumulation of sediments in water reservoirs due to reduced water flow
- Degradation of water quality, sediments and changes of ecosystem in large water reservoirs

#### **6.4. Agriculture**

The agricultural sector in Serbia enjoys very favourable natural conditions for intensive agricultural production. Indeed, within the total territory of Serbia (not including Kosovo and Metohia) 66.03% is agricultural land (59.35% in central Serbia and 83.43% in Vojvodina). Of the total population of the Republic of Serbia, 10.87% is employed in agricultural sector (11.01% in central Serbia and 10.58% in Vojvodina), contributing 19.2% to GDP (17.1% in central Serbia and 23.8% in Vojvodina).

In terms of ownership structure, about 85% of the cropped land is privately owned; state farms cover 15% of arable land. Private farms tend to be small and fragmented and many are used principally for subsistence farming. State farms are usually large, highly mechanized and tend to be concentrated in the fertile and flat plains of high quality land.

The main crops include: cereals with 63% share (maize, wheat, barley, oats and rye), livestock fodder with 14.6% share (alfalfa, clover, fodder corn, vetch, and fodder green-peas), industrial crops with 13.2% share (sunflower, soy, sugar beats, tobacco, oil beat), and vegetables with 9.2% share (potatoes, cabbage, tomato, lemon and water melon, paprika, onion, beans, and green peas).

Fruit orchards in Serbia cover 4.8% of the agricultural land and the predominant fruits are plum, apple, raspberry, pear, peach, strawberry, apricot, cherry, hazelnut and quince. Vineyards cover 1.3% of agricultural land and total grape production in 2003 was 450,000 tonnes.

Livestock breeding, in terms of number of animals, include mostly: poultry (17.7 million), pigs (3.6 million), sheep (1.5 million), cattle (1.1 million), goats (169 thousand) and horses (24 thousand).

The consumption of fertilizers in Serbia declined from 115 kg/ha in 1991 to 36 kg/ha in 2002. Consequently, the contribution of land cultivation to eutrophication of water bodies has been significantly reduced. Currently, the soil contamination and eutrophication problems in Serbia are connected mostly with uncontrolled effluents from livestock farms. There is little promulgation of good environmental management practices in large livestock farms.

#### Causes of problems:

- Lack of national strategy for sustainable agriculture
- Improper and uncontrolled use of pesticides
- Inadequate management of soil fertility and application of fertilisers
- Inadequate environmental management in large livestock farms
- Agricultural and forestry practices encouraging soil erosion
- Low level of environmental awareness amongst agricultural producers

#### Environmental impacts:

- Organic pollution caused by inadequate management in large livestock farms
- Contamination of agricultural soil caused by improper handling of chemicals used in agriculture and application of polluted irrigation water
- Pollution of soil and agricultural products by lead along the main roads
- Eutrophication of watercourses in areas sensitive to nitrate pollution
- Chemical (mainly nitrate) and bacteriological contamination of shallow aquifers

## **6.5 Forestry and Hunting**

### **Forestry**

Forests represent significant ecological, economic and social potential of the Republic. The law defines forests as public good of the common interest to be used in a sustainable way in order to conserve and increase their value, ensure sustainability and protection, and constantly increase the increment and yield.

The state-owned forests that cover a half of the total forests in Serbia, are managed by public enterprises for forest management Srbijasume and Vojvodinasume (93%), public enterprise National Parks (5.8 %), public enterprise Borjak - Vrnjacka Banja (0.6 %), the Faculty of Forestry of the University of Belgrade (0.4%) and different agricultural and water management organizations (1.3 %).

The public enterprises for forest management and public enterprise National Parks perform professional and technical tasks in private forests. The basic management unit in private forests is a plot. An average plot area is 0.3 ha, which makes management very difficult.

The total forest fund in Serbia is 235 million m<sup>3</sup>, and the current volume increment is estimated to be above 6 million m<sup>3</sup>. An average felling level in Serbia is about 2.5 million m<sup>3</sup>, and the level of afforestation was 3,661 ha in 2003. Measures of care are applied to over 30,000 ha of state-owned forests, and to about 15,000 ha of private forests.

The recorded damage to forests in 2003 included: illegal felling 16,720 m<sup>3</sup>, other types of damage inflicted by men 2,914 m<sup>3</sup>, damage by insects 10,384 m<sup>3</sup>, damage by natural disasters 8,812 m<sup>3</sup>, damage by plant diseases 5,690 m<sup>3</sup> and by fire 37,520 m<sup>3</sup> (about 1,400 ha).

### **Hunting**

In the Republic of Serbia there are 323 hunting sites, of which 199 are located in central Serbia, 91 in the AP Vojvodina and 33 in Kosovo and Metohia. The total hunting

area is 8,828,588 ha of which 73.6% are hunting grounds and 26.4% are non-hunting grounds. There are 94 registered mammal species, of which only 22 have the status of hunting wildlife. Of the registered 360 bird species, only 24 are hunting bird species.

The hunting sites are used by the Serbian Hunting Association and other hunting associations, JP "Srbijašume", JP "Vojvodinašume", Public Enterprises for National Parks, the Army etc.

A number of problems exist regarding the management of populations of some species of hunting fauna. Consequently, populations of certain species declined and are now under protection.

#### Causes of problems

- Inadequate level of technical-technological and institutional management of forestry and hunting
- Lack of strategic planning documents regarding the forestry sector
- Insufficient development of forestry monitoring
- Insufficient research of relations between allochthonous species and resident species, including predators and parasites
- Uncontrolled use of chemicals in agriculture
- Inadequate management of certain game species

#### Pressure on biodiversity

- Pressure on biodiversity
- Pressure on the number and distribution of game species

## **6.6 Transport**

The Republic of Serbia has relatively extensive transport infrastructure network. However, the state of infrastructure has deteriorated in the past decade due to lack of maintenance and the war damage. The total length of the road network is 49,805 km. Paved roads cover 31,029 km. The road network includes 380 km of highways. Most larger cities do not have by-pass roads. Generally, the road conditions are unsatisfactory.

The total length of railways reached 3,819 km in 2002 and 33% of railway is electrified. The condition of the railway infrastructure has deteriorated due to lack of maintenance. The share of railway in the passenger and cargo transport has significantly declined in the past decade.

Serbian navigable rivers are 959 km long. The main navigable river is the Danube (588 km) followed by the Sava (207 km) and the Tisa (164 km). In addition, the Danube-Tisa-Danube Canal provides navigable waterway. The main inland harbours include Belgrade, Novi Sad, Pančevo, Apatin, Bačka Palanka, Prahovo, Smederevo, Senta and Bogojevo. The ports generally do not have adequate environmental infrastructure and environmental protection systems.

Serbia operates two airports with regular traffic: Belgrade and Niš. The Belgrade airport handled 75% of domestic passenger traffic and 90% of cargo in the former State Union of Serbia and Montenegro.

The condition of vehicle fleet in Serbia is generally unsatisfactory. In 2004, Serbia had 2,260,453 registered road vehicles and the number is increasing rapidly.

Public transport and private vehicles do not run on natural gas (very limited number is fuelled with liquid gas). Road vehicles are considered a major contributor to air pollution in Serbia, especially in larger cities. Emissions from vehicle exhausts contribute to SO<sub>2</sub>, CO, NO<sub>x</sub>, O<sub>3</sub>, particulates, and lead pollution in the atmosphere. The sulphur and lead pollution is particularly problematic in Serbia because of the poor quality of fuels (high sulphur diesel and leaded petrol). The concentration of nitrogen oxides and carbon monoxide regularly exceed the permissible levels in Belgrade (particularly, in the central city zone). Air pollution from transport is increasing in the past few years due to import of large number of used cars.

There are no registered public transport vehicle in Serbia which uses natural gas. There is no significant number of transport vehicles which use liquid gas. There are no private cars running on natural gas, and no significant number of private cars using liquid gas.

Causes of problems:

- Poor state of repair of the vehicle fleet
- Insufficient use of gas and other alternative fuels
- Insufficient number of gas fuel stations
- Excessive reliance on road transport
- Insufficient national and urban road network for the increasing volume of traffic including insufficient number of by-pass roads
- Poor enforcement of the Regulation on Exhaust Gases Emissions from Motor Vehicles
- Inadequate fuel quality standards allowing excessive content of sulfur, lead & PAH
- Lack of technology for recovery of fuel vapour from the handling of petrol at terminals, petrol stations, mobile containers and tankers
- Insufficient use of public transport and obsolete public transport vehicles

Environmental impacts:

- Non-point air pollution caused by traffic (lead, CO, formaldehyde, VOCs, benzene, heavy metals, NO<sub>x</sub>, particulate matter and O<sub>3</sub>)
- Hydrocarbon emissions (including VOC) from loading and unloading of motor fuel
- Oil and derivative pollution in navigable watercourses
- Noise pollution and vibration caused by non-point sources mainly car and aircraft traffic
- Soil and water pollution caused by traffic (dust, soot, lead)

## **6.7. Environmental impacts of other sectors**

### **6.7.1. Urbanism and spatial planning**

The uncontrolled urbanisation in the past decade has lead to accumulation of environmental problems in large urban areas, and to depopulation of rural areas. In most cities the number of inhabitants has been increasing, which has not been followed by the adequate measures stimulating local economy, employment, housing, transport infrastructure, sewerage, waste management etc. The non-compliance with the Law on Planning and Construction (Official Gazette RS No. 47/03), Environmental Protection

Law and other laws has contributed to the expansion of illegal construction, which violates spatial plans and threatens rational use of space, resources and all environmental factors.

The Republic of Serbia Spatial Plan (RSSP) adopted in 1996, created the basic strategic framework for long-term policy of spatial organisation and development in the Republic based on the harmonisation and integration of spatial aspects of different sectoral strategies, plans and programmes.

The implementation of the RSSP recommendations has not fulfilled the expectations. It included mostly the preparation and adopting of two regional plans and a number of spatial plans for special purpose areas, such as the plans for: national parks and protected areas, areas of constructed cultural sites, water protected zones, tourist areas, areas of electric power complexes, areas of main infrastructural corridors, etc. However, even before the plans were adopted in areas attractive for tourism and economic development, there was a serious deterioration of environmental quality due to illegal construction activities. The environmental impact assessment practice could not provide adequate results for plans and programmes due to methodological shortages for assessment of cumulative and synergy impacts in complex systems.

Certain new arrangements were introduced by the Law on Planning and Construction requiring that instead of adopting a Master Spatial Plan of the Republic of Serbia, the Republic should adopt the Serbia Spatial Development Strategy as the principal national spatial planning document. For the development of regions the following planning documents should be adopted: spatial development schemes, spatial plans for special purpose areas, regional spatial plans and municipal spatial plans. The Law on Strategic Environmental Assessment provided the legal framework for assessment of spatial development plans.

Causes of problems:

- Lack of clearly defined national policy for spatial planning and development
- Excessive demographic growth of biggest towns
- Lack of qualitative spatial and urban plans
- Poor planning practice and ineffective enforcement
- Lack of adequate information base (data-base on space and the state of the environment)
- Insufficiently developed and applied methodologies for sustainable spatial and urban planning
- Lack of methodology for monitoring and implementation of plans (indicator based monitoring system)
- Lack of economic instruments for the implementation of planning documents
- Insufficient integration of environmental issues in spatial and urban planning
- Inadequately developed instruments for comprehensive consideration and integration of economic, environmental and social issues
- Insufficient public utility infrastructure in settlements, especially suburban and rural
- Inadequate and uncoordinated traffic system in towns
- Insufficient traffic links between settlements, especially in rural areas
- Illegal construction
- Poor protection of groundwater and surface water sources used for water supply

Environmental impacts:

- Uneven urbanisation and deterioration of living conditions in urban areas
- Pollution of ground- and surface water (due to limited treatment of urban wastewater)
- Environmental degradation (caused by improper management and disposal of municipal waste)
- Degradation of landscape and visual impacts
- Pressure on protected natural areas and biodiversity due to illegal construction and inadequate use of space
- Contamination of water sources used for water supply

**6.7.2. Tourism**

Tourism has its great interest in maintaining the quality of environment, as it relies on it. Thus, clean and healthy environment is a very important prerequisite for successful development of tourism. The tourism sector is the responsibility of the Ministry of Trade, Tourism and Services.

The main tourism activities in Serbia include tourism in large cities, health (spa), mountain tourism linked to special areas (cultural and natural treasures, hunting, fishing), rural tourism, river tourism (especially on the Danube), skiing. Belgrade and Novi Sad are the most frequently visited cities. The protected natural treasures under significant impact from tourism are: Kopaonik, Zlatibor, Tara, Zlatar, Stara Planina, Golija, Divčibare, etc.

Similarly to other sectors, tourism has impact on the quality of environment as a consumer of natural and other resources: land, water, fuel, electricity and food, as well as a producer of great quantity of waste and emissions. Negative impacts of tourism on the environment are evident in the pressure on natural resources, biodiversity and habitats, generation of waste and pollution.

According to the data from the Republic Bureau of Statistics, in 2002 in Serbia there were about 87,000 beds including 46,000 beds in hotels (within this number 11 % in four and five star hotels). During 2002, 2.2 million tourists, with 7.2 million overnight stays were recorded in the Republic of Serbia.

The tourism sector employs more than 100,000 people, contributing 4.5 % to the total employment in the country. Tourism participated about 2 % to the Serbian GDP in 2002.

The negative impacts of tourism on the environment in Serbia are not significant. The current negative impacts of tourism activities on the quality of environment are caused by weak enforcement of planning regulations, lack of infrastructure for waste water treatment and uncontrolled disposal of waste, and ineffective management of protected areas.

Causes of problems:

- Insufficient compliance with spatial planning and urban planning documents
- Illegal construction in protected natural areas
- Inadequate management of protected areas
- Inadequate communal and transport infrastructure

<u>Environmental impacts:</u>
<ul style="list-style-type: none"> <li>▪ Pressure on environment, natural resources and biodiversity by inappropriate location/illegal construction of tourism facilities</li> <li>▪ Discharge of untreated sewage</li> <li>▪ Littering and illegal dumping of waste</li> <li>▪ Emissions to air from transport and heating installations</li> <li>▪ Noise emissions from traffic</li> <li>▪ Uncontrolled and environmentally unacceptable tourism development in protected areas and other valuable natural areas</li> <li>▪ Disturbance of habitats and wildlife by visitors</li> </ul>

**7 ENVIRONMENTAL POLICY OBJECTIVES**

**7.1. Strategic framework for establishing policy objectives**

Environmental policy objectives of the NES were developed in a strategic framework that included the following elements:

- Analysis of the identified environmental problems;
- Analysis of legal, institutional and infrastructural causes of these problems;
- Set of guiding principles for the NES focusing on sustainable development principles, EU approximation needs, polluter pays principle, prevention principle and other (chapter 2);
- Analysis of the strengths, weaknesses, opportunities and threats (SWOT) of the environment in Serbia (see figure 7.1).

Figure 7.1. Strength, weaknesses, opportunities and threats of environment in Serbia.

<u>Strengths</u>	<u>Weaknesses</u>
<ul style="list-style-type: none"> <li>• Commitment of environmental institutions to environmental protection</li> <li>• High level of biodiversity and geodiversity</li> <li>• Adequate volume of water resources</li> <li>• Considerable potential of natural resources</li> <li>• Low intensity and chemisation of agriculture by fertilisers and pesticides</li> <li>• High quality of environment in non-industrialised areas</li> <li>• Considerable hydro-energy potential</li> </ul>	<ul style="list-style-type: none"> <li>• Excessive exploitation of aquifers, forests and other natural resources</li> <li>• Inadequate time/space distribution of water</li> <li>• Loss of fragile natural habitats</li> <li>• Significant soil erosion processes</li> <li>• Excessive water pollution</li> <li>• Pollution of water, soil and air by poor waste management practices</li> <li>• Excessive air pollution in industrial zones and in energy and mining regions</li> <li>• Excessive air pollution resulting from traffic</li> <li>• Significant gaps in environmental infrastructure (wastewater treatment, solid waste disposal and treatment, and air pollution abatement)</li> <li>• Inadequate legislative framework</li> <li>• Insufficient monitoring</li> <li>• Insufficient law enforcement</li> <li>• Insufficient institutional capacity</li> </ul>

	<ul style="list-style-type: none"> <li>• Lack of incentives for pollution reduction</li> <li>• Lack of efficient environmental financing system</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Approximation with EU norms and standards providing for improved quality of the environment</li> <li>• Strong political commitment to implement legal reforms in environmental protection</li> <li>• Access to EU funds during the pre-accession process and commitment of other donors</li> <li>• Modernisation and privatisation of industry</li> <li>• Enhanced economic competitiveness in the international market</li> <li>• Introduction of the concept of cleaner technologies</li> <li>• Improving energy and raw materials efficiency</li> <li>• Introduction of new technologies</li> <li>• Participation of stakeholders in environmental decision-making</li> <li>• Increasing public environmental awareness</li> <li>• Clearly stated environmental policy objectives</li> <li>• Intensive international cooperation</li> <li>• Ban on nuclear power plants</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Poverty, indebtedness and slow economic growth,</li> <li>• Lack of political will to implement legal environmental reforms</li> <li>• Poor implementation of laws, programs and plans</li> <li>• Slow pace of institutional strengthening</li> <li>• Insufficient institutional coordination</li> <li>• Low level of environmental awareness</li> <li>• Environmental funds not used for the specified ear-marked purpose</li> <li>• Inability of citizens to pay the full cost of public utility services</li> <li>• Restrictive budget policy</li> <li>• Re-starting industrial production with obsolete technologies</li> <li>• Rising level of motorvehicle transport based on low quality fuel</li> </ul>

## 7.2. Approach to ranking policy objectives

The process of setting priority policy objectives consisted of the following stages:

- A Selecting prioritisation criteria
- B Setting weighting system
- C Setting scoring system
- D Setting priorities by stakeholders

Ten prioritisation criteria were used (table 7.1). Stakeholders applied weights to reflect the significance of each prioritization criterion.

Table 7.1. Prioritisation criteria and weighting system applied in the NES process.

No.	Prioritisation criteria	Weights
1.	Expected environmental benefits	3.78
2.	Expected health benefits	3.28
3.	Meeting EU approximation needs and international agreements	2.56
4.	Savings of natural resources and energy	2.5
5.	Creation of permanent jobs	1.61
6.	Total expenditure required to achieve objective	1.5



7.	Expected biodiversity & habitat gains	1.44
8.	Creating a basis for implementation of other policy objectives	1.06
9.	Expected benefits for nature protected areas	1.06
10.	Size of the beneficiary population	1.0

The scoring system for the prioritisation criteria was both qualitative and quantitative. For instance, qualitative scoring was applied to the criterion *expected environmental benefits*:

- Score 3: High or very high
- Score 2: Medium
- Score 1: Low or indirect
- Score 0: None

Whereas, the scoring system for the prioritization criterion *total expenditure required to achieve objective* was quantitative:

- Score 3: less than 0.5 million Euros
- Score 2: 0.5 – 5 million Euros
- Score 1: 5.1 – 50 million Euros
- Score 0: more than 50 million Euros

Each policy objective was analysed through the prioritisation criteria. The individual result per criterion (e.g. the size of the beneficiary population) was obtained by multiplying the score (e.g. score 2 for the population of 300,000) by the weight attached to the criterion (which reflects its importance, e.g. weight 1.0). The results from each criterion (e.g. score 2 multiplied by weight 1.0 for criterion addressing the size of the beneficiary population) were then added up to obtain a specific number for each policy objective and presented in the summary prioritisation matrix. The score was adopted as priority rank of the objective. The final step was to list all policy objectives in the order of priority ranks from top to bottom, and subsequently grouping the policy objectives into the short- and medium term categories.

### 7.3 General policy objectives

General policy objectives of the NES address the general causes of environmental problems identified in section 5.1. They should be considered as pre-conditions for effective implementation of specific policy objectives and are integral part of environmental policy improvements in economic sectors and in the environmental media. Due to their general and declarative nature, the general policy objectives were not prioritized. Hence, they are grouped in the following key policy areas:

1. Full integration of environmental policy with economic and other sectoral policies. Sectoral policies and strategies should incorporate environmental considerations. Environmental principles should also be integrated into spatial and urban planning.
2. Institutional capacity for development and enforcement of sectoral and environmental policy should be strengthened generally and emergency response systems should be developed.
3. Upgrading environmental monitoring and enforcement system will require establishing accredited laboratories, enforcement of norms and standards and

mandatory quality control of analyses and emission monitoring, self-monitoring by polluters, the establishment of inventory of polluters and environmental information system.

4. Developing comprehensive system of environmental legislation through adoption of sectoral laws and by-laws, improved law enforcement monitoring, and increasing capacities of the judiciary system. Laws relevant to the environment should be further revised and gradually harmonized with the EU environmental *acquis*.
5. Establishing effective system of environmental financing and economic incentives. The polluter pays principle should be fully implemented. Effective system of economic instruments should be introduced to provide strong incentives for pollution reduction. Effective financing mechanisms should be introduced to stimulate environmental expenditures and provide reliable sources of financing for the Environmental Fund. They should include debt for environment swaps, full cost recovery in environmental services, investment programs in privatized companies etc. Environmental liabilities should be adequately addressed in the process of privatisation. The level of environmental investment should be increased to provide for operating, maintenance and upgrading/modernization of existing environmental infrastructure and abatement technologies. Competition and private sector involvement in municipal environmental services should be encouraged, especially in waste and water management.
6. Improve formal and informal environmental education to be based on the National Strategy for Environmental Education. Increase environmental awareness through improved information and communication with the public and develop mechanisms for public participation in environmental decision-making in line with the Aarhus Convention.

#### **7.4 Time frames for implementation of policy objectives**

##### **7.4.1. Short-term policy objectives 2006-2010**

The overall goal for the short-term period is to build an effective environmental policy and enforcement framework (compliant with the EU environmental *acquis*) that will allow significant improvement of environmental quality in Serbia in the medium-term. The policy priorities for 2006 – 2010 constitute the most urgent policy objectives that will allow substantial reform of environmental policy at relatively low cost. The objectives concentrate on improving the legal framework, developing sectoral strategies and investment plans, and improving the monitoring system.

##### **7.4.2. Ongoing policy objectives 2006-2015**

The on-going priorities include policy objectives that should start in 2006 but their implementation requires long time and can only be accomplished within the whole time frame of the NES. The ongoing policy objectives for this period focus on extension and modernisation of environmental infrastructure, nature conservation and biodiversity related objectives. Implementation of these objectives will concentrate in areas with the status of especially endangered environment. It will include wastewater treatment plants, sanitary landfills, air pollution abatement technology, traffic improvements etc., and consequently incur high investment costs.

### 7.4.3. Medium term policy objectives 2011-2015

The medium term priority objectives are envisaged for implementation after 2011. The objectives include investment projects of lower priority that are less important from the view point of pollution reduction (e.g. recycling and reuse of certain waste streams, pollution reduction in navigable waters, sewage sludge management). They address also implementation of the less critical provisions of the EU environmental *acquis* such as setting up nitrate protection zones, bathing water standards or planning provisions of the Noise Framework Directive.

### 7.5. Priority environmental policy objectives

#### 7.5.1. Water quality and water resources

##### Short-term policy objectives 2006-2010

- To harmonise the national water management legislation with the EU Water Framework Directive 2000/60/EC, and introduce effluent standards according to the Urban Wastewater Treatment Directive 91/271/EEC
- To establish protection zones for all current and planned water supply sources
- To improve coordination of national institutions responsible for water management
- To adjust the drinking water standards to requirements of the Drinking Water Directive 98/83/EC by 2008
- To ensure sustainable use of groundwater aquifers
- To improve standards and efficiency of laboratories for water quality monitoring

##### On-going policy objectives 2006-2015

- To improve water quality in water courses by reducing discharges of untreated industrial and municipal wastewater
- To upgrade or renew operation of the existing municipal wastewater treatment plants
- To provide wastewater treatment in agglomerations with organized sewerage system that have significant impact on the receiving waters and especially on sensitive areas<sup>2</sup>
- To extend sewerage system to cover 65% of population by 2015
- To ensure that drinking water in urban areas meet quality standards of the Drinking Water Directive 98/83/EC, and to extend the centralised water supply to selected rural areas with the most unsatisfactory water quality
- To rationalize water consumption by individual users

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<sup>2</sup> Priority is given to agglomerations above 100,000 pe, cities located in vulnerable areas (including water source protection zones) but excluding agglomerations discharging directly to large water bodies (Danube, Sava) where the wastewater treatment plants will be completed after 2015.

#### Medium-term policy objectives 2011-2015

- To adjust the bathing water quality standards to the Bathing Water Directive 76/160/EEC by 2012
- To ensure environmentally and technically sound reuse or disposal of sewage sludge from WWTPs

#### **7.5.2. Waste management**

##### Short-term policy objectives 2006-2010

- To harmonize national waste legislation with the EU environmental *acquis*
- To develop integrated waste management plans for all regions following the Waste Framework Directive 75/442/EEC by 2010
- To extend municipal waste collection to cover 80% of population by 2008
- To establish national capacity for treatment of hazardous waste by 2007
- To develop programme for management of animal waste

##### On-going policy objectives 2006-2015

- To introduce separate collection and treatment of municipal hazardous waste
- To establish sanitary landfill in each region according to technical and operational requirements of the Landfill Directive 99/31/EC
- To safeguard appropriate incineration capacity for organic industrial and medical waste
- To encourage the use of waste as alternative fuel for cement and metallurgical industries
- To recultivate dumpsites that pose the greatest environmental risk
- To strengthen professional and institutional capacity of institutions dealing with hazardous waste
- To increase recovery and recycling of packaging waste (glass, paper, cardboard, metal and plastics) to 25% of their volume

##### Medium-term policy objectives 2011-2015

- To introduce treatment of end of life vehicles (ELV) following Directive 2000/53/EC
- To achieve 25% reuse/recovery/recycling rate for electrical and electronic waste
- To introduce composting of green waste

### 7.5.3. Risk and chemicals management

#### Short-term policy objectives 2006-2010

- To harmonize national legislation for management of chemicals and risk management with the EU environmental *acquis*
- To revise national regulations on accidents in industry and transport
- To ratify important international conventions on chemicals and accidents
- To establish and expand information system for management of chemicals and risk

#### On-going policy objectives 2006-2015

- To build professional and institutional capacity for management of chemicals
- To establish system for risk management and response to chemical accidents in industry and transport

### 7.5.4. Air quality and climate change

#### Short-term policy objectives 2006-2010

- To harmonize national air quality (including emissions to air) legislation with the EU environmental *acquis*
- To establish cadastre of polluters<sup>3</sup> and emission balances
- To upgrade the ambient air quality monitoring and assessment programme
- To modernize monitoring network and laboratories, and establish automatic stations for continuous monitoring of ambient air quality
- To draft National Action Plan for Combating Climate Change by 2007

#### On-going policy objectives 2006-2015

- To improve quality of ambient air in line with air quality standards by reducing emissions from energy, industry, transport and other sectors
- To ratify and implement international agreements dealing with air protection, climate change and protection of ozone layer
- To establish automatic monitoring of significant stationary air pollution sources

#### Medium-term policy objectives 2011-2015

- To designate zones and agglomerations, prepare and implement action plans where the ambient air quality does not meet the prescribed limit values following the Air Framework Directive 96/62/EC

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<sup>3</sup> As part of the Integrated Cadastre of Polluters

### 7.5.5. Nature conservation and biodiversity

#### Short-term policy objectives 2006-2010

- To adopt national legislation on nature protection and biodiversity consistent with the EU environmental *acquis* and international conventions
- To develop national strategies to maintain biodiversity and geodiversity
- To compile biodiversity inventory, especially the inventory of endangered ecosystems and habitats of rare and endemic species in 2006
- To establish monitoring of biodiversity components
- To implement effective measures to control introduction of Genetically Modified Organisms

#### On-going policy objectives 2006-2015

- To halt the loss of biodiversity by 2010 in accordance with the Kiev declaration
- To expand the coverage of nature protected areas to 10% of the national territory
- To prepare and implement action plan for conservation and sustainable use of wetlands
- To ensure conservation, improvement and extension of the existing forest ecosystems (increasing forested area and improvement of forest structure)
- To improve management of protected areas of national and international significance (information system, supervision of economic and tourism activities, implementation of protection and development plans, streamlining competencies etc)
- To establish eco-corridors to link fragmented fragile eco-systems
- To improve protection of Important Bird Areas
- To improve protection of autochthonous species and halt introduction of invasive species

### 7.6. Other environmental policy objectives

#### 7.6.1. Soil protection

#### Short-term policy objectives 2006-2010

- To harmonize national soil legislation with the EU environmental *acquis*

#### On-going policy objectives 2006-2015

- To achieve 20% reduction of land endangered by soil erosion by introduction of effective erosion control measures

### **7.6.2. Noise and vibration**

#### Short-term policy objectives 2006-2010

- To harmonize national noise and vibration legislation with the EU environmental *acquis*

#### On-going policy objectives 2006-2015

- To establish noise zoning and noise monitoring system in agglomerations most affected by noise emissions by 2010, following Directive 2002/49/EC
- To set up noise monitoring system in most congested sections of national roads
- To reduce excessive noise emissions in the most affected locations

#### Medium-term policy objectives 2011-2015

- To prepare action plans for areas covered by the noise maps following Directive 2002/49/EC
- To draw up noise maps for agglomerations with more than 250,000 inhabitants, major roads with more than 6 million passengers/year; major railways and the Belgrade airport by 2012 following Directive 2002/49/EC

### **7.6.3. Ionizing and non-ionizing radiation**

#### Short-term policy objectives 2006-2010

- To revise national legislation and improve institutional capacity for enforcement in the field of ionizing and non-ionising radiation
- To develop programme for management of radioactive waste
- To complete decontamination of soil contaminated by depleted uranium and establish monitoring of contaminated sites

#### On-going policy objectives 2006-2015

- To modernise and extend the radioactivity monitoring network by 2012
- To develop capacity for final disposal of radioactive waste

## **7.7. Priority environmental policy objectives for economic sectors**

### **7.7.1. Industry**

#### On-going policy objectives 2006-2015

- To reduce industrial emissions of SO<sub>2</sub>, NO<sub>x</sub>, particulate matter, VOC, PAH and other pollutants from the existing industrial facilities which do not meet the EU emission standards
- To expand treatment of industrial wastewater by upgrading the existing wastewater treatment facilities and installation of treatment plants in industries discharging hazardous sewage
- To introduce cleaner production and environmental management systems in industrial facilities
- To introduce integrated permitting system for industrial installations following the Law on Integrated Pollution Prevention and Control
- To clean up soil in the most severely contaminated industrial sites
- To increase energy and raw materials efficiency of industry and reduce waste generation

### **7.7.2. Mining**

#### Short-term policy objectives 2006-2010

- To revise national regulations on mining and geological research

#### On-going policy objectives 2006-2015

- To provide treatment of wastewater from mining and processing of minerals by upgrading the existing wastewater treatment facilities and installation of treatment plants in the mining sites discharging hazardous sewage
- To remediate and recultivate degraded land by mining activities
- To minimise risk of severe water pollution caused by mining activities
- To resolve the problems of disposal of washing water and solids from oil bore-holes

### **7.7.3. Energy sector**

#### On-going policy objectives 2006-2015

- To reduce emissions of SO<sub>2</sub>, NO<sub>x</sub> and particulate matter from large combustion plants to the levels required by the Large Combustion Plants Directive (2001/80/EC)
- To reduce environmental impacts of oil refineries



- To provide treatment of wastewater from energy sector by upgrading the existing wastewater treatment facilities and installation of treatment plants in energy plants discharging hazardous sewage
- To reduce environmental impacts of fly ash disposal by changing disposal technology
- To increase energy efficiency of the energy sector and reduce waste generation
- To recultivate land most degraded by ash heaps by 2011
- To increase the use of renewable energy sources and natural gas
- To connect individual households in cities above 20,000 to the municipal heating systems or gas heating systems
- To increase energy efficiency and reduce heat losses in the municipal heating generation and distribution
- To utilise 20% of fly ash from thermal power plants by 2011

#### **7.7.4. Agriculture, forestry and hunting**

##### Short-term policy objectives 2006-2010

- To increase environmental awareness amongst agricultural producers by developing and disseminating the Code of Good Agricultural Practice
- To revise legislation regarding forestry and hunting
- To adopt strategic documents addressing forestry and hunting

##### On-going policy objectives 2006-2015

- To reduce the discharge of nutrients from point and non-point agricultural sources and identify areas sensitive to water pollution by nitrates following Directive 91/676/EEC
- To improve management of fertilisers and pesticides in agricultural land, and hence reduce their environmental impacts
- To improve environmental management in livestock farms and processing facilities
- To develop organic farming
- To improve sustainable forest management system (especially in private forests)
- To develop modern monitoring system for forestry and hunting
- To improve hunting and fishing management and reduce their impact on biodiversity and protected areas

##### Medium-term policy objectives 2011-2015

- To restrict agricultural activities along waters that are sensitive to pollution by nitrates following Directive 91/676/EEC and in nature protected areas

## 7.7.5. Transport

### On-going policy objectives 2006-2015

- To phase out leaded petrol by 2010
- To introduce and implement standards for fuel quality according to the EU Directive 2003/17/EC by 2010
- To ensure that all cars produced in Serbia or imported comply from 2010 with the emission limit values for motor vehicles according to Directive 98/69/EC and 2001/100/EC
- To improve conditions and competitiveness of public transport in larger cities and hence reduce emissions from mobile sources in city centers
- To construct bypass roads in cities most affected by environmental impacts of through traffic
- To reduce pollution from vessels in navigable waters

### Medium-term policy objectives 2011-2015

- To reduce fuel vapor emissions from petrol stations, mobile containers and tankers following Directive 94/63/EC

## 8. POLICY MEASURES FOR IMPLEMENTATION OF ENVIRONMENTAL OBJECTIVES

### 8.1. Phasing of policy reforms

Implementation of policy objectives of the National Environmental Strategy requires significant reform of environmental policy and environmental institutions. The reforms are inter-related: reform of one policy instrument can be dependent on reform of other instruments, and in turn may enable further reforms of other policies. The policy reform measures refer to the following areas: regulatory instruments, environmental monitoring and reporting, economic instruments, environmental financing system, environmental institutions, environmental infrastructure needs, environmental education. The policy reforms presented include a wide range of instruments and reflect the implementation needs of the NES policy objectives. The policy instruments presented will need to be packaged to achieve each individual policy objective in an effective manner.

The environmental policy reform efforts should be broadly divided into two phases.

The short-term phase (2006 - 2010) should involve practical, financially feasible reforms, which can be implemented straight away. It refers primarily to legislative and regulatory reforms, aiming at harmonisation with the EU *environmental acquis*. The legislative reform will have to be coordinated with institutional strengthening and developing an effective monitoring system and increasing public awareness.

It is necessary to develop an efficient environmental financing system based on ear-marked funds and wide application of economic instruments. Funds and investments should be directed at this stage to the most endangered, priority areas, such as air pollution from large industries and power plants, wastewater treatment from large industries, urban wastewater treatment in cities discharging to small water courses and vulnerable zones (including water source protection zones), phasing out of leaded petrol, recultivation of the largest landfills causing the most significant threat to environment, construction of regional sanitary landfills, and clean up of the most severely polluted sites.

In the case of newly permitted installation and activities, all regulatory requirements should be identical with those provided for by the EU legislation. As far as the existing installation and activities, the 'temporary national approach' can be applied under which the regulatory requirements may differ from those applied by the EU.

The medium-term phase (2011-2015) will be dependent upon prior implementation of the preceding phase. It should focus on a wider application of incentive based instruments, accelerated harmonisation with the EU *environmental acquis*, improvement of environmental quality, and strengthening public and stakeholder involvement in decision-making, as well as resolving problems in degraded areas. Major capital investment projects will be implemented during this phase, especially in the urban wastewater treatment, waste management infrastructure and in industrial pollution abatement.

## **8.2. Legal regulatory framework**

### **8.2.1. Overview of the current situation**

Regulatory instruments are a category of environmental policy instruments whereby public authorities mandate the environmental performance to be achieved or technologies to be used. The Law on Environmental Protection (The Official Gazette RS No. 135/04) regulates especially the following:

- Criteria and conditions for sustainable use and protection of natural resources and values.
- Environmental protection (air, water, land, soil, forests, protected natural areas and national parks, waste, hazardous substances, ionizing radiation, noise and vibration).
- Measures and conditions for environmental protection (prevention), in terms of: spatial planning and construction; conditions for operation of facilities and installations; environmental quality standards and emission standards (ambient and emission limit values); bans and limitations; environmental management systems; standards for technologies, products, processes and services; environmental labeling.
- Remediation measures.
- Systems of permits and approvals.
- Hazardous substances protection measures (production, transport and handling).
- Environmental monitoring (monitoring and information system).
- Public awareness and participation in decision-making.
- Economic instruments for environmental protection.
- Liability for pollution.
- Administrative supervision.

➤ Fines policy.

The Law on Water Management (Official Gazette 46/91, 53/93, 67/93, 48/94 and 54/96) specifies the provisions regarding water regime, water management areas, competences for issuance of water management acts (including conditions and permits), water management activities, limitation of owner's or beneficiary rights, water co-operatives, financing water management activities, as well as administrative inspection, i.e. the supervision over the enforcement of the law.

The environmental protection system includes also special laws which need to be harmonized with the EU legislation: preservation of nature, introduction of GMOs, protection of air, water, land, soil, forests, geological resources, management of chemicals, waste management, ionizing and non-ionizing radiation, noise and vibration, etc.

The control of use and protection of natural resources and values is provided especially in the planning and construction stage by enforcement of standards, norms and regulations relevant to the use and protection of natural resources and values, strategic environmental assessment, environmental impact assessment, integrated pollution prevention and control, a coordinated system of permits and approvals, maintaining cadasters of exploitation of natural resources and values, establishing monitoring over the use of natural resources and environmental monitoring.

Preventive measures are developed with the aim to remediate damage and reduce the risks of damage. Integration of these measures and environmental conditions is implemented during the planning process through the SEA, EIA and IPPC procedures.

The most frequently used regulatory instruments are ambient and emission standards. Construction and operation of facilities and activities is possible if the ambient and emission standards, and the emission abatement technologies are met.

Ambient standards are better regulated and more frequently applied than emission standards. The ambient air standards exist for PM, soot, SO<sub>2</sub>, NO<sub>2</sub>, HCl, ammonia, heavy metals and other pollutants. The ambient limit values for surface water are in place. The ambient standards for soil and irrigation water cover a range of heavy metals. Ambient standards are also put in place for noise. Limit values for bathing waters, and fish waters have not been introduced. Most of the existing ambient limit values are not harmonised with the relevant EU directives.

Emission standards are set for air pollution (though these are not harmonised with the relevant directives such as the Large Combustion Plant Directive 2001/80/EC or the VOC Directive 1999/13/EC). The air emission limit values regulate combustion plants, processing of mineral raw materials, cement kilns, coke production, metallurgy, inorganic chemistry, organic chemistry, and vehicles (cars, lorries, motorcycles). Emission standards have not been introduced for effluent discharges.

System of bans or restrictions is put in force for certain trade and other activities including:

- Import, export and transit of technologies, processes, products, semi-finished products, raw materials that may be harmful to the environment and human health;
- Pollution of soil by excessive use of fertilizers or pesticides and by hazardous substances;
- Discharge of excessive amount of hazardous substances into surface and groundwater;
- Discharge of certain hazardous substances into water;

- Production, import and export of ozone-depleting substances, or products containing these substances, which are banned from trading (subject to permitting);
- Import, export and transit of endangered and protected species of wild flora and fauna and their reproductive forms and parts (subject to permitting);
- Import of hazardous and radioactive waste;
- Import, export and transit of waste (subject to permitting);
- Specific activities within the territory of national parks;
- Devastation of forests.

Product standards are introduced for certain products (petrol, diesel fuels, emissions from vehicles) but these are often non-compliant with the EU legislation.

The law provides for the participation of physical and legal entities in the process of environmental management systems (EMS) in compliance with the EU requirements, approvals and cancellation of environmental labelling of products, processes and services with reduced environmental impact.

Remediation measures imply the adoption of remediation plans at the level of national government, autonomous province and the units of local government, for a period of five years, in line with the law.

The key permitting procedures include: land use permit, construction permit (accompanied by the EIA procedure), water use permit and permits for the use of other natural resources (fish, medicinal herbs, timber, hunting etc). There are no emission permits for air pollution and wastewater discharges. The permit issuing authorities are respective ministries, autonomous province, municipalities or appointed institutions. Enforcement is usually carried out by the same institutions, which issue permits.

Strategic environmental assessment is introduced by the Law on Strategic Environmental Assessment (Official Gazette RS No. 135/04) in compliance with the EU Directive 2001/43/EC. It applies to state plans and programs as well as municipal spatial and land use plans. Public participation is envisaged at all stages of strategic assessment. The Law is implemented directly without the adoption of separate regulation.

The EIA procedure is implemented in Serbia according to the Law on EIA (Official Gazette RS No. 135/04). The list of projects is different from that required by the respective EU directive (85/337/EEC, as amended by 97/11/EC). The procedure consists of assessment in three stages for the existing and future facilities and projects: screening stage; determining the scope and content of the assessment study, and decision to issue the approval of the study. Public participation is envisaged at all stages of impact assessment. Full implementation of the law will be achieved after adoption of relevant by-laws.

The IPPC system was introduced by the Law on Integrated Pollution Prevention and Control (Official Gazette RS No. 135/04) in compliance with the EU Directive (96/61/EC). This system provides: integrated approach to pollution control by issuing integrated permits stipulating the obligation of the operator and conditions for the operation of facility or performance of an activity; full coordination between relevant authorities in the permitting process; public access to information and public participation prior to the permit decision-making. Full implementation of the law will be achieved after adoption of relevant by-laws.

Measures for protection against hazardous substances include bans and limitations regarding the production and trade of ozone depleting substances, or products containing such substances and the export, import and transit of waste. Handling of

hazardous substances is regulated in line with requirements of the EU Seveso Directive on industrial accidents.

Public information and public participation in decision-making has been introduced in line with the EU Directive (2003/35/EC). Capacity building for relevant organizations is necessary in order to achieve effective implementation.

The question of environmental liabilities of polluters for environmental damage is regulated by the law. However, the question of environmental liabilities of polluters for past pollution by privatised companies is not fully regulated by the privatisation Law. The proceeds from privatisation sales are allocated to the state budget.

The new recently adopted laws have, in some fields, delegated the administrative supervision to the bodies of the autonomous province and the units of the local government, which calls for further capacity building of relevant supervisory authorities.

### **8.2.2. Short-term reforms of the regulatory framework (2006 - 2010)**

A great majority of regulatory reforms should be undertaken during the short-term phase to enable implementation of the NES policy objectives and reform of other policy areas.

The focus is placed on the adoption of separate laws addressing conservation of nature, air quality, water, land, soil, forests, geological resources, ionizing and non-ionizing radiation, noise and vibration, management of chemicals, waste management and other.

Priority is assigned to the adoption of by-laws on the basis of the Law on Environmental Protection relevant to:

- Environmental quality standard and emission standards;
- Environmental Management System;
- Environmental labeling;
- Import and export of ozone-depleting substances or products containing them, if their trade or use is prohibited;
- Import, export and transit of waste;
- Handling hazardous substances;
- Environmental monitoring and information system and an integral cadastre of polluters;
- Economic instruments (user charges and pollution charges).

A shift should be made from the ambient quality standards to the emission and technology based standards to achieve a balanced approach, which allows more effective enforcement. The emission standards should be revised and the missing standards (e.g. for effluent) should be introduced.

The ambient standards should be aligned with the respective EU directives during the short-term period. Certain national standards should be kept in the areas which are not covered by the EU legislation. The ambient quality limit values for air (including indoor standards), surface water, drinking water, groundwater and noise should be introduced following the respective EU directives (96/62/EC, 1999/30/EC, 2000/67/EC, 75/440/EC, 88/68/EC, 98/83/EC, 2002/49/EC etc.) as soon as possible due to the potential direct impact on human health. The existing national limit values should be retained for soot and total particulate matter until the monitoring network is modernized to measure PM10.

The limit values for the content of heavy metals in agricultural soil and in sewage sludge used in agriculture should be introduced following the Directive 86/278/EEC. Other limit values for soil quality could stay in place during the short-term phase.

The emission standards require a substantial reform. They should become in a short-term a basis for industrial pollution control and enforcement. The high priority reform is the introduction of effluent standard following the Urban Wastewater Treatment Directive 91/271/EC. The air emission limit values should be revised following the Large Combustion Plants Directive (2001/80/EC), the VOCs Directive 99/13/EC and the Incineration of Waste Directive 2000/76/EC.

Technical requirements should be urgently revised for sanitary landfill sites following the Landfill Directive 99/31/EC. A number of product standards should be revised in the short-term, especially those related to the sulphur content in liquid fuels (Directive 99/32/EC) and the quality of petrol and diesel fuels (Directive 98/70/EC). The phasing out of leaded petrol should be initiated as high priority although the implementation will be extended until 2010. The regulation for the content of certain hazardous substances in packaging (Directive 94/62/EC) should be introduced in the short-term.

The environmental management systems (ISO 14000, EMAS) for industrial sites should be widely promoted as voluntary measure. Companies should be encouraged to introduce EMS and a register of accredited companies should be set up. The eco-labeling scheme for environmentally friendly products should be introduced in the market, as stipulated in the Environmental Law (The Official Gazette R Serbia 135/04). It is necessary to adopt regulations for establishment and implementation of the EMAS system in compliance with the EU decision.

Ban on the import of CFCs specified in annex A of the Montreal Protocol should be introduced by 2010.

The system of integrated permitting shall be implemented according to the Law on Integrated Prevention and Pollution Control which is harmonized with the IPPC Directive 96/61/EC. Certain types of existing and proposed new installations will be subject to integrated permitting. For new installations, the law becomes applicable as of the time of its coming into effect. For the existing installations subject to IPPC the Government shall adopt a program of harmonization with the Law by 2015. The emission based permitting system should be introduced for installations that are not subject to IPPC.

The existing regulation concerning the import, export and transit of waste should be revised (following the EU requirements) in view of introducing a permitting system, lists of hazardous and non-hazardous waste, and the contents of documents supporting the permit application. Permitting system should be introduced for collection, treatment and disposal of waste.

In the field of handling hazardous substances, regulations are needed regarding: contents of plans for protection against accidents and safety reports; the keeping of records concerning types and quantities of hazardous substances in production, use, trade, transport, processing, storage and disposal, and the deadlines for submission of reports; the level of concentration of hazardous substances in environmental media requiring public information; the procedures and criteria for categorization and characterization of hazardous substances (including hazardous waste); and criteria for determining the significance of accidents that require proclamation of the state of environmental emergency.

### **8.2.3. Medium term reforms of the regulatory framework (2011 -2015)**

The medium term phase should focus on implementation and expanding of the various regulatory instruments introduced or reformed in the short-term phase. Emphasis should be put on introducing permitting to all significant pollution sources. In parallel, additional regulatory instruments should be introduced following the EU *environmental acquis*.

The EU ambient quality limit values should be transposed following Directives 76/160/EEC, 78/659/EEC and 79/923/EEC. The remaining soil quality limit values (other than the heavy metals introduced during the short-term phase) should be introduced following Directive 86/278/EEC.

Ban on the distribution of leaded petrol should be introduced by 2011 following a gradual phasing out of leaded petrol. From 2011 all cars produced and imported should meet the emission standards of the Directives 98/69/EC and 2001/100/EC. Protection of the nitrate sensitive zones (following Directive 91/676/EEC) will require that bans are introduced for certain agricultural activities (including limitations of the use of fertilisers, and cultivation of land along sensitive water bodies).

Voluntary agreements can be gradually phased in when the key regulatory system is effectively implemented.

## **8.3. Monitoring and information system**

### **8.3.1. Overview of the current situation**

Environmental monitoring and reporting requirements in Serbia are regulated by law and include the scope and manner of performing monitoring, authorized organizations, reporting, information system and cadastre of polluters. Obligation to carry out measurements and to report the data to the competent authorities exists in the case of air polluting installations (emission measurements), and producers of wastewaters (measurements of COD, BOD<sub>5</sub>, insoluble matter, pH, coliform bacteria, N, P).

The network of measuring stations for permanent and systematic monitoring of the quality of environment has been established in accordance with the current legislation and obligations assumed by the ratification of a large number of international conventions and protocols. However, the existing capacities (both in terms of equipment and human resources) for monitoring and reporting the condition and changes of the quality of environmental components in Serbia are inadequate and insufficient.

Apart from the inadequate equipment for environmental monitoring (especially the lack of automatic monitoring stations), significant problems are created due to a limited number of accredited laboratories, lack of standard operational sampling and analytical procedures, reference laboratory, inter-laboratory calibration and comparison. For those reasons, in some cases, the quality of the obtained data is unsatisfactory.

Monitoring in Serbia is focused on ambient quality. It does not cover all priority areas, especially the self-monitoring and compliance monitoring are inadequate and of limited scope. The reliance on ambient quality monitoring and limited compliance monitoring related to industrial emissions leads to the financial dependence of the



monitoring system on the limited state funding rather than private sector financing (if the self-monitoring was well developed).

Air quality monitoring is carried out in a network of measuring sites (stations) set up at different levels by professional organizations (the Public Health Institutes, the Hydro-Meteorological Institute, and research institutes). The quality of data from systematic measurements depends on the quality of equipment in institutions dealing with monitoring, and it is affected by financial constraints.

The state monitoring system of the Republic Hydro-Meteorological Institute, according to the Decree on Determining Air Quality adopted by the Government for the period of two years, covers systematic air-quality monitoring carried out in the network comprising: 13 stations not affected by significant sources of pollution, and 10 stations situated in meteorological stations affected by a range of sources of pollution, and 1 meteorological station for implementation of the EMEP programme. The monitoring stations carry out 24-hour sampling of air quality, and chemical analyses to determine ambient concentration of SO<sub>2</sub>, NO<sub>x</sub> and soot.

The network of local urban stations covers monitoring of basic pollutants: soot, SO<sub>2</sub>, NO<sub>x</sub>, CO, ozone, particulate matter and heavy metals. Air monitoring activities are based on biannual monitoring programme adopted by the government, based on monitoring network located in 76 measuring points in 40 settlements. In addition, 19 settlements are covered by 44 measuring points of local network for monitoring of specific pollutants depending on the proximity to industrial facilities (e.g. acrolein, formaldehyde, phenol, NH<sub>3</sub>, benzene etc).

Polluters occasionally perform special monitoring. Systematic monitoring of imissions of basic and specific pollutants is performed in a more limited scope compared to the Monitoring Programme, due to lack of funds. Measuring of basic pollutants is performed in 28 settlements, with 60 measuring points, and the control of specific pollutants is performed in 5 settlements, with 11 stations. Monthly reports are submitted to the Directorate for Environmental Protection and used for preparation of annual reports.

The water quality monitoring lies in the competence of the Republic Hydro-Meteorological Institute, the Institute of Public Health and other specialized organizations and institutes. Surface and groundwater quality, aquifers and reservoirs are monitored by the Republic Hydro-Meteorological Institute based on a two-year programme adopted by the government. The principal network of measuring stations, established during the 1960's, was enlarged both in terms of the number of stations and in terms of the frequency of sampling and analysis. In 2005, the state-owned hydrological monitoring system in the territory of Serbia (Kosovo and Metohia excluded) included 187 surface-water hydrological stations. The groundwater level is monitored on average 3-6 times a month in 400 stations.

The water quality is permanently monitored by the network of surface-water stations that includes 133 measuring profiles, with the sampling frequency 12-24 times a year, and analysis of 36-63 water-quality parameters. Daily control of water quality is carried out in 12 water quality stations on 8-10 parameters (complete analysis of water quality is carried out twice a month). Ground-water quality monitoring is carried out in 68 stations on average 30 parameters with the sampling frequency twice a year.

The analysis of water quality and sediments is carried out in all main water reservoirs in Serbia. The programme includes 36 measuring points with sampling

frequency twice a year, and testing of 36-63 parameters of water quality. Sediments are tested once a year on 33 profiles in water reservoirs and 33 profiles in river courses.

Organizations performing monitoring of surface and groundwater and effluent quality are obliged to report monthly the monitoring results to the Republic Hydro-Meteorological Institute and the public utilities for water supply according to the Law on Water Management article 60. In case of accidents the reporting is required during the same day. The quality of drinking water in the distribution networks and groundwater used by water supply companies is monitored regularly.

Over the past decade very little investment was made in modernizing the existing sampling and laboratory analysis equipment, especially for analyses of specific parameters.

Obsolete legislative regulations (the existing decree concerning the categorization and classification of surface water was adopted in 1978) does not enable implementation of modern approaches in this area.

Monitoring of wastewater discharges is a legal obligation, which is poorly implemented in Serbia and hence wastewater discharges are not systematically monitored. The number of parameters measured is too limited and usually not linked to hydrological measurements. There is no accessible registry of wastewater discharges and lack of available current data on discharge of wastewaters. However, a number of local cadastres of river polluters were established. Polluters are obliged to measure the quantity of wastewater, and monitor the operation of wastewater treatment installations (this obligation is insufficiently implemented). Compliance monitoring of wastewater is hampered by the lack of effluent standards.

Waste monitoring in Serbia is highly insufficient. There is no reliable mass balance of waste landfilled (lack of weighting bridges) and the waste statistics are therefore rather approximate. Statistical data on other waste streams such as municipal solid waste, biodegradable waste, construction waste and materials recoverable from waste streams are not available. The obligations of waste importers and exporters are based upon the Basel convention. The existing regulations require that all industrial waste prior to disposal or processing is separated, characterized and categorized. The waste characterisation is provided by the authorized laboratory; the waste category certificates are issued by the Recycling Agency. An inventory of hazardous substances, including data on more than 500 companies, is established and it includes also data on hazardous waste.

Monitoring of ionizing radiation is carried out by the Institute for Professional Medicine and Radiological Protection "Dr Dragomir Karajović" of the Clinical Center of Serbia. The monitoring has been in place for the past 40 years. Since 1996 it is performed according to the Decision on Systematic Monitoring of the Content of Radionuclides in the Environment ("The Official Gazette of FRY" Nr 45/97).

The Republic of Serbia lacks an integrated environmental information system and cadastre of polluters. There are bottom-up uncoordinated activities such as setting up of local or regional databases, emission cadastres but these may cause future problems with the database compatibility. The inadequate monitoring and reporting system adversely affects decision-making at the state level, and most of all, the efficient enforcement of environmental regulations and the application of the polluter pays principle. Due to the lack of data on emission sources it is not possible to use spatial dispersion models to obtain pollution maps and plan effective mitigation measures. Environmental externalities are not reflected in the System of National Accounts (SNA).

### 8.3.2. Policy reform measures regarding monitoring and information systems

Large number of specific policy objectives related to environmental media or economic sectors can only be implemented in an enhanced monitoring, self-monitoring and integral information and reporting framework (table 8.1).

Table 8.1. List of reforms of the monitoring and information system.

Relevant NES policy objectives	Monitoring and IS reforms
Water quality	Further development of surface and groundwater monitoring accordingly to the Framework Water Directive Establishing automatic stations for continued monitoring of certain water quality parameters Development of modern biological monitoring. Accreditation of laboratories and setting up reference laboratories Developing cadastre of polluters Increasing the number of monitoring sites, frequency and list of monitoring parameters of drinking water quality Establishment of integrated information system
Waste	Improving self-reporting of waste producers Monitoring waste volume, composition and physico-chemical characteristics Establishing waste database Increasing the number of labs for waste characterization
Chemicals	Setting up inventory of chemicals Establishing integrated information system for management of chemicals Establishing systematic monitoring of trading in and use of chemicals and their metabolites, the chemical pathways in the environment and living organisms in order to place the chemicals on the list of controlled substances Monitor and control laboratories with GLP certificates (good laboratory practice)
Air and Climate Change	Improving program of ambient air monitoring and air quality assessment Modernising monitoring networks in large cities and hot spots for monitoring of ambient concentrations Accreditation of laboratories and setting up reference laboratories Developing cadastre of polluters and pollution balances Defining zones with pollution levels above permissible levels Modelling effects of stationary and large point sources Enforcing self-monitoring Establishing GHGs emission inventory
Nature and biodiversity	Improving monitoring of biodiversity components, endangered species, ecosystems and protected areas Establishing bio-monitoring of certain water eco-systems Establishing national information system and databases in protected areas (based on GIS)
Soil and forestry	Improving monitoring of heavy metals, PAHs and pesticides in soil Introducing monitoring of sludge quality Monitoring of nitrates in surface- and groundwater Improving forest health monitoring in accordance with the ICPF Improving monitoring of soil erosion
Noise	Improving ambient noise monitoring especially in hot spot locations. Drawing noise maps Accreditation of organizations and setting up reference organizations for noise
Ionizing and non-ionizing	Improving radioactivity monitoring including indoor radon

radiation	Improving control of radioactivity of goods during import, export and transit Introducing monitoring of radiation of sites contaminated by depleted uranium Introducing monitoring of UV radiation Developing database for ionizing and non-ionizing radiation sources Developing database of radioactive waste
Industry	Enforcing self-monitoring (air, water) and improving emission compliance monitoring Monitoring of contaminated soil Setting up cadastre of polluters and manage database Collecting statistical data on industrial waste
Mining	Enforcing self-monitoring (air, water) and improving emission compliance monitoring Monitoring of contaminated soil Setting up cadastre of polluters and manage database Collecting statistical data on waste
Energy generation	Enforcing self-monitoring (air, water) and improving emission compliance monitoring Monitoring of contaminated soil Setting up cadastre of polluters and manage database Collecting statistical data on industrial waste
Agriculture	Monitoring the impact of big livestock farming estates and processing plants Monitoring the use of hazardous chemicals in agriculture Expand monitoring of nitrates and nutrients in the nitrate sensitive zones
Transport	Establishing and improving monitoring of air quality in the most affected traffic routes Setting up obligatory measurements of exhaust emissions

### 8.3.3. Short-term reforms of the monitoring and information system (2006 – 2010)

Reform of the environmental monitoring and reporting system in the short-term should concentrate on the key gaps that are affecting enforcement of environmental law and decision-making. Many of the monitoring and reporting reforms will be initiated in the short-term but their implementation will stretch over the whole decade. The following reforms are required:

- The laboratories should become accredited with International Standard ISO/IEC 17025, i.e. certified in line with good laboratory practice. Reference laboratories should be established. Uniform sampling and analytical procedures should be applied.
- A major part of the monitoring activities should be increasingly carried out by polluters as self-monitoring, coupled with record keeping, notification and reporting obligations to competent authorities on obligatory bases. Polluters must be fully responsible for emission self-monitoring. However, the state authorities should have sufficient laboratory capacities to carry out random checks, reference analysis and field measurement (sampling and mobile measuring devices). The reliability and quality of self-monitoring is a basic precondition for proper use of other policy instruments, enforcement and inspection activities.
- Monitoring based on the program adopted by the government (national monitoring – the state owned network for monitoring the quality of air, water, etc.) should be

adequately financed by the state budget. It should be developed by establishing automatic measuring stations.

- Self-monitoring should be performed and financed by polluters. The random compliance monitoring should be performed intermittently by the state authorities.
- The network of monitoring stations should be reviewed and optimized, and automatic ambient air monitoring should be introduced in the largest cities and in the hot spot locations (including radiation monitoring in areas contaminated by depleted uranium).
- Surface and groundwater monitoring should be harmonized with the recommendations of the EU water directives in line with the time schedules of activities for countries within the Danube water basin.
- Monitoring network for wastewater discharges should be set up.
- The GHG emission inventory should be established.
- Inventory of green house gas emissions should be set up.
- Establishing a central and integral data bank on all environmental components and cadastre of polluters in Serbia; provision of public access to environmental information. This database should be linked with the network of the European Environmental Agency (EIONET).
- Setting up monitoring and processing of data regarding waste generation, waste composition and physical-chemical characteristics of waste.
- System of National Accounts (NSA) should be modified to reflect environmental externalities and exploitation of natural resources. Capacity for estimation of green GDP should be developed.

A number of regulations will need to be adopted to reform the environmental monitoring and information system, including:

- The criteria for determining the number and distribution of measuring points, the network of measuring points, the scope and frequency of measurements, classification of events that are monitored, methods and indicators of environmental pollution including their monitoring, schedule and reporting requirements.
- Detailed conditions to be met by the authorized monitoring organizations.
- Types of emission subject to self-monitoring by polluters, measuring and sampling methodologies, records keeping, reporting schedule and management of records.
- The content and scope of maintaining information systems, methodology, structure, categories and data collection levels, and the content of information regularly reported to the public.
- The methodology for establishing the integral cadastre of polluters and the type, procedures, classification and reporting schedule.

#### **8.3.4. Medium-term reforms of the monitoring and reporting system (2011 -2015)**

The following reforms are envisaged in the medium-term:

- Strengthening of quality assurance and quality control in the certified monitoring institutions and laboratories.
- Further expansion of self-monitoring and compliance monitoring.

- Introduction of continuous ambient air (and noise) monitoring in smaller agglomerations.
- Broadening the network for monitoring of wastewater discharges.
- Introduction of regular monitoring of heavy metal content in sewage sludge, and heavy metal and pesticide's concentration in soil.
- Monitoring and processing of data on waste generation, waste composition and physical-chemical characteristics.
- Monitoring the reduction of the POPs' emissions.
- Regular monitoring of nitrates and nitrites in the nitrate sensitive zones.
- Expanding monitoring of nature components and forest health.
- Drawing of noise maps based on the monitoring data.
- Updating and expansion of the cadastre of polluters.
- Wider dissemination of environmental data and further improving public access to environmental information.
- The Green GDP figures should be published in the System of National Accounts.

#### **8.4. Economic instruments**

Economic instruments are a category of instruments intending to influence the behaviour of economic actors by introducing financial incentives in order to improve cost-effectiveness in environmental management and management of natural resources. From the economic point of view, economic instruments should:

- Maximize rational use of natural resources;
- Be an integral component of development strategy, especially of technological development and spatial distribution of economic /industrial facilities;
- Be legally defined, market based and effective in indicating the benefits of environmental protection. They should be institutionalised to become an effective tool persuading the polluters and consumers of goods and services that investing in environmental protection and reducing pollution load can bring financial benefits.

Overall, economic instruments should generate reliable sources of financing for environmental expenditures and enhance the level of environmental protection.

##### **8.4.1. The current situation**

The Law on Environment Protection provides the basis for application of effective economic instruments: user charges, environmental pollution charges, refund or exemption mechanisms or reduced charges for environmental pollution, and charges for the local government. Two regulations were adopted in accordance with the polluter pays principle specifying the criteria for calculation of the level of pollution charges for various types of pollution emissions, rules for collection of pollution charges, as well as measures and criteria for reduction or waiver of pollution charges. Pollution charges are defined (according to the types of pollution) for individual sources, generation and disposal of waste, IPPC installations, ozone depleting substances, motor vehicles.

In the water sector, there is legal basis for introduction of effluent charges (not related to effluent standards). The economic instruments currently in force include

mainly user charges (for water abstraction, water supply, waste, natural resources) and non-compliance charges which are generally set at below incentive levels.

Effluent charges<sup>4</sup> are paid by those discharging to surface and groundwater or man-made channels. Charges are based on the volume of discharges and the quality of the recipient. Charges are highest for the most polluting types of activity and for discharging untreated wastewater to the highest quality water bodies. The published rates are increased by 50% for Class I and 25% for Class II water bodies respectively. Polluters may be exempted from charges if they operate primary or secondary treatment plant. Revenues are collected in a special account of the Ministry of Agriculture, Forestry and Water Management. They are ear-marked for water related expenditure.

Exemption from payment of import duties is applied to equipment used directly in environmental protection, provided that equivalent equipment is not produced locally.

User charges are currently the most widely used economic instruments. Water supply companies, industry, agriculture and other water users pay charges for the abstraction of the permitted volume of water according to tariffs set out in the Decree on charges for water abstraction, water protection and material excavated from water bodies. Enterprises and households receiving water from public water supply systems pay charges, according to user categories or quantity based on metered usage. Tariffs are also payable by enterprises and households on the basis of sewage discharges. Both the charges and tariffs are paid to the water supply companies. User charges are levied on enterprises and households for municipal and industrial waste collection and disposal. Charge levels are not based on volume but rather on the size and/or type of residential property. Charges are intended to reflect the operational costs of the service (including maintenance) but do not generate surpluses for upgrading infrastructure (collection, treatment or disposal) or making new investments.

Taxes and payments for natural resources management are charged for abstraction and use of water and minerals, the use of land and forests, fishing and hunting. A 3% levy is payable on the value of timber to the State Forest Enterprise responsible for the management of the forest estate and for nature conservation in protected areas. The Law on Environment Protection allows also for application of tax on wild plants and species collected for commercial purposes. This tax is ear-marked for general environmental expenditure (including biodiversity and management of protected areas).

Fines are imposed for violation of environmental law. Fines are applied for discharge of effluents containing polluting substances exceeding the prescribed limits and activities leading to deterioration of ambient quality below the prescribed standards. They are also prescribed to be levied on enterprises or individuals for illegal waste disposal. The non-compliance fines are collected in the state or municipal budgets. However, the level of fines is low, fines are not indexed to inflation, and they are not an effective disincentive for violation of environmental laws.

Deposit-refund schemes in Serbia apply only to certain types of packaging (glass bottles, plastic bottle gaskets etc.).

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<sup>4</sup> Referred to in Serbian as charges for water protection.

#### 8.4.2. Policy reform measures

The underdeveloped system of economic instruments needs to be reformed and upgraded to successfully implement the NES taking into account (table 8.2):

- The charging basis of the instrument (whether by volume, weight, concentration of active ingredients or other factors);
- The likely financial burden of the instrument;
- The paying entities and their likely responses;
- Administration implementing the economic instruments.

Special attention should be paid to the ear-marked use of revenues, the likely impacts on the wider economy, and to reducing environmental pollution. Local communities should have the right to use a part of the landfill tax collected, if landfills for municipal or industrial waste are located within their territory.

Table 8.2. List of incentive based instruments supporting implementation of the NES policy objectives.

Relevant NES policy objectives	Reforms of Economic Instruments
<b>Water resources and wastewater</b>	
To ensure sustainable use of groundwater aquifers	Increase abstraction charges
To provide wastewater treatment in agglomerations with organized sewerage system that have significant impact on the recipient waters, especially on sensitive areas <sup>5</sup> To upgrade or renew operation of the existing municipal wastewater treatment plants To extend sewerage system to cover 65% of population by 2015	Raise effluent charges to stimulate treatment of wastewater Raise charges for collection and treatment of municipal wastewater Raise fines for discharge of untreated water and earmark the revenue
To achieve rational water consumption by individual users	Increase the level of water charges
<b>Waste management</b>	
To extend municipal waste collection to cover 80% of population by 2008	Change basis of waste charges for households and businesses Full cost recovery principle for waste charges
To introduce composting of green waste To establish sanitary landfill in each region according to technical and operational requirements of the Landfill Directive 99/31/EC	Landfill tax Methane tax
To increase recovery and recycling of packaging waste to 25% of their volume	Deposit refund for recycling packaging based on producer/importer responsibility
<b>Energy, industry and transport</b>	
To reduce emissions of SO <sub>2</sub> , NO <sub>x</sub> and PM from large combustion plants to the levels required by the LCP Directive To reduce industrial emissions of SO <sub>2</sub> , NO <sub>x</sub> , PM, VOC, PAH and other pollutants in industrial facilities which do not meet the EU standards	Air emissions charge for SO <sub>2</sub> , NO <sub>x</sub> , PM

<sup>5</sup> Priority is given to agglomerations above 100,000 pe excluding agglomerations discharging directly to large water bodies (Danube, Sava), where waste waters treatment plants will be completed after 2015



To phase out leaded petrol by 2010	Differentiated tax on leaded/unleaded petrol
All cars produced in Serbia or imported to comply from 2010 with the emission limit values following Directives 98/69/EC and 2001/100/EC	Trade in premium on old cars for new
To increase the use of renewable energy sources and gas in energy generation	Incentive instruments stimulating the use of renewable energy, such as tax and custom relief, other subsidies, system of feed in tariffs for energy producers or quota system with green certificates. Implementation of the Kyoto protocol instruments.
To increase energy and raw materials efficiency of industry and reduce waste generation	Establishing Fund for Energy Efficiency (according to the Energy Strategy of Serbia) and other measures stimulating energy efficiency Carbon energy tax on electricity Change water and waste charges to achieve full cost recovery Tax on tipping of fly ash and mining waste Tax incentives for companies investing in cleaner production
To utilize 20% of fly ash from thermal power plants by 2010	Subsidies for utilization of fly ash, slag etc in construction and building materials industry
<b>Forestry, Biodiversity &amp; agriculture</b>	
To achieve better conservation, improvement and extension of forest ecosystems	Stumpage charges for timber and fuel wood Subsidies for land forestation Quota & permit system for exploitation of wild plants and animals
To restrict agricultural activities along waters that are sensitive to pollution by nitrates in accordance with Directive 91/676/EEC and in nature protected areas	Subsidies to farmers for land use restrictions and income forgone (especially in protected areas and water protection zones)
To achieve 20% reduction of land endangered by soil erosion by introduction of effective erosion control measures	Subsidies for land afforestation

#### 8.4.3. Short-term reforms of incentive based instruments (2006 – 2010)

The main goal of the reform of economic instruments in the short-term is to introduce incentive function of the existing instruments by applying volumetric pollution, water and waste charges, differentiation of taxes to promote environmental desirable products or activities (e.g. unleaded petrol), air emission charges for the basic range of pollutants (based on the revised air quality standards and strengthened self-monitoring and compliance monitoring system), and raising the level of user charges to ensure application of the full cost recovery principle. Economic instruments should be implemented to stimulate environmental improvements during the privatisation process. User fees and pollution charges should be earmarked and channeled to the Environmental Protection Fund and other earmarked funds.

A differentiated tax on leaded and unleaded petrol should be introduced as high priority to reduce lead emission from vehicles. The differentiated tax in Serbia should take the form of an additional time-limited surcharge on leaded petrol in order to assist the phase out of leaded fuel by 2010. The tax rate would range from Euro 0.03 to 0.05/litre surcharge on leaded petrol by 2010. Revenues could be spent as ear-marked funds for creating suitable market conditions for a faster switch to unleaded petrol. Such a tax could also serve a useful role in raising public awareness of air pollution issues.

The basis of the existing public water supply user charges should be changed to volumetric charges in order to provide a clearer incentive for demand management and

reduce average consumption per capita and per unit of GDP. Such an approach will require fitting of a water meter for each individual household (technical limitations are likely to be faced in older buildings where each apartment may be fed by a number of different rising water mains). The charge rates would be determined by the needs of individual companies to cover operating and capital costs. It is estimated that reform of the charging system will require gradual increasing of the existing prices to finally achieve a price of Euro 1/m<sup>3</sup> to the end consumer. The price increase should be matched with direct support to the most vulnerable households.

The reform of sewage treatment charges for households should be introduced increasing the charge rate for sewage collection, treatment and discharge. Stepped increases in charges will be required to cover the operating and capital costs and to improve financial standing of the utility companies, and to satisfy requirements of the EU *environmental acquis* (the Urban Wastewater Directive 91/271/EC).

The reform of the effluent charges for discharges to surface waters will involve changing the charging basis of existing volume & process based charges to pollution load based charges (reflecting environmental impacts of pollutants). The new charging basis and the overall increase of the charge level will introduce disincentive for pollution. The revenues from such charges should be earmarked for water pollution reduction.

Air emission charges for SO<sub>2</sub>, NO<sub>x</sub>, PM10, lead and heavy metals should be levied on industrial polluters. The basis of the charge would be for each unit of pollutant over and above those permitted in the national air quality standards. A pre-requisite for the success of the air emissions charge is that units of pollution are easily measured and verified by inspectors and that the charges are set at deterrent levels. The air emission charge would facilitate transition to meeting policy objectives and targets related to air pollution. Exemptions should be introduced for companies actively investing into pollution abatement or clean technology.

The municipal waste management charges should be revised to change the charging basis for households. The charges at source should be based on volume of waste generated or number of containers, rather than on property size (implementation will be more complex in large residential areas and may require application of the per capita charge). Neighbourhood containers should be replaced by individual containers for collection at source wherever feasible (especially in individual houses). Linking charges to volume of waste generated would increase awareness of recycling issues and provide an incentive for individuals to pre-sort waste or to reduce the volume of packaging. Recyclables collected separately at sources should not be charged (the financial loss should be offset by higher charge for mixed waste).

The reform of the industrial waste charges should focus on a transition to a volumetric charging base which reflects both the volume and the nature of the waste collected. Tax on tipping of fly ash and mining waste should be introduced to encourage reuse and backfilling. The reform would stimulate minimisation of waste generation and expand reuse and recycling of waste. Charges should be increased in order to cover both operating and capital costs of waste management.

Tax incentives for clean technology and pollution abatement should be introduced to address the constrained capital market for long term pollution abatement investment. The proceeds from the various pollution charges should be used to provide tax incentives, grants or low interest loans for companies willing to invest in cleaner technologies or end-of-pipe solutions. This instrument should be urgently introduced to phase out production of leaded petrol in oil refineries.

User charges for timber, forest and other natural products should be streamlined. Part of the revenues from the user charges could be used for nature protection and biodiversity programmes and to provide subsidies to farmers for land use restrictions in the nature protected areas and zones that are particularly sensitive to nitrates and non point source pollution from agriculture.

The charges should take the form of an administrative charge for a permit to collect e.g. mushrooms, snails, frogs, medicinal plants, berries, fuel wood etc.

System of competitive small grants for NGOs involved in environmental education and awareness raising activities should be introduced. The grants should be managed by the ministry in charged for environment or by the Environmental Protection Fund.

Introduction of short-term instruments (charges and levies) should be accompanied by effective awareness raising campaign emphasizing the need for sustainable management and transparency of procedures regarding the ear-marked nature of the funds.

#### **8.4.4. Medium-term reforms of economic instruments (2011 – 2015)**

The reform of the incentive based instruments in the medium term will depend on the improvements of the monitoring system, regulatory instruments and environmental infrastructure. Landfill tax will be introduced when the technical level of waste disposal sites improves to allow effective charging. Deposit refund schemes and packaging tax will be introduced to facilitate recycling and recovery of waste.

Landfill tax should be introduced and paid by waste management operators (for municipal and industrial, including hazardous waste). The twin objectives are to provide an incentive to reduce the percentage of waste going to landfill and to cover the costs of investment in a network of modern sanitary landfills. The charge would be based on the volume of waste (measured on weight bridges at landfills) and its relative risk. It would be made up of a volume/weight element paid on both hazardous and non hazardous waste, and a 'risk' charge levied only on hazardous waste. It is estimated that a charge of Euro 5/tonne of waste (similar to the level applied in the new EU member states) would generate significant ear-marked funds.

Deposit refund scheme for priority waste streams making producers/importers responsible for taking back packaging and other specified products such as consumer electronics and household appliances at the end of their life. If companies failed to achieve the recovery targets they would become liable to pay a tax. This instrument will create incentives to companies to buying into a green labelling scheme and delegating responsibilities to a coordinating recovery and recycling body.

Refund premium on trade in of old cars for new should be introduced as a variant of a deposit refund scheme whereby a small remuneration is paid to the customer bringing back an old (pre-catalytic converter) vehicle and buying a new one. The system should be operated by car sellers and stimulated by the state through fiscal instruments. The scheme would facilitate transition to meeting the policy objectives addressing air pollution from mobile sources. The intention would be to speed up the transition to a higher rate of vehicles that meet the EU standards by 2011.

System of compensations for land use restrictions paid to farmers and land owners in the nature protected areas and nitrate sensitive zones to stimulate agricultural activities which are compatible with environmental considerations.

## 8.5. Environmental financing system

### 8.5.1. Overview of the current situation

The environmental financing system in Serbia is centralised and relies mainly on the revenues and the state budget funds. Other sources of funding include municipal budgets, industrial funds, funds of the public utility companies (PUCs) and foreign assistance funding. The general features of the environment financing system include limited earmarked funds, very limited decentralised funding sources especially those of the private sector, and lack of application of financing instruments such as long-term loans, securities, public-private partnership or equity investments. The limited revenues raised from pollution charges are generally not spent on pollution abatement. The weaknesses of the environmental financing system result from the very limited application of user charges, high dependency on the state budget, limitations of the legal framework, and limited implementation of incentive based instruments.

The economic conditions and the weaknesses of the existing financing system result in the chronic shortage of funds for environmental protection. Environmental expenditure appears to be well below 1 percent of the GDP, which is lagging behind other transitional countries where such expenditure amounted to around 2 percent of GDP.

There is no systematic collection of information on the environmental expenditure at present. The data shortages relate especially to industry and the private sector. There are on-going efforts to collect data on environmental expenditure at local level.

The environmental revenues at the state level come from the tax on the collection of wild plants and species collected for commercial purposes, effluent charge, and non-compliance fines. The Law on Environmental Protection provides for establishment of the Environmental Protection Fund, sets out the sources of financing for the Fund, management of these funds, the supervisory bodies of the Fund etc. The Law provides for setting up environmental funds at the state, provincial and local government levels. The revenues of the Fund include: part of the revenues from nature and resource use, pollution charges, a portion of funds resulting from privatization, funds from multilateral and bilateral international cooperation such as programmes, projects and other activities in the field of environmental protection and energy efficiency, reinvested income and revenues of the Fund, contributions, donations, grants and assistance, and other sources.

The environmental non-compliance fines are included in the general state budget. They are not ear-marked for environmental expenditure.

The environmental financing at the local level is affected by chronic shortage of revenues. This is largely due to the low level of public utility service charges, and lack of the multiyear budget planning. Local governments undertake environmental investments on annual planning basis. Capital expenditure is financed on an annual basis, depending on the availability of funds in the municipal budget. Loans are rarely taken due to the lack of available ear-marked funds, high interest rates on commercial loans and administrative restrictions on borrowing. Environmental funds exist only in a few local governments (Čačak, Užice, Valjevo, Obrenovac) with sources of revenues prescribed by local by-laws, such as vehicle registration tax and the like.

Environmental financing by the public utility companies (PUC) hardly meets the operation and maintenance costs, and hence their infrastructure has been seriously deteriorating. The revenues of the PUCs come from the collection of tariffs for services that they provide. The level of charges differ: for households and institutions of special social interest (schools, etc) they are considerably lower than the charges paid by the business entities. The rates of collection of utility charges vary greatly from municipality to municipality from as high as 85 percent (Belgrade or Čačak) to as low as 50 percent in other locations. The increase of charges is negotiated with the municipality and is still not market based. Consequently, the PUCs are granted funds for investment from the general municipal budget or special environmental budget lines or from the state budget. This significantly limits the ability of PUCs to manage their operations and minimise costs. The PUCs are still state owned and operated by municipalities. Privatisation of the PUCs, public-private partnership agreements or concession agreements have not been applied yet.

Industrial expenditure on pollution abatement and cleaner technologies is insufficient. There is no obligation for companies to report environmental investments to authorities thus very limited information is available on the nature of industrial environmental expenditure. The lack of incentives for industry and energy sector to strengthen pollution control (fines and pollution charges are very low, enforcement is weak), the existing high level of taxation and the poor financial standing of many industrial companies hinder increase of environmental expenditure. The instrument of liability for damages caused to the environment, and the obligation to obtain environmental impairment insurance for industrial installations posing high risk to human health and the environment in case of third party damages has not been applied in Serbia yet.

The most active donors and IFIs providing environmental financing in Serbia include the European Union (EU), the European Bank for Reconstruction and Development, the World Bank and bilateral donors.

#### **8.5.2. Policy reform measures**

The investment heavy objectives of the NES require substantial reform of the environmental financing system in order to generate sufficient funds for their implementation. The policy objectives of the NES call for effective funding mechanisms for environmental expenditure including Environmental Protection Fund, Debt for Environment Swap mechanism, full cost recovery for environmental services to cover operation, maintenance and modernisation costs, and stimulation of competition in environmental services (through privatisation and concessions). Different reforms of environmental financing system will be required to address policy objectives considered as responsibility of the central government, local government and industry respectively.

Ear-marked environmental funds are a key component in building an effective environmental financing system. The experience of Central European countries (Poland, the Czech Republic and Slovakia) demonstrate that the establishment of the Environmental Protection Fund enabled the collection of significant funds and acted as a catalyst for important investment through soft loans and grants for environmental expenditures.

Addressing the environmental pollution issues in urban areas (especially waste water, waste management, district heating and water supply) will require gradual implementation of the full cost recovery for environmental services. Inevitably it will lead

to significant increase and improved enforcement and collection of waste management charges, water supply charges, wastewater discharge- and treatment charge. It will be necessary to introduce multi-year financial planning in municipalities and public utility companies. Decentralisation of the public financial system will increase environmental expenditures at local level. Restructuring and privatisation of the public utility companies (waste collection, waste treatment, sewerage, waste water treatment) will stimulate cost-effective operation in providing public services. The private sector should be strongly integrated in building and operating environmental infrastructure.

Industrial pollution issues should be dealt with based on the full application of the „polluter pays principle“. In order to comply with all prescribed environmental standards the industry will have to invest in the environment with its own funds and using loans and other financial market instruments. Environmental issues should be adequately resolved during the privatisation process. Environmental improvement issues (including the clean up of past pollution) should be an integral part of the privatization agreements. Privatisation will provide significant funds for environmental expenditure from the international capital market as the new owners will be obliged to invest in environmentally friendly technologies and clean up.

In cases of environmental pollution and degradation where it is not possible to implement the “polluter pays” and the “user pays” principles (for instance in the clean up of past pollution, air pollution and noise from non-point mobile sources, nature and biodiversity protection) it will be necessary to rely more strongly on ear/marked funds, funds of international financial institutions and international assistance. Funds provided by international financial institutions may play a significant – balancing – role in financing of projects which do not generate income (preparation of technical design documents, clean up projects, pilot projects, nature protection projects, etc).

### **8.5.3. Short-term reforms of the environmental financing system (2006 – 2010)**

In the short-term horizon, the reform of environmental financing system should concentrate on improving the revenue collection and expanding the collection base, improving the existing earmarking system and re-introducing ear-marked funds, establishing transparent system of environmental investment, decentralisation of environmental financing away from the state budget to ear-marked funds, municipal funding, service related funding, private sector investment, and use of loans and public-private partnership arrangements. The short-term reforms will be dependent upon the reform of incentive based instruments, regulatory system, environmental monitoring and institutional reforms.

Environmental revenue collection should be improved by more efficient collection of environmental charges through strengthened organisation ability to bill and collect charges, shift to volumetric charges, improved monitoring and enforcement.

It is necessary to support the development and introduction of full cost recovery through service charges. The revenue collection base should be increased by introduction of air pollution charges and environmental tax on leaded petrol.

All environmental revenues should be used as ear-marked funds for investment in the protection and improvement of the environment, which can best be achieved through the Environmental Protection Fund

Funds collected under economic instruments for environmental purposes shall be channeled to the Environmental Protection Fund. The Fund should appropriate these

funds as ear-marked funds for investments aiming to achieve improvement of the environment. The Environmental Protection Fund (in cooperation with relevant ministries) should actively cooperate with the international and national financial institutions to increase its financial capacity, especially for projects introducing full cost recovery for public utility environmental services.

It is necessary to harmonize the operation of the Environmental Protection Fund with other earmarked environmental funds in order to achieve greater efficiency.

Establishing of the Debt for Nature Swap mechanism for environmental investments shall be considered, taking into account its successful implementation in Poland and Bulgaria. The sources of the Swap fund would come from the partial conversion of the Serbian foreign debt for environmental investments. The key issue in this respect will be negotiating an agreement with the key creditor countries concerning the conversion of the outstanding interest and/or capital that Serbia is to repay, to be converted into the revenues of the Swap fund for environmental investments. It is necessary to provide for efficient, independent and transparent operation and supervision of this fund.

Municipal environmental funding capacity should be strengthened by fiscal and financial decentralization, and wide application of the multiyear financial planning. The decentralisation should include transferring the responsibility for administering and collecting the property tax to municipal level, responsibility for billing and collection of charges and setting the charge level. Introduction of multiyear financial planning will require setting up local and national investment priorities. Municipal borrowing ability should be significantly increased, and financial instruments such as municipal bonds should be applied.

Financial standing of the public utility companies should be strengthened by application of the full cost recovery principle to environmental services. Service charges should be correctly priced to reflect operational and maintenance costs as well as capital investment. Charges should be efficiently collected and exemptions should be disallowed. The increase of charges should be initiated in the short-term. Subsidies may need to be provided for the lowest income groups to ensure affordability of new tariffs. The public-private-partnerships will allow more efficient use of resources, continuous efforts to minimizing costs, division of control and executive functions and the initial surge of investment without major burden to public budgets.

The increase of industrial and private sector expenditure on environmental protection should be achieved by better monitoring and enforcement, elimination of state subsidies to industry for the clean-up and pollution abatement, exemption from pollution charges for companies investing into pollution clean up and cleaner technology. Privatisation will significantly increase environmental financing capacity of industry. Finally, system of soft loans for industry and the private sector should be introduced by the Environmental Protection Fund.

#### **8.5.4. Medium-term reforms of the environmental financing system (2011 – 2015)**

The medium-term reforms will require further strengthening of the environmental revenue collection, expanding the revenue base, fiscal decentralisation, privatisation and further increase of tariffs to achieve full cost recovery. Environmental revenues will be increase by introduction of landfill tax and deposit-refund schemes.

The Environmental Protection Fund and other earmarked funds will provide soft loans to industry and the public utility companies.

Taxes for municipal environmental charges should be further increased to reach full cost-recovery levels. The public utility companies play an important role in environmental financing. Hence, they should be further restructured. Furthermore, the possibility of partial privatization, short-term (3-5 years) service contracts and long-term (15-25 years) concessionary contracts should be considered. The BOT (Built-Operate-Transfer) arrangements are also recommended, especially for the wastewater treatment plants.

Public-private partnership ventures should be widely applied to provide initial capital investment, effective management, and training.

## **8.6. Reform of the institutional framework**

### **8.6.1. Overview of the current institutional situation**

The key feature of the present situation of the institutional framework for environmental protection is inconsistency and overlapping responsibilities and competences of institutions, as well as the lack of a strong central institution for coordination of all activities in this field. Despite the visible achievements in individual sectors, such situation reflects partial regulation of the field of environmental protection at the central republic level and causes problems in coordination, both horizontally (between sectors) and vertically (between the republic and local level). The problem of unspecified and unclear division of competences in the field of regulating the issues of water, land, forests, mineral resources etc. leads to compartmentalised, incomplete and ineffective approach to their protection.

Institutional capacities in the field of environmental protection are generally insufficient to fully exercise the institutional competences. This is further aggravated by the inefficient environmental institutional structure. Institutional deficiencies in environmental policy and management include:

- Insufficient decentralization of competences in sectoral laws;
- Frequent institutional changes;
- Inadequate law enforcement and supervision of law enforcement by inspection services;
- Limited capacity for monitoring, especially at the level of autonomous province and units of the local government;
- Lack of coherent legislative framework, lack of personnel, financial and other capacities as the basis for efficient and operative functioning of the Environmental Protection Agency;
- Lack of mechanisms for development of institutional links between professional monitoring organizations and the Environmental Protection Agency in collection, processing and dissemination of environmental information;
- Insufficient capacity of most environmental institutions, especially regarding policy planning and appraisal, economic instruments and financing, project preparation and management;
- Lack of specialized educational institutions, special programs in the field of environmental protection at all levels of education.

The existing status of the Directorate for Environmental Protection (DEP) does not enable effective coordination (horizontal and vertical) of environmental policy.



There is lack of horizontal coordination between the Ministry for Capital Investments and the Directorate for Environmental Protection in the field of spatial and urban planning and construction. There is lack of consistent integration of environmental considerations and requirements in the process of adoption of spatial and urban plans and construction permitting.

There is an overlap of competencies between the Water Directorate and the Directorate for Environmental Protection in relation to water quality and water pollution. There is a potential conflict of responsibilities between the Forest Directorate, which is managing forests considered as economic sector and the DEP which is charged with responsibility for protection of forest ecosystems. There are unclear responsibilities for protection of wild fauna in the context of hunting.

There are inadequately defined competences between the Ministry of Mining and Energy and the DEP in the field of geological research (a clear division of competences is required).

Institutional arrangements regarding nature protection exemplify the currently prevailing institutional problems. Public enterprises in charge of management of national parks have inadequate management structure and capacities, conflicting competences relevant to nature protection and commercial activities (especially forests management). The financial, human and management capacity of most natural protected areas is insufficient to implement their management plans. Public enterprises managing national parks operate within a legislative framework consisting of almost 70 laws and by-laws.

The institutional inconsistencies could be partly addressed by a well functioning system of interministerial cooperation that would facilitate integration of environmental considerations in sectoral policies and address institutional overlaps and inconsistencies. However, such system has not been set up except for the National Council for Sustainable Development (NCSD). The Council provides a forum for discussion and consensus building between ministries, and other stakeholders on issues related to the environment and sustainable development. The NCSD supports the “joined up” government thinking on the environment and horizontal coordination between the DEP and other government authorities and organizations, and addresses potential conflicts in policy formulation and implementation. However, sessions of the Council are infrequent, and hence its operation is not effective.

There is insufficient institutional coordination and coverage of environmental monitoring activities in Serbia. The ambient environmental quality monitoring is reasonably well covered in contrast to the lack of self monitoring by polluters. The existing environmental monitoring system suffers from limited accreditation of environmental laboratories and lack of rigorous QA/QC procedures for data collection, analysis and reporting.

Integrated environmental information system and cadastre of polluters are missing in Serbia. There are bottom-up uncoordinated activities such as building of local/regional databases, emission cadastres, which may cause further problems with database compatibility. The main institutions providing the DEP with environmental information and reporting include: the Hydro-meteorological Institute; the Institute for Nature Protection; the Institute for Water “Jaroslav Cerni”; the Institute for Soil; the Republic Institute for Public Health “Batut” and individual institutes for public health and the Recycling Agency. The Environmental Protection Agency is gradually taking a coordinating role in setting up integrated environmental information system.

The current situation in the Republic of Serbia regarding the organisation of the response to minor or major chemical accidents is not satisfactory in particular in relation to:

- Insufficient institutional cooperation, capacity and expertise regarding the accident risk management methodology;
- Insufficient expertise in the preparation of the accident risk assessment, as well as the preparation of the Accident Protection Plans;
- Inadequate training of staff of the competent authorities for management of accident response, as well as insufficient cooperation and harmonisation between institutions and companies regarding the action plans in the event of chemical accidents;
- Insufficient number of mobile eco-toxicological units and intervention units.

Serbia has very sizeable requirements for financing environmental infrastructure. The Fund for Environmental Protection has been established at the republic level. However, there is lack of regulatory mechanisms to provide sources of financing of the Fund. Local environmental funds exist only in few municipalities and operate very limited funds. There is very limited structural, procedural and transparent approach to disbursement of the Fund's resources. National financial markets and the banking system are not yet involved in financing large scale environmental projects.

Under the existing laws, a number of environmental competences have been decentralized to the level of the autonomous province or units of local government. At the level of autonomous province, there is lack of clear division of competences delegated to the province according to the Law on Competences of the Autonomous Province of Vojvodina (setting up the provincial institute for nature protection, public enterprises for management of national parks, etc.).

At the local level there is need for capacity building to address statutory competences (strategic impact assessment, EIA, integrated permitting, monitoring, inspection services, financing local environmental infrastructure). There are about 200 environmental inspectors operating at the local level, mostly with insufficient training and inadequate equipment to carry out their duties properly and to provide assurance of effective enforcement. Only about 20% of municipalities have environmental staff to carry out these tasks. The municipalities suffer also from under-funding and lack of financial decentralisation to cover their statutory tasks.

The existing educational institutions are not sufficiently prepared to train an adequate number of environmental professionals.

#### **8.6.2. Short-term reforms of environmental institutions (2006-2010)**

Most reforms of the environmental institutions shall be carried out in the short-term as they are usually the pre-conditions for implementation of other policy reforms.

However, a number of these reforms, especially those related to capacity building, horizontal integration and decentralisation of decision-making, will stretch beyond 2010. The starting point of the institutional reforms is the new Law on Environmental Protection that introduces significant reforms of environmental policy in Serbia and allows more effective environmental management. The legal reform which is currently under way should also include sectoral laws. Institutional competencies should be clearly defined in the new legislation to address the existing overlaps and inconsistencies.

Horizontal coordination of environmental policy should be strengthened as high priority. Addressing the inter-sectoral issues should be coordinated by a government committee for environmental protection. Apart from this committee, inter-sectoral commissions should also be established to address certain operational issues (such as addressing the issues of environmental liabilities and clean up of past industrial pollution in the process of privatization). Capacity building in all ministries for integration of environmental issues in sectoral policies is needed to integrate environmental policy with other sectoral policies, especially energy policy, industrial policy, agricultural policy, transport policy, privatisation policy, tourism etc. It is recommended that the role of the National Council for Sustainable Development is strengthened to act effectively as coordinating body for policy integration. This would require setting up permanent secretariat and operating procedures. The forthcoming introduction of strategic environmental assessment of policies, plans and programmes should further improve integration of environmental policy.

Integrated environmental management should be introduced, especially in relation to water management and waste management. Integrated water management should include water protection, water resources management and flood protection, and it should be organized in river basins following the EU Water Framework Directive 2000/60/EC. At least one River Basin Management Institution should be set up in the short-term. Integrated waste management and horizontal coordination should be strengthened at the municipal level by establishing the Intermunicipal Waste Management Council to coordinate activities within waste management regions; and by the introduction of regional waste management systems, to achieve greater cost-efficiency.

Establishing the Ministry for Environmental Protection and strengthening the capacity of the Environmental Protection Agency should become a key institutional priority for the short-term horizon. The new organizational structures should streamline the effectiveness of the Ministry and the Agency by raising the capacity regarding policy development and appraisal, strategic planning, economic instruments, environmental financing, project preparation and indicator based monitoring of the state of environment. Expansion of staff and training of specialists will be required.

The Environmental Protection Agency needs to be expanded so that it becomes fully operational and fully addresses its statutory tasks. The Agency needs to become in the short-term a centre for environmental data collection, processing and reporting on the state of environment. Establishing integrated cadastre of polluters and setting standards for environmental databases is of pressing importance. The introduction of IPPC will require setting up and maintenance of the BAT database. The Agency should become a reference centre for BAT. It should also become a centre for environmental reporting and dissemination of environmental information supporting the DEP with information on the state of environment. The Agency should disseminate environmental information to stakeholders and the general public.

The environmental monitoring system should be strengthened. Institutional responsibility for monitoring activities should be streamlined and coordinated by the Environmental Protection Agency. Uniform sampling and data collection procedures should be put in place following the EEA and the EIONET guidelines. Monitoring activities should follow the monitoring programmes adopted by the government (e.g. the Programme for the Control of Air Quality) and consistent standardised format. The staff of the monitoring institutions should be trained accordingly. The network of monitoring stations should be optimised, modernised and it should rely on automatic stations.

Another pressing issue is standardisation and accreditation of laboratories conducting environmental analysis. Uniform analytical procedures and quality control procedures should be introduced, reference and calibration laboratories should be set up, and the labs should become accredited with International Standard ISO/IEC 17025. Intensive training of staff will be required. Accreditation should be mandatory for all laboratories supplying data to government institutions.

Establishing an effective chemical accident emergency response system requires systematic solutions at all institutional levels, horizontal and vertical links among the responsible institutions in the implementation of prevention, readiness, response and clean up of consequences of chemical accidents. It will also require streamlining of decision-making. In the short-term the municipalities of Novi Sad and Niš should be equipped with the eco-toxicological and intervention/fire fighting units. It is further necessary to build awareness and increase institutional capacity through training and provision of equipment (eco-toxicological units and intervention units).

National Centre for Cleaner Production should be established to support industry in preventing environmental pollution.

Environmental Inspectorate should be substantially strengthened to improve environmental enforcement and cope with the forthcoming EU harmonisation tasks (such as the IPPC). Emphasis should be put on raising capacity for compliance monitoring and assessment of self-monitoring by polluters. The staff numbers and budget of the Inspectorate should be increased and equipment should be modernised/expanded (especially mobile monitoring equipment, computers and vehicles). Intensive training for inspectors should be provided including preparation of the Inspector's Handbook, training in industrial processes, use of monitoring equipment, monitoring techniques, data analysis etc.

Strengthening of the Environmental Protection Fund is a task of high priority. The Fund should operate on the basis of clear procedures and criteria for ear-marked investments. Efforts are needed to streamline operations of the Environmental Protection Fund and the earmarked funds of the Water Directorate. Consideration will be given to the possibility of setting up the Debt for Nature Swap Fund, subject to reaching agreement with foreign creditors.

Professional education institutions at all levels should expand their environmental activities. Special attention will be paid to the area of environmental economics, environmental policy and environmental management.

### **8.6.3. Medium-term reforms of environmental institutions (2011-2015)**

The timeframes of several institutional reforms initiated in the short-term will inevitably stretch into the medium-term horizon. The mechanisms of horizontal coordination and integration of environmental policy initiated in the short-term will need to be further expanded and institutionalised in the medium-term. Integrated regional waste management should be implemented in the whole territory of the Republic. River Basin Management Institutions should be set up in all relevant river basins.

The institutional reforms will require on-going capacity building and human resources development efforts. The activities of the Ministry for Environmental Protection should be based increasingly on the state of environment indicators, policy progress indicators, strategic planning and cost-effectiveness. Gradual shift should be made

towards environmental policy relying on incentive based instruments and IPPC. The EU environmental *acquis* should be guiding all activities of the Ministry.

The Environmental Protection Agency should become fully operational institution providing a wide range of data on environmental conditions. The Agency should also become the BAT reference centre and it should regularly publish the State of Environment and sub-sectoral reports.

Improving effectiveness of the Environmental Inspectorate, environmental monitoring institutions and environmental laboratories will extend to the medium-term horizon when the reforms should concentrate on further training and standardisation of activities. Privatisation of laboratories could be considered at this stage as increasing demand for private sector monitoring is expected.

Increased revenues of the Environmental Protection Fund and other ear-marked funds are expected in the medium term in line with improving effectiveness of the monitoring and enforcement systems. The municipal environmental protection funds should be expanded in the medium-term. The Debt for Nature Swap Fund should become operational within the medium-term and provide additional environmental funding.

Professional education institutions should further expand their environmental curricula responding to the human capacity needs of the state institutions and the private sector.

## **8.7. Improvement of environmental infrastructure and introduction of cleaner technology**

### **8.7.1. Overview of the current situation**

The environmental infrastructure in Serbia is substantially underdeveloped and it leads to excessive pollution of air, water and soil. The major gaps exist in municipal and hazardous waste disposal and treatment, municipal and industrial wastewater treatment, and air pollution abatement technologies in the industry and energy sectors.

About 33% of Serbia's population is connected to sewerage system. In most urban areas the coverage ranges from 45 to 85%. It is estimated that 13% of all municipal wastewater is treated. Only 28 towns in Serbia have a wastewater treatment plant. The largest towns of the country, Belgrade, Novi Sad and Niš do not have a municipal WWTP. Some of the existing WWTP's are abandoned, many only provide primary (mechanical) treatment and most are not continually operated. Currently, 152 industrial sites have some effluent treatment installed, including 20 large industries. However, very few installed industrial wastewater treatment facilities (13%) are effectively operated.

About 60% of the population in Serbia has access to piped drinking water supply (15% have partial access). There are 153 public water supply systems serving 50% of the country's population. Although the coverage of piped water is very high, many systems are not always properly functioning, resulting in large physical water losses and low, inadequate service levels.

Approximately 60% to 70% of the population is covered by municipal waste collection system. While in urban areas municipal waste is collected by public utilities, in rural areas collection is practically non-existent. The equipment of the public utility companies is insufficient, obsolete and inadequately maintained. Containers intended for

household waste collection are also used for some types of hazardous waste (medical waste, fluorescent lamps, old batteries, waste oil, paints and solvents waste, etc).

There is hardly any separate collection, sorting and recycling of municipal waste in the republic of Serbia. There are few industrial waste recycling facilities in Serbia: a waste oil recuperation plant (Belgrade), which currently operates at low capacity; accumulators' recycling in the Lead Smelter in Zajača (capacity of 10,000 t/year) and in accumulators production company in Sombor (capacity of 2,000 t/year).

At present there are no sanitary landfills in Serbia which comply with the EU standards. Only the newly constructed sanitary landfill in Vranje partly meets the EU standards. There are 180 officially registered municipal waste disposal sites in Serbia. In rural areas waste is dumped in illegal dumpsites or burnt causing environmental pollution. Disposal sites generally do not meet the prescribed requirements according to national legislation with respect to waste disposal. Numerous sites are located along riverbanks, and often in zones where the possibility of groundwater contamination is high.

There are large quantities of fly ash (approximately 5.5 million tons of ash per year) resulting from operation of thermal power plants. The fly ash is disposed in ash heaps without environmental precautions.

There are no facilities for hazardous waste treatment and disposal, leading to a continuous build-up of improperly stored hazardous waste within industrial sites. Few enterprises have temporary storage sites equipped to prevent the spreading of toxic components or their diffusion into soil and groundwater. The animal waste management does not comply with the EU standards. Radioactive waste is collected in special containers, and it is temporarily stored at the Institute of Nuclear Sciences "Vinča".

The municipal heating system in Serbia exists in 45 towns with district heating systems serving approximately 60% of households in those cities. There are 232 heating plants, 555 boilers and 1,132 km of distribution network with 11,622 sub-stations. There are no pollution abatement installations apart from low efficiency dry scrubbers.

The natural gas network in Serbia comprises 1,900 km of steel medium-and-high-pressure gas pipeline and about 2,700 km of distribution gas pipeline. Only about 7 % of households and about 1,200 industrial consumers are connected to the gas network. There are no gas pipelines in Eastern and Southern Serbia.

Electric power and heat generation in Serbia is based on thermo-electric and hydro-electric power plants. The total installed capacity of thermo-electric power plants using lignite is 3,936 MW, the capacity of hydro-electric power plants is 2,831 MW and the installed capacity of thermo-electric power combined heat-and-power plants based on oil and natural gas is 353 MW (excluding the thermo-electric power plants in Kosovo and Metohia with the 1,235 MW capacity currently not operating within the power grid of Serbia). Most of the plants have been in use more than 20 years. Apart from low-efficiency electric filters, power-generating plants have no other pollution abatement installations. The heat energy production in enterprises is decentralized. About 30 industrial enterprises have industrial power plants that provide the co-generation of heat and electricity (with capacity about 250 MW). Most of them have not been operational for an extended period of time.

The concept of clean production as proactive, preventive approach that allows conservation of raw materials, water and energy, elimination of toxic materials, and reduction of waste and emissions to water and air has not been widely applied by industries. Environmental management systems are not introduced by industry and the concept of Best Available Technology (BAT) as a basis for integrated environmental

permitting has not been implemented yet. Problems exist in particular in terms of obsolete industrial technologies in chemical, metal, motor and paper industries and energy generation leading to excessive consumption of energy and raw materials, poor optimisation of processes and general housekeeping.

Many large cities in Serbia do not have by-pass or ring roads. The exceptions include Novi Sad, Niš, Subotica, Pančevo and Požarevac, which divert most through traffic away from the city centres. In Belgrade, buses are the predominant means of public transport. Trolley-buses and trams operate in the city centre. Belgrade has no underground system. The vehicles used in public city transport are very old, many (especially those run by private bus companies) are in service for over 20 years. There are in total 650 buses operated by public transport enterprise and about 250 operated by private transport operators. The estimated present needs are about 1,400 vehicles.

### 8.7.2. Short-term investment needs of environmental infrastructure (2006 – 2010)

Large scale environmental infrastructure improvements are dependent on the successful reform of environmental financing system, introduction of incentive based instruments and improved enforcement. Consequently, modest infrastructure improvements are envisaged in the short-term (table 8.3.) The detailed determination of the priority investment projects in environmental infrastructure will be based on cost-effectiveness.

Table 8.3. Key infrastructure improvements necessary to address the NES policy objectives in the short-term 2006 – 2010.<sup>6</sup>

Relevant NES policy objectives	Required infrastructure improvements
<b>Water and water resources</b>	
To extend sewerage systems to cover 65% of population by 2015	Construction of 1,000 km of municipal sewage collectors – phase 1 Construction of 700 km of municipal stormwater collectors – phase 1 Construction of 200 km of general sewage collectors – phase 1 Upgrading of the existing infrastructure – especially the pumping stations
To provide wastewater treatment in agglomerations with organised sewerage system that have significant impact on the receiving waters especially on sensitive areas <sup>7</sup> To upgrade or renew operation of the existing municipal wastewater treatment plants	Building of primary and secondary sewage treatment plants in 6-7 largest agglomerations and 10 hot spot locations Rehabilitation of existing sewage treatment plants in all agglomerations starting with an assessment of cost effectiveness phase 1
To ensure that drinking water in urban areas meet quality standards of Drinking Water Directive 98/83/EC, and to extend the centralized water supply system to selected rural areas with unsatisfactory water quality	Upgrading the existing infrastructure (both drinking water treatment and distribution) in agglomerations above 100,000 and in 5-6 hot spot locations
<b>Waste management</b>	
To extend municipal waste collection	Extending the existing infrastructure (vehicles, containers) for

<sup>6</sup> The table presents selected key infrastructure projects. Comprehensive list of infrastructure projects will be presented in the Action Plan

<sup>7</sup> Priority is given to agglomerations above 100,000 pe excluding agglomerations discharging directly to large water bodies (Danube, Sava), where waste waters treatment plants will be completed after 2015

to cover 80% of population by 2009	collection and transport of waste. Building of transfer stations to serve the regional landfills
To establish sanitary landfill in each region according to technical and operational requirements of the Landfill Directive 99/31/EC	Building of regional landfills <sup>8</sup> for at least 50% of the population and controlled phasing out, remediation and recultivation of the existing dumps posing the greatest environmental and health risk
To increase recovery and recycling of packaging waste (glass, paper, cardboard, metal, plastic) to 25% of their volume	To set up separate collection centres and storage facilities in pilot cities Improve industrial capacities for recycling and reuse of waste
To establish national capacity for treatment of hazardous waste by 2008	Improvement of production efficiency in industrial plants in order to minimize waste generation and to enforce industrial waste reuse or recycling Building of physical-chemical treatment plant for inorganic industrial waste and landfill for disposal of post-treatment residues
To safeguard appropriate incineration capacity for organic industrial waste and medical waste	Procurement of facilities for collection and storage, vehicles for transport of separated organic industrial and medical waste Building of incineration plant for hazardous and bio-hazardous waste and construction of disposal sites for post-treatment residues Purchase of equipment for waste treatment by autoclaving and microwaves for distant locations
To develop capacity for final disposal of radioactive waste	Building of permanent storage site for radioactive waste
<b>Energy sector</b>	
To reduce emissions of SO <sub>2</sub> , NO <sub>x</sub> and PM from large combustion plants to the levels required by the LCP Directive 2001/80/EC	Upgrading or replacement of existing boilers, increase combustion efficiency of furnaces Upgrading/replacement of burners (low NO <sub>x</sub> ) Upgrading/replacement of existing PM control equipment
To increase energy efficiency of the energy sector and reduce waste generation	Introduction of cleaner and more efficient production technologies Development of local capacity for utilisation of biomass for heat and electricity production
To increase the use of renewable energy sources and gas	Construction and revitalisation (including installation of additional and reversible turbines) of small and medium hydropower stations Expansion of the gas distribution network to connect industrial and individual consumers
To reduce environmental impacts of oil refineries	Installation of desulphurisation plants Installation of closed systems for cooling- and wastewater Remediation of contaminated land in the NIS Novi Sad plant Temporary storage for contaminated land and hazardous waste in the NIS Novi Sad plant Wastewater treatment plant in the NIS Pančevo plant
To reduce environmental impacts of fly ash disposal by changing disposal technology	Reconstruction of the system of transport and disposal of fly ash Back filling of fly ash in the open cast mines
To provide treatment of wastewater from energy sector by upgrading the existing wastewater treatment facilities and installation of treatment plants in energy plants discharging hazardous sewage	Renovation of all existing wastewater treatment plants – phase 1 Construction of new WWTP for energy plants
To connect individual households in cities above 20,000 to the municipal heating system or gas heating systems	Upgrading of the existing district heating plants (upgrading combustion efficiency of furnaces; new pollution abatement installations) Expansion of district heating systems in largest cities and hot spot locations for 180,000 customers (first phase)
To increase energy efficiency and reduce heat losses in the municipal heating generation and distribution	Extension of the gas distribution network for 400,000 customers (first phase)

<sup>8</sup> According to the National Waste Management Strategy



<b>Industry</b>	
To reduce emissions of SO <sub>2</sub> , NO <sub>x</sub> , PM, VOC, PAH and other pollutants from the existing industrial facilities, which do not meet the EU emission standards	Modernization of production technologies and installation of air pollution abatement facilities Introducing environmentally friendly technologies
To expand treatment of industrial wastewater by upgrading the existing wastewater treatment facilities and installation of treatment plants in industries discharging hazardous sewage	Reconstruction of all existing industrial wastewater treatment plants – phase 1 Construction of new WWTP in industrial plants that have the greatest impact on receiving waters
<b>Mining</b>	
To provide treatment of wastewater from mining and processing of minerals by upgrading the existing wastewater treatment facilities and installation of treatment plants in mining sites discharging hazardous sewage	Renovation of all existing wastewater treatment plants – phase 1 Construction of new WWTP for mining sites
To minimize risk of severe water pollution caused by mining activities	Modernisation of pipes and collectors Stabilisation of tailing dams Construction of drainage tunnels
<b>Agriculture</b>	
To improve environmental management in livestock farms and processing facilities	Building of manure and wastewater storage and treatment facilities in the largest farms
<b>Traffic</b>	
To phase out leaded petrol by 2010	Construction of the isomerisation facility in order to improve fuel quality
To construct bypass roads in cities most affected by environmental impacts of through traffic	Construction of ring road in Belgrade and in other hot spot locations Local road network and traffic improvements in Belgrade and in other hot spot locations
To improve conditions and competitiveness of public transport in larger cities and hence reduce emissions from mobile sources in city centres	Purchase of new buses, trams and trolleybuses Construction of gas fuel stations
To reduce pollution from vessels in navigable waters	Upgrading the necessary infrastructure in the Belgrade, Novi Sad and Smederevo ports (waste collection and storage, spillage clean up and prevention)

### 8.7.3. Medium-term investment needs of environmental infrastructure (2011– 2015)

Substantial extension and modernisation of environmental infrastructure will take place in the medium term (2011 – 2015) when efficient environmental financing system is put in place and investment priorities are established (Table 8.4). The extension and improvement of infrastructure will proceed in agglomerations not addressed in the short-term.

Table 8.4. Key infrastructure improvements necessary to address the NES policy objectives in the medium-term 2011 – 2015.<sup>9</sup>

Relevant NES policy objectives	Required infrastructure improvements
<b>Water and water resources</b>	
To extend sewerage systems to cover 65% of population by 2015	Construction of 1,000 km of municipal sewage collectors – phase 2 Construction of 700 km of municipal stormwater collectors – phase 2 Construction of 250 km of general sewage collectors – phase 2 Upgrading of existing infrastructure, especially sewage pumping stations.
To provide wastewater treatment in agglomerations with organised sewerage system that have significant impact on the receiving waters and especially on sensitive areas <sup>10</sup> To upgrade or renew operation of the existing municipal wastewater treatment plants	Building of primary and secondary sewage treatment plants in 20-30 other largest agglomerations and hot spot locations Renovation of all existing municipal wastewater treatment plants – phase 2 Building sludge treatment facilities
To ensure environmentally and technically sound reuse or disposal of sewage sludge from WWTPs	
To ensure that drinking water in urban areas meet quality standards of the Drinking Water Directive 98/83/EC, and to extend the centralized water supply system to selected rural areas with unsatisfactory water quality	Upgrading the existing infrastructure, both drinking water treatment and distribution network in agglomerations below 100,000  To build water treatment and distribution network in hot spot rural locations
<b>Waste management</b>	
To establish sanitary landfill in each region according to technical and operational requirements of the Landfill Directive 99/31/EC	Building of the remaining regional landfills <sup>11</sup> and further controlled phasing out, remediation and recultivation of existing dumpsites Building of transfer stations and collection centres
To increase recovery/recycling of packaging waste (glass, paper, cardboard, metal and plastics) to 25% of their volume	Building of regional plants for sorting and recycling of packaging waste
To introduce treatment of end of life vehicles (ELV) following Directive 2000/53/EC	Building of regional centers for treatment of end of life vehicles
To achieve 25% reuse/recovery/recycling rate of electrical and electronic waste	Building of regional plants for sorting and recycling of electrical and electronic waste
To introduce composting of green waste	Setting up prism composting sites for green and park waste in larger towns
<b>Energy sector</b>	

<sup>9</sup> The table presents selected key infrastructure projects. Comprehensive list of infrastructure projects will be presented in Action plan

<sup>10</sup> Priority is given to agglomerations above 100,000 pe excluding agglomerations discharging directly to large water bodies (Danube, Sava), where waste waters treatment plants will be completed after 2015

<sup>11</sup> According to the National Waste Management Strategy

To reduce emissions of SO <sub>2</sub> , NO <sub>x</sub> and PM from large combustion plants to the levels required by the LCP Directive 2001/80/EC	Continued upgrading of existing boilers (combustion efficiency of furnaces) in the remaining facilities Upgrading/replacement of burners (low NO <sub>x</sub> ) in the remaining facilities
To increase energy efficiency of the energy sector and reduce waste generation	Introduce continuous combustion control Upgrading/replacement of existing PM control equipment in the remaining facilities
To increase the use of renewable energy sources and gas in energy generation	Installation of de-NO <sub>x</sub> equipment in the remaining facilities Installation of desulphurisation plants Continued introduction of cleaner and more efficient production technologies Development of local capacity for utilisation of biomass for heat and electricity production Construction and revitalisation (including installation of additional and reversible turbines) of small and medium size hydropower stations Expansion of the gas distribution network to connect industrial and individual consumers
To connect individual households in cities above 20,000 to the municipal heating system or gas heating system	Upgrading of the existing district heating plants (upgrading combustion efficiency of furnaces; new pollution abatement installations) in the remaining agglomerations
To increase energy efficiency and reduce heat losses in the municipal heating generation and distribution	Expansion of district heating systems in largest cities and hot spot locations for more than 180,000 customers (second phase) Extension of the gas distribution network for 400,000 customers (second phase)
To provide treatment of wastewater from energy sector by upgrading the existing wastewater treatment facilities and by installation of treatment plants in energy plants discharging hazardous sewage	Renovation of all existing wastewater treatment plants – phase 2 Further construction of new WWTP for energy plants
<b>Industry</b>	
To reduce industrial emissions of SO <sub>2</sub> , NO <sub>x</sub> , PM, VOC, PAH and other pollutants from existing industrial facilities which do not meet the EU emission standards  Increase energy and raw materials efficiency in industry and reduce waste generation  To expand treatment of industrial wastewater by upgrading the existing wastewater treatment facilities and installation of treatment plants in industries discharging hazardous sewage	Further modernization of production technologies and installation of air pollution abatement  Further introduction of environmentally friendly clean technologies  Reconstruction of all existing industrial wastewater treatment plants – phase 2 Further construction of new WWTP in industrial plants that have the greatest impact on receiving waters
<b>Mining</b>	

To provide treatment of wastewater from mining and processing of minerals by upgrading the existing wastewater treatment facilities and installation of treatment plants in mining sites discharging hazardous sewage	Renovation of all existing wastewater treatment plants – phase 2 Further construction of new WWTP for mining sites
To minimize risk of severe water pollution caused by mining activities	Further upgrading of lagoons, tailings, dams and collectors
<b>Agriculture</b>	
To improve environmental management in livestock farms and processing facilities	Further construction of manure and wastewater storage and treatment facilities in large farms
<b>Traffic</b>	
To construct bypass roads in cities most affected by environmental impacts of through traffic	Construction of by-pass roads in the remaining large agglomerations
To improve conditions and competitiveness of public transport in large cities and hence reduce emissions from mobile sources in city centres	Local road network improvements in the remaining agglomerations Further modernization of the public transport vehicle fleet
To reduce fuel vapour emissions from petrol stations, mobile containers and tankers following Directive 94/63/EC	Upgrading/replacement of vessels for oil and gasoline transport Construction of gas fuel stations
To reduce pollution from vessels in navigable waters	Upgrading the necessary environmental infrastructure in the remaining inland ports (waste collection and storage, spillage clean up and prevention)

## 8.8 Education and Awareness Raising

### 8.8.1 Overview of Current Situation

The research and daily observations show that the general environmental awareness and environmental culture in Serbia are at a very low level. The consequence of public attitude towards the environment is increasing degradation of the environment, irrational exploitation of natural resources, increasing pressure on natural resources, littering etc.

The low level of environmental awareness and environmentally unfriendly behaviour result from inadequate education, poor enforcement of environmental standards and low living standard<sup>12</sup>.

The education, environmental culture and awareness raising related activities are coordinated by the Directorate for Environmental Protection on the basis of legally established framework<sup>13</sup> and international obligations, working closely with the Ministry of Education and Sports and other competent institutions. However, strategic approach to environmental education has been insufficiently introduced.

Formal environmental education in Serbia has not been developed to a satisfactory level, which further affects the generally low level of environmental

<sup>12</sup> Survey conducted in 2003 indicating that educated citizens and affluent social groups are more willing to forego a part of personal income for environmental benefits.

<sup>13</sup> The National Assembly has identified environmental education as one of six priorities in the environmental field.

awareness. The strategic approach to environmental educational process is missing. The quality of formal education, from preschool institutions to university level, is unsatisfactory although environmental topics were first introduced over a decade ago. However, it was only in 2001 that multidisciplinary and intersectoral approach to environmental education was first introduced through educational reform that included the principles of sustainable development into the courses.

The reform of education system in the classes that have been reformed (first and second grade of primary school) adopted more holistic approach to environmental education through the new subject called 'the world around us', as well as the Serbian language, arts, physical and health education. Optional subjects 'environmental education' and 'guardians of nature' were introduced for the first, second, third and fourth grade respectively. The new schoolbooks were revised accordingly, methods of active participation were introduced, and additional training courses were organized for teachers.

Apart from the vocational profile of environmental sanitary technician, which was introduced in the nursing schools, there is a new profile of environmental technician in the schools providing education in the field of chemistry, non-metals and graphic industry. Environmental protection related issues were incorporated into the school subjects such as biology, chemistry, ecology and environmental protection, disinfection and pest/rodent control, etc.

In the general educational curriculum of grammar schools, environment is taught within the subjects of biology, chemistry, geography, physics (all four years) as well as in the subjects such as philosophy, sociology, constitution and civil rights etc. The general education subjects of the secondary school include the subject 'biology with environmental science'. Inter-disciplinary environmental contents including production technologies and standards in environmental protection and management of by-products and wastes are introduced in other subjects.

A more advanced environmental education is present at the university level at four universities in Serbia (Belgrade, Nis, Novi Sad and Kragujevac). More than 20 faculties have set up departments or study groups for teaching environmental issues in both graduate and post-graduate studies. There is general lack of qualified lecturers and shortage of educational material. The training of teachers in environmental issues has commenced within the process of developing new textbooks and didactic instruments based on proactive learning and learning for life.

The development of informal environmental education is hindered by the lack of coordination, and systematic approach as well as restricted access to different categories of the public, limited access to information, limited interest of the media and limited opportunity of the public to participate in environmental decision-making.

The Directorate for Environmental Protection has provided financial support to over 30 educational programs prepared by NGOs. In order to promote and raise public awareness, numerous campaigns have been organized. Publishing activities were oriented mostly at raising the level of environmental awareness among children, including long-term projects 'School in Nature' and 'Living with the Nature'.

Dissemination of information as an important component of informal education is still fragmented, not systematically planned, and event driven. There are special magazines that deal with environmental issues, as well as children magazines, with special emphasis on environmental issues. The number and quality of articles in daily newspapers and periodicals is generally far from satisfactory. Although there are special radio and TV programs, insufficient attention is paid to these issues. Positive example is

provided by information-education centers in protected natural areas as a useful approach to promote the issues of environmental protection.

### **8.8.2 Short-Term Measures in Education and Raising of Environmental Public Awareness (2006 – 2010)**

Raising environmental awareness is an inseparable pre-condition of environmental policy reform. The main focus in the short-term should be put on:

- Preparation of the National Strategy for Environmental Education and Education for Sustainable Development.
- Integration of environmental education into regular schools and other forms of formal education.
- Establishing a network of centers for improvement of environmental education.
- Improved professional environmental education. University education should be expanded to cover environmental policy development, environmental law, environmental economics, environmental management, environmental ethics and sustainable development.
- Better public access to environmental decision-making and environmental information.
- Systematic improvement of informal environmental education through educational activities by professional institutions, NGOs for different targeted groups of population, organized awareness raising campaigns and environmental culture campaigns with adequate media coverage.
- Establishing a database of institutions and organizations involved in environmental education.

### **8.8.3 Medium-Term Measures in Education and Raising of Environmental Awareness (2011 – 2015)**

The reforms of environmental education and awareness raising in the medium term should focus on:

- Greater level of integration of environmental related subjects in the curricula of the education process, training of teachers, development of teaching methods and development of teaching aids.
- Continuous education and awareness raising activities according to the Environmental Education Decade.
- Improvement of professional environmental education in order to prepare experts in the field of integrated environmental management.
- intensive awareness raising efforts to develop environmental culture among all categories of population, especially in the field of separate collection and sorting of waste and tourist activities, with focus on protected areas. To this effect, further efforts should aim at development of information centres in nature protected areas.

## 8.9. International cooperation

The principles and forms of international cooperation reflect specific heritage and state of the environment in the Republic of Serbia as well as political and economic conditions.

The Republic of Serbia makes an effort to enter the Stabilisation and Association Process, which should facilitate the process of approximation and accession to the European Union. Acceleration of the EU approximation process is considered as key political priority. The EU aid channeled through the CARDS programme is of particular importance. Further support of the European Union on the path towards the EU accession is expected.

Significant part of international cooperation relates to the ratification and implementation of a large number of international conventions and agreements in the field of environmental protection. Serbia and Montenegro has ratified 64 international agreements. The ratification of other international agreements is still pending. The Republic of Serbia will become further involved in the activities of the international community concerning drafting and adoption of international conventions and treaties addressing global environmental problems. Annex 3 presents the list of international treaties and conventions that were signed by the Republic of Serbia, and those which are expected to be signed in the short-term.

The Republic of Serbia will continue cooperation with international and regional organizations and initiatives dealing with environmental protection, such as: the United Nations and its specialized agencies, the World Bank, the European Commission, the European Environment Agency, the European Bank for Reconstruction and Development, the World Trade Organisation, the International Monetary Fund etc. The focus in the next two years will be on organization of the 6<sup>th</sup> Ministerial Conference Environment for Europe that will be hosted in Belgrade in 2007.

The strategic position of the Republic of Serbia, the existing international links, economic potential, and the cross-border character of pollution reinforce the need for closer bilateral relations. Therefore, the accelerated conclusion of intergovernmental agreements on the establishment and development of bilateral cooperation is expected. It will serve as a basis for preparing effective cooperation programs. Developed countries play particularly important role in bilateral cooperation providing aid programs contributing to the improvement of environmental conditions in Serbia and increase of institutional capacity.

Bilateral cooperation enables the exchange of relevant experience which contributes to the proper assessment and addressing of environmental problems, and it facilitates dissemination of skills relevant for policy and decision making. The experience of the EU member states (in particular the new member states from Central Europe) and the candidate countries related to the implementation of the EU environmental *acquis*, reform of environmental policy, institutions, monitoring and financing system is of special importance. Close cooperation will be sought with neighbouring countries that are pursuing the EU approximation process with the aim to harmonise long-term activities and address common problems of environmental protection.

Well designed, timely and effective international environmental activities, combined with the use of national potential should allow the Republic of Serbia to take up a key role in terms of strengthening and developing good general political and economic relation in the region. Successful international cooperation will also enable

Serbia to become an active participant in the process of ensuring sustainable development in the world and addressing global environmental challenges.

The successful and effective international environmental cooperation is expected to bring the following benefits:

- Acceleration of the process of approximation and accession to the European Union;
- Participation in the preparation and adoption of international conventions and agreements;
- Ratification of the relevant international conventions and agreements;
- General strengthening of cooperation and relations with the neighbouring countries, as well as joint effort to address environmental problems;
- Recognizing environmental issues as one of the key elements of the national development policy;
- Adoption of the sustainable development principles in designing the strategy of foreign policy and international cooperation.



## 9 FINANCING OF THE NATIONAL ENVIRONMENTAL STRATEGY

### 9.1 Sources of funding

Financing of the National Environmental Strategy, alongside the institutional capacity building and establishing an effective financing system, will constitute the most important implementation challenge. Funding of the NES is closely linked with environmental policy reforms, especially setting up an efficient and decentralised system of environmental financing and upgrading of environmental infrastructure and monitoring system.

The assessment of the NES expenditure over the next ten years consists of total expenditures required to implement the NEAP (2006-2010) based on costing of individual actions, and estimation of expenditure required to implement the NES medium-term policy objectives and reforms (2011-2015). The assessment of expenditures were also based on comparative experiences in countries of Central Europe, as well as experience of countries which have already successfully implemented major environmental programs.

The assessment of the capacity to finance the NES expenditure relies mainly on the following sources of funding:

- Own funds; revenues from charges and taxes, user charges for the use of natural values and other sources provided by national legal and physical persons (application of the Polluter Pays Principle);
- Earmarked funds from the state budget and municipal budgets;
- Loans taken by the state and municipalities for implementation of policy objectives;
- International sources – donor assistance programs and loans from international financial institutions (IFI's).

### 9.2 Expenditure

The total NES expenditure (investment and operational) for the next decade is estimated in the range of 4.1 – 4.2 bln Euros. The estimated level of expenditure is considered as the minimum required to implement the Strategy. Efforts will be made to raise the estimated level of expenditure if additional financing sources become available (e.g. faster GDP growth, effective implementation of the polluter and user pays principles, adequate pricing of resources, greater involvement of private sector in environmental investment, higher level of EU funding). The total NES expenditure does not include operational expenditure of the existing environmental infrastructure (waste collection and disposal, wastewater collection and treatment etc) as well as the existing expenditure on environmental institutions, environmental monitoring system etc. The estimated NES operational expenditure shows the additional costs that will need to be financed when the infrastructure is expanded and when the policy and institutional reforms are implemented. However, the total NES expenditure includes a large number of projects, which have been planned irrespectively of the NES. Thus, the total figure should not be considered exclusively NES related.

The total expenditure is estimated to increase from about 44 mln Euros annually in 2006 to some 718 mln Euros in 2015 (figure 9.1). The temporal distribution of the expenditure shows that during the short-term implementation period covered by the NEAP (2006-2010) the increase of expenditure is gradual. The reason is that the short-term NES implementation phase focuses on building an effective legal, financial,

monitoring and reporting system of environmental protection thus involving many non-capital-intensive type activities. The investment type expenditure during this period addresses mostly hot spot locations and existing projects in the pipeline. Significant increase in environmental expenditure is foreseen in the medium-term implementation period (2011-2015).

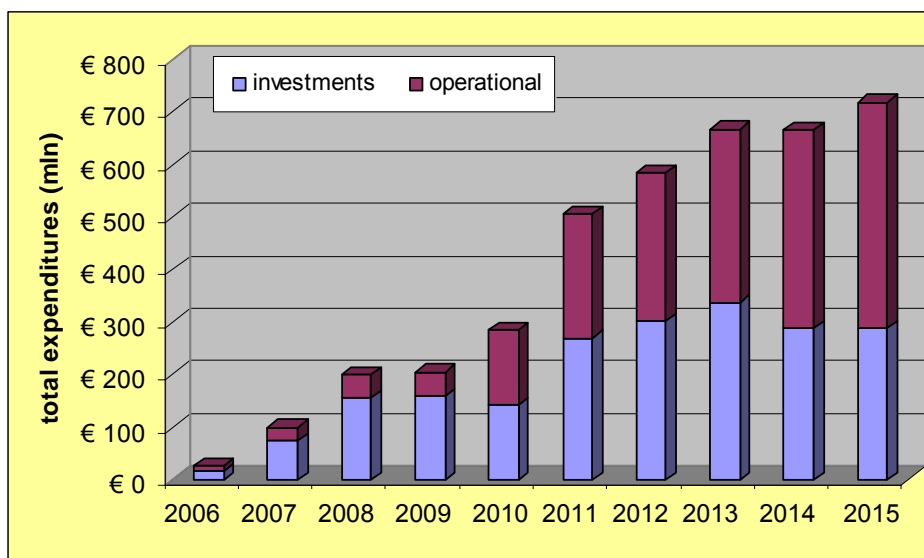
Figure 9.1 Total annual NES environmental expenditures (excluding indirect environmental expenditure) for sub-sectors 2006 – 2015 [mln Euros]

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	total
waste	€ 10	€ 36	€ 52	€ 70	€ 138	€ 128	€ 133	€ 139	€ 144	€ 150	€ 1000
energy	€ 4	€ 2	€ 54	€ 47	€ 51	€ 141	€ 192	€ 243	€ 227	€ 244	€ 1.204
mining		€ 2	€ 0.3	€ 10	€ 12	€ 2					€ 26
industry	€ 0.3	€ 18	€ 30	€ 20	€ 15	€ 18	€ 21	€ 25	€ 28	€ 31	€ 205
chemicals	€ 0.5	€ 4	€ 6	€ 6	€ 8	€ 5	€ 5	€ 5	€ 5	€ 5	€ 50
transport	€ 0.1	€ 1	€ 15	€ 12	€ 12	€ 68	€ 79	€ 94	€ 107	€ 127	€ 515
agriculture	€ 1	€ 12	€ 14	€ 15	€ 15	€ 11	€ 12	€ 13	€ 15	€ 16	€ 123
soil	€ 0.1	€ 2	€ 2	€ 2	€ 2	€ 3	€ 3	€ 3	€ 3	€ 3	€ 24
air	€ 0.4	€ 5	€ 7	€ 3	€ 3						€ 19
water	€ 25	€ 40	€ 50	€ 60	€ 80	€ 108	€ 115	€ 121	€ 127	€ 134	€ 860
nature	€ 2	€ 2	€ 3	€ 1	€ 4	€ 3	€ 3	€ 3	€ 4	€ 4	€ 29
noise	€ 0.3	€ 0.5	€ 1.0	€ 0.9	€ 0.9	€ 1	€ 2	€ 3	€ 4	€ 5	€ 19
radiation	€ 0.4	€ 1	€ 1	€ 1	€ 3	€ 18	€ 18	€ 18	€ 1	€ 1	€ 61
<b>Total</b>	<b>€ 44</b>	<b>€ 125</b>	<b>€ 234</b>	<b>€ 249</b>	<b>€ 343</b>	<b>€ 506</b>	<b>€ 583</b>	<b>€ 667</b>	<b>€ 665</b>	<b>€ 718</b>	<b>€ 4.134</b>

The NES embraces activities that are directly related to environmental improvements but it also includes sectoral activities that bring environmental benefits but their main purpose is not environmental protection (e.g. transport infrastructure, drinking water supply and treatment). This indirect environmental expenditure is estimated to require about 655mln Euros in the period 2006 - 2015. Majority of the indirect expenditure relates to traffic and transport improvements (approximately 300mln Euros), approximately 250mln Euros will be spent on the extension of district heating, and 100mln Euros will be invested in extending drinking water supply and improving drinking water quality.

The expenditure presented consists of investment costs and operational costs. Initially, the share of investment expenditure is much higher than the share of operational costs. However, with the rising number of completed environmental infrastructure projects (wastewater treatment plants, landfill sites, recycling projects, monitoring system etc), the operational costs will be rising gradually to exceed 50% of the total annual expenditure of the NES in 2015 (figure 9.2).

Figure 9.2 Estimated NES expenditure (investment and operational) 2006 -2015 directly related to environmental improvements.



Estimation of the total NES expenditure expressed as percentage of GDP depends on the economic development scenarios in Serbia. For this, the official GDP forecast of the Ministry of Finance (the macro-economic unit) was applied. Based on the national GDP in 2004 of 17.8 bln Euros, the NES expenditure (excluding indirect environmental expenditure) is expected to increase (figure 9.3) from 0.2% of GDP in 2006 to 2.4% of GDP in 2015 (assuming the rate of economic growth of 5% in 2006 and 2007, 7% in 2008, and 5% per year between 2011 and 2015).

Experience from the new EU member states in Central Europe show that their environmental expenditure was in the range of 1.5% - 2.5% of GDP during the pre-accession period. Assuming the medium GDP growth rate (about 5% annually), it is expected that Serbian environmental expenditure will reach a similar range in the medium-term. Consequently, provided that effective financing, enforcement and monitoring mechanisms are introduced in Serbia, financing of the NES should not cause major obstacles.

Figure 9.3. Estimated share of the NES expenditure (excluding indirect environmental expenditure) in GDP

	2006	2011	2015
Share of environmental expenditure in GDP assuming 5% growth scenario	0.2%	1.2%	2.4%

The NES expenditure should be considered also from a different perspective. Assessment of the costs of environmental damage in Serbia shows that environmental degradation incurs annual costs on the national economy in the range of 4.4% (conservative scenario) to 13.1% (maximum scenario) of GDP (2005). The highest burden is estimated to be caused by air pollution (53% of total costs), followed by water pollution (22% of total costs) and waste management (11% of total costs). Implementation of the NES will produce significant reduction of pollution load and environmental degradation, hence it will also generate savings in the national economy. This is estimated to be 2.2% (conservative scenario) to 5.4% of GDP.

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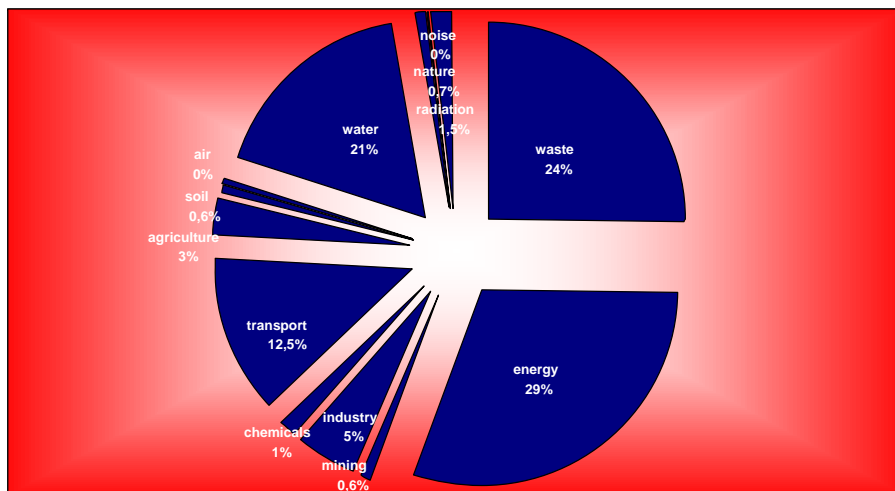
Breakdown of the total estimated NES expenditures by sub-sectors shows (figure 9.4) that the highest expenditure will be required in the energy sector (29%), waste management sector (24%), water management sector (21%), and transport expenditure directly related to environmental improvements (12.5%). It should be noted that the air expenditure presented is low, as it is largely included in the energy, transport as well as industry sectors (the air expenditure presented covers mostly monitoring and institutional related costs). If the air expenditure in these sectors is added, the combined total air-related expenditure is estimated at about 40% of the total NES expenditure. The climate change related expenditure (mainly extension of district heating) is considered as indirect expenditure, but it would also generate environmental benefits.

It is estimated that the major investment expenditure in the waste management sector will include construction of sanitary landfills (on average 14.5mln Euros annually). The annual operational expenditure on operation of sanitary landfills is expected to reach 20mln Euros in 2015. It is estimated that recultivation of the existing dumpsites will require at least 2.5mln Euros annually after 2010. Operational expenditure on waste collection is expected to increase to 70mln Euros annually during the period 2010 -2015. Setting up the recycling and composting system is envisaged in the medium-term horizon (2011-2015). The respective average investment is estimated at € 13.5mln per year (2011 – 2015), the operational cost at € 15mln by 2015.

The total investment in the hazardous waste incinerator for medical and organic industrial waste is estimated at € 40mln, while the investment into the physico-chemical treatment and transport of hazardous waste is foreseen at the level of 17mln Euros. The operational cost of hazardous waste management system is estimated to rise gradually to reach about 14 mln Euros in 2015.

It is estimated that the total investment expenditure of the energy sector necessary to reach compliance with the LCP Directive will be almost 800 million Euros during the coming decade. Of this at least 50mln Euros has to be invested by the Refineries. Operational costs are estimated to reach € 100mln in 2015, of which about 90% for the power sector and 10% for refineries.

Figure 9.4. Share of the estimated total NES expenditure (excluding indirect environmental expenditure) by sub-sectors.



To reach the respective policy objectives regarding the industrial wastewater treatment, € 10mln annually will need to be invested after 2010. Operational costs of industrial wastewater treatment are estimated at € 17.5mln in 2015. The average annual expenditure on introduction of the Environmental Management System to the largest industrial plants is estimated at 1.5mln Euros (50,000 Euros annually per enterprise). It is also assumed that after 2011 each year € 2mln will be spent on clean up of industrial contaminated sites. Setting up and operation of the management system for chemicals is estimated to require public sector investment of about 4mln Euros per year, and private sector investment of 4.5mln Euros/annum. Operational costs (after 2010) will be € 1mln for the public sector and € 4mln for industry and private sector.

The introduction of unleaded petrol is estimated to incur additional costs for consumers and industry at the level of 5mln Euros annually (assuming 5% annual increase of consumption). The low sulphur diesel fuel is estimated to require additional expenditure of 15-18mln Euros annually. International studies show that cars with Euro 3 or Euro 4 engines cost on average 310 Euros more than cars, which do not meet these emission limit values (the figure for trucks is estimated at 2,745 Euros). Consequently, assuming the annual 5% increase in the vehicle fleet, and gradual decrease of the share of second hand cars to 50% of total sales in 2014, the additional cost for new vehicles that meet the EU emission limit values is estimated at 36mln Euros in 2010 rising steadily to 87mln Euros in 2014. Rigorous vehicle inspection (including monitoring of emissions) is estimated to require additional expenditure of 10mln Euros in 2007 rising to 15mln Euros in 2014.

Expansion and improvement of urban wastewater treatment will require an increase of the treatment capacity by some 1.6mln pe. Total investment is estimated at € 400mln (on average at least € 35mln annually after 2009). Operational costs are estimated at € 25mln in 2015. It is estimated that about 1mln inhabitants will be additionally connected to the sewerage system by 2015. Assuming an average cost of €

334 per inhabitant this leads to a total investment of € 342mIn, or € 55mIn annually after 2010. Additional operational costs are estimated at the level of € 17mIn in 2015. It is estimated that € 10mIn annually will be invested into improvement of drinking water quality, and € 2mIn will be invested annually into improvement of the drinking water distribution network to reduce water losses (which is considered as indirect expenditure).

It is estimated that from 2010 the expenditure on reduction of noise emissions from traffic and industry will grow from € 1mIn in 2010 to € 5mIn in 2015. The estimated investment costs of radioactive waste storage facility will be € 50mIn to be invested after 2010. The annual operating expenditure of the storage facility is estimated at € 1.25mIn.

### 9.3 Financing the NES

The time-frame of the NES is too long to develop a detailed financing plan. Financing plan will be prepared for the NEAP (2006-2010), which develops the short-term policy objectives and reforms of the NES into specific packages of actions, with clear indication of funding sources and funding categories. Instead, the NES should present funding sources and funding mechanisms of implementation. The main financial burden of the NES implementation will be shared by the polluters (industry, population), the municipal budgets, ear-marked environmental funds, the state budget and foreign donors. The following sources of funding and financing mechanisms need to be put in place to successfully implement the NES:

1. Implementation of Polluter and User Pays Principle:
  - Implementation of the Polluter Pays Principle. Polluter should cover all costs of environmental degradation caused by its operations. Full implementation of this principle will require effective enforcement of environmental liability rules, monitoring and application of pollution taxes and resource use charges.
  - Industry and energy sector own resources. The role of the state environmental policy should be to incentivise industries to invest into pollution abatement through application of economic instruments and better enforcement and monitoring of environmental regulations.
  - Sources of public utility companies (PUCs). These are especially important for municipal wastewater, drinking water, waste management projects and municipal heating. In principle, the PUCs investment expenditure should be recovered from the service fees during a reasonable pay-back period.
  - Ear-marked funds: Environmental Protection Fund and other ear-marked funds collecting revenues from pollution and resource use charges. Pollution charges should be set for all environmental media and their level should be sufficiently high to reflect at least a considerable part of the environmental damage inflicted by particular pollutants so to encourage industries to reduce pollution rather than pay the charges. Experience from the new EU member states show that the environmental charges in combination with finance supplied by the environmental funds provides incentives to reduce pollution and initiate (large scale) environmental investments. Environmental funds should provide soft (low or no-interest) loans and grants for environmental projects.
  - Privatisation of industrial facilities. Clean up of past pollution and modernisation of industrial technology to meet the emission limit values and reduce water and energy consumption should be safeguarded in the privatisation contract.

2. State and municipal financing:

- State budget funds allocated to the Ministry of Science and Environment, Ministry of Agriculture, Water and Forestry and other sectoral ministries.
- Municipal budgets catalysing large scale municipal infrastructure projects (wastewater, drinking water, waste management, road infrastructure etc). In addition to direct financing by municipal budget municipal bonds or loans can be applied to provide additional funding that cannot be recovered from service fees during a reasonable pay back period.
- Debt-for-Nature Swap Fund that would convert part of the interests paid to foreign creditors by the state budget into a special fund supporting pollution abatement investment projects.

3. Borrowing mechanisms:

- Loans from local commercial banks.
- BOT (build-operate-transfer) scheme financing environmental investments in wastewater treatment, waste management and district heating by private sector companies, which are offered concessions for operation of the facilities over certain period of time.
- Loans from international finance institutions i.e. the World Bank, EBRD, EIB.

4. Foreign assistance:

- EU assistance funding through the European Agency for Reconstruction, and in the future pre-accession funding.
- Global Environmental Facility providing support for reduction of greenhouse gas emissions, protection of biodiversity, reduction of ozone depleting substances, development and reduction of pollution load to transboundary water bodies.
- Bilateral assistance programmes i.e. SIDA, GTZ, Italian Ministry for Environment and Territory, USAID, JICA and other.

It is estimated that more than 50% of expenditure linked directly to the NES should be financed by polluters themselves (consumers and industries). Part of the expenditure will be financed from own resources (including operating surplus) of polluters. For example, if consumers buy a new car this automatically will include the expenditure on the catalytic converter that is installed, costs of unleaded gasoline and low sulphur fuels will also be directly included in the purchase price. However, it may be anticipated that investments by (private) industries will need to be partly financed by loans (if the operating surplus of the enterprise is not large enough to finance the investments directly). Capital inflow from multinational companies taking part in the privatisation of Serbian industry will also be an important source of finance for industrial pollution abatement.

Large part of environmental expenditure will need to be initiated by municipalities, to built and operate (new) sewers, wastewater treatment plants and waste collection and processing services. As municipal budgets cannot supply all needed finance for this expenditure (nor that this would be desirable as the "user pays principle" stipulates that the users of these services should ultimately finance it); a large part of the

expenditure on municipal environmental infrastructure should be increasingly covered by user fees.

The state budget will play a modest role in the financing of environmental expenditures. During the first 5 years the state budget will continue to play an important role in financing environmental policy and legislative reform, institutional reform and capacity building, strengthening of monitoring system, project preparation etc. Once the environmental and financing capacities are put in place, the role of the state budget in financing environmental protection should diminish significantly.

As indicated earlier, the long time-frames of the Strategy and the uncertainties typical for transitional economy prohibit presentation of a detailed financing plan for the NES. However, rough figures can be derived from the application of a set of assumptions that describe the potential sources of financing.

The environmental financing will need to be increased substantially to supply sufficient funds for implementing the NES. The basis of environmental financing will consist of (new and revised) user fees for municipal environmental services applied to consumers and industries. In this indicative assessment it is assumed that by 2011, 20% of the additional expenditure on municipal wastewater and waste management will be covered by user charges. For the medium term (2011-2015) it is assumed that the cost coverage ratio will increase to 80%. It is estimated that the revenues of environmental charges directed to the Environmental Protection Fund, and thus the role of the Fund in financing environmental policy will increase to about 7.5% of the total environmental expenditure. This can be achieved by gradually introducing new environmental charges (air, waste), and also a gradual increase of the charge rates. Thus, about 55mln Euros can be generated annually by 2015.

It is difficult to predict the volume of capital inflow from privatisation, equity investment and private sector involvement in municipal infrastructure. In the indicative assessment it was assumed that 50% of investments by private enterprises and public utility companies will need to be covered by external finance (loans) of local, national and international financial institutions. Other sources of finance will be the inflow of capital due to privatisation and operating surpluses of enterprises.

Finally it was estimated how much funds may potentially be raised by grants of foreign donors (EU, bilateral cooperation, World Bank). The value of foreign aid after 2011 is estimated at 10% of the total investments (based on international experience of Central and Eastern European countries). The EU aid is expected to grow gradually in line with the progress of the EU approximation process.

## **10 IMPLEMENTATION AND PROGRESS MONITORING**

Implementation of the National Environmental Strategy requires much more effort than the preparation of the document and management of the policy process. Implementation of the NES will require many implementation arrangements. The experience of other European countries indicates that the lack of such arrangements renders national strategies unimplementable.

The following measures are critical for successful implementation of the NES:

- Development of the National Environmental Action Plan;
- Institutionalisation of the NES;



- Financing;
- Progress monitoring and reporting;
- Evaluation, revision and updates.

National Environmental Action Plan is the key implementation mechanism of the NES. The NEAP develops policy objectives and policy reforms of the NES into packages of actions consisting of direct regulations, enforcement, incentive instruments, planning, monitoring, capital investment, training and education etc. The packages of actions use synergies for achieving environmental objectives in a cost-effective and coherent way. The NEAP is prepared for short-term horizon of 5 years. It is presented in action plan matrix that specifies the type of intervention, expected outputs, implementing institution, implementation time-frames, expenditures, funding status and sources of funding. The NEAP was developed in parallel with the NES and its adoption by the government will follow the adoption of the NES. Apart from the NEAP, the National Environmental Health Action Plan (NEHAP) (including the Children Environmental Health Action Plan) will need to be developed to foster improvements of public health affected by environmental degradation.

The starting point in the institutionalisation of the NES is its adoption by the National Assembly of the Republic of Serbia. In addition, specific management arrangements are required to ensure effective implementation. These arrangements include:

- Clear mandate of the ministry in charge of the environment for coordination and management of the NES implementation;
- Establishment of the NES and NEAP coordination office in the ministry in charge of the environment;
- Continuous proactive operation of the NEAP Forum (representatives of ministries, industry and NGOs). At least one NEAP Forum meeting per annum should be convened discussing implementation progress and identifying bottle necks;
- Proactive involvement of other Ministries, industry and NGOs in practical implementation of the NES;
- Communication of implementation results to the interested parties and to the public.

Financing of the NES is the most challenging implementation task. Environmental funding will have to increase substantially over the coming years to make the NES vision reality. The most pressing issue is the reform of environmental financing system so that the main financing burden is shifted away from the state budget to polluters and to earmarked funds. Clear commitment to financing on the part of the national government, municipal government, industry and donors is crucial. The amount of funding available to the NES should be rising significantly every year and the implementation progress can be measured against the committed and invested funding. The NES is also expected to facilitate donors' involvement in the environmental sector.

Implementation of the NES is integrated with progress monitoring arrangements that are based on well-defined and measurable set of progress monitoring criteria. Monitoring criteria include policy progress criteria and state of environment criteria. The set of criteria applied to monitor the NES implementation progress include:

- Timing: are the policy objectives implemented according to time schedule?
- Value of financing sources allocated to the NES;
- Meeting targets of specific objectives stipulated in the NES;

- Improvement of environmental monitoring and reporting system;
- Reduction of pollution load discharged into waters, air and soil;
- Improvement of air and water quality;
- Improved waste management;
- Reduced impact of noise;
- Improvement of public health conditions measured by life expectancy, infant mortality, decline in morbidity in areas with severely degraded environment;
- Maintenance of the present level of biodiversity;
- Increasing energy, raw materials and water efficiency per production unit;
- Raised public environmental awareness measured through public opinion surveys.

Progress monitoring should be undertaken regularly to identify reasons of delays and possible stumbling blocks. According to the Law on Environmental Protection, the ministry in charge of the environment will submit biannually the NES progress evaluation reports to the National Assembly.

Experience with the Strategy implementation builds over time and allows evaluations, updates and revisions to be made and thus initiating the new policy planning cycle. It is a good practice for evaluations to be undertaken by external reviewers. Updates and revisions of the NES should be carried out with participation of the NEAP Forum and the NEAP working groups under the leadership of the ministry in charge of the environment.

## **APPENDIX 1 LIST OF LEGAL ACTS IN THE ENVIRONMENT SECTOR**

### **1. General regulations**

1. The Constitution of the Republic of Serbia (Off. Jour. of RS, No. 1/90)
2. Law on Environmental Protection (Off. Jour. of RS, No. 66/91, 83/92, 67/93, 48/94, 53/95)
3. Law on Environmental Protection (Off. Jour. of RS, No. 135/04)
4. Law on Strategic Environmental Impact Assessment (Off. Jour. of RS, No. 135/04)
5. Spatial Plan of the Republic of Serbia (Off. Jour. Of RS 13/96)

### **2. Protection of Nature**

1. Law on national parks (Off. Jour. of RS, No. 39/93, 44/93, 53/93, 67/93, 48/94)
2. Regulation on protection of natural rarities (O.H. RS 50/93, 93/93)
3. Decision on placement under control the use and trade of wild flora and fauna (Off. Jour. of RS, No. 31/05)
4. Regulation of categorization of natural goods (O.H. RS 30/92)
5. Regulation on methods of marking protected natural goods (O.H. RS 30/92, 24/94, 17/96)
6. Regulation on the registry of protected areas (O.H. RS 30/92)

### **3. Environmental Impact Assessment**

1. Law on Environmental Impact Assessment (Off. Jour. of RS, No. 135/04)

2. Regulation on validation of projects for which impact assessment is obligatory and list of projects for which environmental impact assessment could be requested (Off. Jour. RS No. 84/05)
3. By-law on the content of the request for decision making on the need for the impact assessment completion, and the content of the request for definition of the extent and content of the environmental impact assessment study (Off. Jour. RS No. 69/05)
4. Regulation on the content of the environmental impact assessment study (Off. Jour. RS No. 69/05)
5. Regulation on the content, appearance and the way of keeping official book on managed procedures and decisions made regarding environmental impact assessment (Off. Jour. RS No. 69/05)
6. Regulation on activities of the technical commission for evaluation of the environmental impact assessment study (Off. Jour. RS No. 69/05)
7. Regulation on the public access, presentation and public discussion of the environmental impact assessment study (Off. Jour. RS No. 69/05)

#### **4. Integrated pollution prevention and control**

1. Law on integrated pollution prevention and pollution control of the environment (Off. Jour. RS No. 135/04)
2. By-law on type of activities and facilities for which integrated permit is issued (Off. Jour. RS No. 84/05)
3. By-law on the content of the program of measures for synchronization of operation of the existing facility or prescribed conditions for activities (Off. Jour. RS No. 84/05)
4. By-law on the criterion for determination of the best available techniques, implementation of quality standards, and determination of the limit emission values in integrated permit (Off. Jour. RS No. 84/05)
5. Regulation on the content and the way of administration of the register of issued integrated permits (Off. Jour. RS No. 69/05)
6. Regulation on the content, appearance, and the manner of submitting a request and issuing an integrated permit (Off. Jour. RS No. 30/06)
7. Regulation on the integrated permit content and presentation (Off. Jour. RS No. 30/06)

#### **5. Harmful substances and waste**

1. Law on transportation of harmful substances (Off. Jour. of SFRY, No. 27/90, 45/90, Off. Jour. of FRY, No. 24/94, 28/96, 21/99)
2. Law on trade in explosive substances (Off. Jour. of SFRY, No. 30/85, 6/89, 53/91, Off. Jour. of FRY, No. 24/94)
3. Law on production and trade of poisonous substances (Off. Jour. of FRY, No. 15/95, 28/96)
4. Law on explosive substances, inflammable liquids and gases (Off. Jour. of SRS, No. 44/77, 45/85, 18/89, Off. Jour. of RS, No. 53/93, 67/93, 48/94)
5. Law on handling of waste substances (Off. Jour. of RS, No. 25/96, 26/96)
6. Regulations on documentation submitted in the procedure for granting the waste import export and transit permits (Off. Jour. of FRY, No. 69/99)
7. Regulations on criteria for determining the location and disposal of waste materials in waste disposal sites (Off. Jour. of RS, No. 54/92)
8. Regulation on conditions and the manner of selection, packaging and storing of secondary substances (Off. Jour. of RS, No. 55/01)

9. By-law on road and railroad transport of dangerous substances (O.H. RS 53/2002)
10. Regulations on handling waste products of hazardous nature (Off. Jour. of RS, No. 12/95)
11. Regulation on construction of plants for liquid oil gas and on warehousing and loading of liquid oil gas (O.J. SFRY 24/71)
12. Regulation on construction of plants for flammable liquids and on warehousing and loading of flammable liquids (O.J. SFRY 20/71)
13. Regulation on construction of petrol stations and on warehousing and tanking of petrol (O.J. SFRY 27/71)
14. Regulation on placing and keeping oil for heating (O.J. SFRY, 45/67)
15. Regulations on permitted amounts of hazardous and harmful substances in soil and water for irrigation and methods of their testing (Off. Jour. of RS, No. 23/94)

#### **6. Protection of Air**

1. Law on Hydro-meteorological affairs of interest for the whole country (Off. Jour. of SFRY, No. 18/88, 63/90)
2. Regulations on establishing networks and work programs of meteorological stations of interest for the whole country (Off. Jour. of SFRY, No. 50/90)
3. Regulations on limit values, emission measuring methods, selection of sample spots criteria and data collecting (Off. Jour. of RS, No. 54/92, 30/99)
4. Regulations on emission limit values, methods and timeframe for measuring and data recording (Off. Jour. of RS, No. 30/97, 35/97)
5. Regulation on detailed conditions which must be fulfilled by professional organizations which perform emissions and imissions measurement (O.H. RS 5/2002)
6. By-law on the Establishment of the Air Quality Control Programme in 2004 and 2005 (Off. Jour. of RS no. 48/2004)

#### **7. Protection from Noise**

1. Regulations on permitted noise level in the environment (Off. Jour. of RS, No. 54/92)
2. By-law on determining organizations that fulfill conditions for measuring noise in the human environment (Off. Jour. of SRS, No. 1/84, 44/84, 44/87, 51/91)

#### **8. Protection from Accidents**

1. Regulations on methodology for chemical accident risk and environmental pollution assessment preparatory measures and measures for remediation of consequences (Off. Jour. of RS, No. 60/94)
2. Law on protection from elementary and major disasters (O.H. SRS 20/77, 24/85, 27/85, 6/89, 52/89 and O.H. RS. 53/93, 67/93, 48/94)
3. Law on protection from fire (O.H. SRS 37/88 and O.H. RS. 53/93, 67/93, 48/94)
4. By-law on basics, criteria and conditions for classifying organisations and state authorities in appropriate categories of fire risk (O.H. SRS 58/89, 4/90)
5. Regulation on measures for protection from elementary and major disasters which must be contained in technical documentation for construction of certain objects (O.H. SRS 34/78)
6. Guideline for founding working units for protection from elementary and major disasters during peace (O.H. SRS 34/78)

## **9. Protection from Radioactivity**

1. Law on protection from ionizing radiation (Off. Jour. of SFRY, No. 46/96)
2. Law on prohibiting construction nuclear power plants in FRY (Off. Jour. of FRY, No. 12/95)
3. Regulations on limit values of irradiation for population and persons working with sources of ionizing radiation, on measuring levels of exposure to ionizing radiation of persons working with sources of these radiation and on testing contamination of working environment. (Off. Jour. of SFRY, No. 31/89, 63/89)
4. Regulations on methods of application of sources of ionizing radiation in medicine (Off. Jour. of FRY, No. 32/98, 33/98)
5. Regulations on conditions to be fulfilled by legal persons for performing systematic investigations of radio-nuclide contents in the environment (Off. Jour. of FRY, No. 32/98)
6. Regulations on conditions for circulation and utilization of radioactive materials, X-ray devices and other devices producing ionizing radiation (Off. Jour. of FRY, No. 32/98)
7. Regulations on limit values for exposure to ionizing radiation (Off. Jour. of FRY, No. 32/98)
8. Regulations on conditions for putting in circulation food supplies and objects of general use that are preserved by ionizing radiation (Off. Jour. of FRY, No. 42/98)
9. Regulation on limit values of radioactive contamination of the environment and on method of performing decontamination (Off. Jour. of FRY, No. 9/99)
10. Regulations on methods and conditions of collecting, preserving, recording, storing, treating and depositing of radioactive waste materials (Off. Jour. of FRY, No. 9/99)
11. Regulations on conditions to be fulfilled by legal persons for performing decontamination (Off. Jour. of FRY, No. 9/99)
12. Decision on establishing the Committee for nuclear energy (Off. Jour. of FRY, No. 16/96)
13. Decision on conditions for location, construction, and test work, starting the operation, utilization and permanent closure of nuclear facilities (Off Jour. of FRY, No. 42/97)
14. Decision on producing and contents of the report on nuclear safety and other documentation necessary for determining compliance with the measure of nuclear safety (Off. Jour. of FRY, No. 42/97)
15. Decision on method and conditions for systematic investigations of radionuclide presence in the environment in the vicinity of a nuclear facility (Off. Jour. of FRY, No. 42/97)
16. Decision on conditions for circulation and utilization of nuclear materials and methods for keeping record of nuclear materials according to the zones of material balances (Off. Jour. of FRY, No. 42/97)
17. Decision on qualifications and health conditions of persons working with sources of ionizing radiation (Off. Jour. of FRY, No. 45/97)
18. Decision on keeping the record of sources of ionizing radiation and irradiation of population, patients and persons exposed to effects of ionizing radiation at work (Off. Jour. of FRY, No. 45/97)
19. Decision on systematic investigations of radionuclide contents in the environment (Off. Jour. of FRY, No. 45/97)
20. Decision on conditions to be fulfilled by legal persons to perform measurements for assessing the level of exposure to ionizing radiation of persons working with radiation sources, patients and population (Off. Jour. of FRY, No. 45/97)

21. Decision on criteria for assessing safety of nuclear facilities (Off. Jour. of FRY, No. 2/98)
22. Decision on conditions to be fulfilled by persons working on tasks and activities of managing production process in a nuclear facility and tasks and activities of monitoring such process (Off. Jour. of FRY, No. 2/98)

#### **10. Protection of Water**

1. Law on water regime (Off. Jour. of FRY, No. 59/98)
2. Law on waters (Off. Jour. of RS, No. 46/91, 53/93, 67/93, 48/94, 54/96)
3. Regulations on methods and minimum number of wastewater quality testing (Off. Jour. of SRS, No. 47/83, 13/84)
4. Bylaw on method for determining and maintenance of areas and belts for sanitary protection of drinking water plants (O.H. SRS 33/78)
5. Regulations on harmful substances in waters (Off. Jour. of SRS, No. 31/82)
6. Bylaw on conditions which must be fulfilled by firms and other legal persons performing certain kind of examination of surface and groundwater, as well as examination of wastewater quality (O.H. RS 41/94, 47/94)
7. Regulations on water classification (Off. Jour. of SRS, No. 5/68)
8. Regulations on categorization of watercourses (Off. Jour. of SRS, No. 5/68)
9. Regulations of the sanitary quality of drinking water (Off. Jour. of FRY, No. 42/98, 44/99)
10. Law on hydro-meteorological affairs of interest for the whole country (Off. Jour. of SFRY, No. 18/88, 63/90)
11. Water Master Plan of the Republic of Serbia (Off. Jour. Of RS 7/02)
12. Annual Programmes for Construction, Reconstruction and Maintenance of Water Management Facilities and Programmes for Construction, Reconstruction and Maintenance of Water Management Facilities.
13. Annual Decree on the water use tax, water protection tax and tax on the excavation of construction materials from water bodies.

#### **11. Protection of Agricultural Land**

1. Law on agricultural land (Off. Jour. of RS, No. 49/92, 53/93, 67/93, 48/94, 46/95, 54/96, 14/00)
2. Law on plant protection (Off. Jour. of FRY, No. 24/98, 26/98)
3. Regulations on maximum amounts of harmful substances in the fodder (Off. Jour. of SFRY, No. 2/90, 27/90)
4. Law on protection of plants from diseases and damaging species (O.H. SRS 14/84, 6/89 and O.H. RS 53/93, 67/93, 48/94)
5. Law on organic agriculture (O.J. FRY 28/2000)
6. Bylaw on method of destroying plants for which measures of destroying are ordered (O.J. FRY 67/2001)
7. Bylaw on types of packaging for pesticides and fertilisers and on destroying pesticides and fertilisers (O.J. FRY 35/99, 63/2001)
8. Bylaw on trade, import and sampling of fertilisers (O.J. FRY 59/2001)
9. Bylaw on trade, import and sampling of pesticides (O.J. FRY 59/2001)
10. Bylaw on methods of organic plant production and on collecting forest fruits and curative plants as products of organic agriculture (O.J. FRY 51/2001)
11. Bylaw on methods of organic livestock production (O.J. FRY 51/2002)

12. Bylaw on conditions which must be fulfilled by legal persons performing examination of methods of organic production process (O.J. FRY 67/2002)
13. Regulations on permitted concentrations of hazardous and harmful substances in soil and water for irrigation and methods of their testing (Off. Jour. of RS, No. 23/94)

#### **12. Genetically Modified Organisms**

1. Law on genetically modified organisms (O.J. fry 21/2001)
2. Bylaw on restricted use of genetically modified organisms (O.J. FRY 62/2002)
3. Bylaw on content and data of register of genetically modified organisms and products from genetically modified organisms (O.J. FRY 66/2002)
4. Bylaw on trading with genetically modified organisms and products from genetically modified organisms (O.J. FRY 62/2002)
5. Bylaw on introducing into production genetically modified organisms and products from genetically modified organisms (O.J. FRY 62/2002)

#### **13. Other Related Laws**

1. Law on energy (O.H. RS 84/2004)
2. Law on hunting (Off. Jour. of RS, No. 39/93, 44/93, 60/93)
3. Law on fishery (Off. Jour. of RS, No. 35/94, 38/94)
4. Law on forests (Off. Jour. of RS, No. 46/91, 83/92, 54/93, 67/93, 48/94, 54/96)
5. Law on geological investigations (Off. Jour. of RS, No. 44/95)
6. Law on mining (Off. Jour. of RS, No. 44/95)
7. Law on planning and construction (O.H. RS 47/2003)
8. Law on spatial plan of the Republic of Serbia (O.H. RS 13/96)
9. Law on tourism (Off. Jour. of RS, No. 35/94, 38/94, 48/99)
10. Law on enterprises (Off. Jour. of FRY, No. 29/96, 33/96, 29/97, 59/98, 74/99)
11. Law on standardization (Off. Jour. of FRY, No. 30/96, 59/98)
12. Law on the protection at work (Off. Jour. of RS, No. 42/91, 53/93, 67/93, 48/94, 42/98)
13. Law on public health protection (Off. Jour. of RS, No. 17/92, 26/92, 50/92, 52/93, 53/93, 67/93, 48/94, 25/96)

#### **14. Competencies of government management bodies regarding environment and legal procedure**

1. Law on ministries (O.H. RS 19/2004, 84/2004)
2. Law on determining certain competencies for autonomous province (O.H. RS 6/2002)
3. Law on local self-government (O.H. RS 49/99, 27/2001, 100/2003)
4. Law on activities of municipalities (O.H. RS 16/97, 42/98)
5. Law on state administration (O.H. RS 20/92, 6/93, 48/93, 53/93, 67/93, 48/94, 49/99)
6. Regulation on principles for internal organization and systematization of jobs within ministries, special organizations and government offices (O.H. RS 78/2004)
7. Decision on founding the organization for protection of natural goods (O.H. RS 88/92)
8. Law on general administrative proceeding (O.J. FRY 33/97, 31/2001)
9. Law on administrative disputes (O.J. FRY 46/96)

#### **Other**

1. Regulation on type of pollution, criteria for calculation of cost recovery for environmental pollution, amount and the manner of calculation of fees ( Off. Jour. of RS, No. 113/05)
2. Regulation on parameters and criteria for return, waiver and reduction of paying charges for environmental pollution (Off. Jour. of RS, No. 113/05)
3. Regulation on control of use and trade of wild flora and fauna (Off. Jour. of RS, No. 31/05 and 45/05)
4. Regulation on type of equipment, content and mark/badge of inspector for environment protection (Off. Jour. of RS, No. 35/05)
5. Regulation on the form of the legal identification card of inspector for environment protection (Off. Jour. of RS, No. 35/05)

## **APPENDIX 2 LIST OF RATIFIED INTERNATIONAL AGREEMENTS IN THE FIELD OF ENVIRONMENTAL PROTECTION**

### **I. International agreements which directly regulate environmental protection**

1. Law on ratification of Convention for the Protection of the Mediterranean Sea against Pollution (Off. Jour. SFRY , International treaties, No. 12/77)
2. Law on ratification of the Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Air-crafts (Off. Jour. SFRY International treaties, No. 12/77)
3. Law on ratification of Protocol Concerning Co-operation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency (Off. Jour. SFRY International treaties, No. 12/77)
4. Law on ratification for International Convention for Prevention of Pollution by Oil (Off. Jour. SFRY International treaties, No. 60/73)
5. Law on ratification of Geneva Maritime Conventions from 29 April 1958, ratifying Convention for Epi-continental Zone (Off. Jour. SFRY International treaties, No. 4/65)
6. By-law on International Convention Relating to Intervention on the High Seas in Case of Oil Pollution Casualties, (Off. Jour. SFRY International treaties, No. 2/77)
7. Regulation on ratification of Convention for Prevention of Pollution of Seas with Waste (Off. Jour. SFRY International treaties, No. 13/77)
8. By-law on Ratification of Yugoslav – Italian Lawsuit on Co-operation for Protection of Adriatic Sea and Surrounding Cost Areas from Pollution, (Off. Jour. SFRY International treaties, No. 2/77)
9. By-law on Convention Concerning Fishing in the Waters of the Danube River, between the governments of FNRY, NR Bulgaria, NR Romania and Confederation of Soviet Republics, (Off. Jour. SFRY International treaties, No. 2/77)
10. Law on ratification of Geneva Maritime Conventions from April 29, 1958, ratifying Convention of High Seas (Off. Jour. SFRY International treaties, No. 4/65)
11. Law on ratification of International Convention for the Protection of Birds (Off. Jour. SFRY International treaties, No. 2/77)
12. By-law on ratification of Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Off. Jour. SFRY International treaties, No. 9/77)



13. Law on ratification of Convention Concerning the Protection of the World Cultural and Natural Heritage (Off. Jour. SFRY International treaties, No. 8/74)
14. Law on ratification of Convention Concerning the Protection of the Cultural Heritage in Case of Wars (Off. Jour. SFRY International treaties, No. 4/56)
15. Law on ratification of Convention on Measures for Prohibition and Prevention of Illegal Import, Export and Trade of Cultural Heritage, (Off. Jour. SFRY International treaties, No. 50/73)
16. Law on ratification of the Vienna Convention on Civil Responsibility for Nuclear damages (Off. Jour. SFRY International treaties, No. 5/77)
17. By-law on ratification of International Plant Protection Convention (Off. Jour. SFRY International treaties, No. 12/57)
18. By-law on ratification of International Plant Protection Convention, (Off. Jour. SFRY International treaties, No. 7/55)
19. Decision on ratification of Protocol about Interventions on High Seas in case of Pollution by Materials Other than Oil (Off. Jour. SFRY International treaties, No. 12/81)
20. Law on ratification of Protocol Concerning Protection of the Mediterranean Sea from Pollution Sources from Land and Annexes I, II and III (Off. Jour. SFRY International treaties, No. 1/90)
21. Law on ratification of Protocol Concerning Special Protected Areas of the Mediterranean Sea (Off. Jour. SFRY International treaties, No. 9/85)
22. Law on ratification of Convention Concerning the Law of the Sea (Off. Jour. SFRY International treaties, No. 1/86)
23. By-law on ratification of International Convention for the Prevention of Pollution from Ships (Off. Jour. SFRY International treaties, No. 2/85)
24. Protocol 1978 Concerning International Convention for Prevention of Pollution from Ships, 1973 not published
25. Law on ratification of Treaty on Pollution Protection of the Tisa River Waters and Tributaries (Off. Jour. SFRY International treaties, No. 1/90)
26. Law on ratification of Convention on Long-range Trans-boundary Air Pollution (Off. Jour. SFRY International treaties, No. 11/86)
27. Law on ratification of Protocol to the 1979 Convention on Long Range Trans-boundary Air Pollution on Financing of the Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMER), (Off. Jour. SFRY International treaties, No. 2/87)
28. Law on ratification of Vienna Convention for the Protection of the Ozone Layer (Off. Jour. SFRY International treaties, No. 1/90)
29. Law on ratification of Montreal Protocol on Substances that deplete the Ozone Layer (Off. Jour. SFRY International treaties, No. 16/90)
30. Law on ratification of Convention for Early Warning in Case of Nuclear Accidents, (Off. Jour. SFRY International treaties, No. 15/89)
31. Law on ratification of Convention for Physical Protection of Nuclear Material (Off. Jour. SFRY International treaties, No. 9/85)
32. Treaty on ratification of Convention on Prohibition of Improvement, Production, and Stockpiling of Bacteriological (Biological and Toxic) Weapons and their Destruction (Off. Jour. SFRY International treaties, No. 43/74)
33. Law on Acknowledgement of Treaty between Federal Government of FR Yugoslavia and Government of Russian Federation in the Field of Environmental Improvement and Protection (Off. Jour. SFRY International treaties, No. 6/96)

34. Law on Acknowledgement of the UN Convention of Climate Change (Off. Jour. SFRY International treaties, No. 2/97)
35. Law on Acknowledgement of the Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal, (Off. Jour. SFRY International treaties, No. 2/99)
36. Law on Acknowledgement of the Convention on Biological Diversity (Off. Jour. FRY International treaties, No. 11/2001)
37. Law on Acknowledgement of the Convention of International Trade of Endangered Species of Wild Fauna and Flora (Off. Jour. FRY International treaties, No. 11/2001)
38. Convention on Co-operation for the Protection and Sustainable Use of the Danube River (Danube River Protection Convention), (Off. Jour. S&M International treaties, No. 4/2003)
39. Amendments to the Montreal Protocol on Substances Depleting Ozone Layer (Off. Jour. S&M International treaties, No. 2/2004)

## **II. International agreements which indirectly regulate environmental protection**

1. Law on ratification of Geneva Maritime Conventions from April 29, 1958, ratifying Convention of Territorial Seas and Outside Sea Zone (Off. Jour. SFRY, No. 4/65)
2. By-law on ratification of Treaty on Financial Contribution to the North-Atlantic Department for Protection from Ice (Off. Jour. SFRY, International treaties, No. 3/59)
3. Directive on ratification of the Treaty for Establishment of the General Council for Fisheries of the Mediterranean Sea (Off. Inf. of Presidium of the National Parliament, No. 25/51)
4. Directive on ratification of Convention on Fisheries and Conservation of Biological Goods of High Seas (Off. Jour. SFRY, International treaties, No. 4/65)
5. By-law on ratification of International Convention for Protection of Human Life on the Sea (Off. Jour. SFRY, International treaties, No. 4/65)
6. By-law on ratification of International Convention on Civil Responsibility for Damages caused by Oil Pollution (Off. Jour. SFRY, International treaties, No. 7/77)
7. Law on ratification of International Convention for establishment of International Fund for Compensation of damages caused by Oil Pollution (Off. Jour. SFRY, International treaties, No. 3/77)
8. Law on ratification of Convention on International Rules for Avoiding Collision on the Seas (Off. Jour. SFRY, International treaties, No. 60/75)
9. Law on Conventions adopted on the bases of Versaille Peace Treaty from June 8, 1919, and on the bases of corresponding directives from other conventions on peace adopted on International conferences held in Washington, Genova and Geneva 1919 – 1926, Off. News. Of Kingdom of Yugoslavia No. 44 XV/30)
10. By-law on ratification of Convention Concerning Protection against Hazards of Poisoning Arising from Benzene (Off. Jour. SFRY, International treaties, No. 16/76)
11. Law on ratification of Convention on Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Matter, (Off. Jour. SFRY, International treaties, No. 3/77)
12. Law on Prohibition of Experiments with Nuclear Weapons in Atmosphere, Universe and under the Water (Off. Jour. SFRY, International treaties, No. 11/63)

13. Law on ratification of Treaty on Prohibition of Placement of Nuclear and other Weapons for Mass Destruction on the Sea and Ocean bed, and their Underground (Off. Jour. SFRY, International treaties, No. 33/73)
14. Law on ratification of Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration (Off. Jour. SFRY, International treaties, No. 14/82)
15. Law on ratification of Convention on Safety at Work, Health Protection and Working Environment (Off. Jour. SFRY, International treaties, No. 7/87)
16. Law on ratification of Convention on Departments for Work Medicine (Off. Jour. SFRY, International treaties, No. 14/89)
17. Law on ratification of Convention Concerning Safety in the Use of Asbestos (Off. Jour. SFRY, International treaties, No. 4/89)
18. Law on ratification of European Convention for Protection of Historical Heritage (Off. Jour. SFRY, International treaties, No. 9/90)
19. Law on ratification of European Convention for Architectural Goods Protection (Off. Jour. SFRY, International treaties, No. 4/91)

**MULTILATERAL ENVIRONMENTAL AGREEMENTS, IN THE PREPARATION  
PROCESS OF RATIFICATION (BY SERBIA AND MONTENEGRO)**

1. Convention on the Conservation of Migratory Wild Animals, Bonn 1979.
2. Convention on the Conservation of European Wildlife and Their Natural Habitats, Bern 1979.
3. Convention on Environmental Impact Assessment in a Trans-boundary Context. Espoo, 1991.
4. Convention on the Trans-boundary Effects of Industrial Accidents. Helsinki, 1992.
5. Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes. Helsinki, 1992.
6. Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters. Aarhus, 1998.
7. Kyoto Protocol to the UN Framework Convention on Climate Change, 1997.
8. Amendments to the Vienna Convention on the ozone depleting substances:
  - London amendment (1990)
  - Copenhagen amendment (1992)
  - Montreal amendment (1997)
  - Beijing Amendment (1999)
9. Rotterdam Convention on the Prior Informed Consent for Certain Hazardous chemicals and Pesticides in International Trade, 1998.
10. Protocol on Biosafety to the Convention on Biodiversity, 2000.
11. Convention on Persistent Organic Pollutants – POPs. Rotterdam, 2001.
12. Framework Agreement on the Sava River Basin, 2002.
13. United Nations Convention to Combat Desertification. Paris, 1994.
14. Protocol on Pollutant Release and Transfer Registers – PRTR. Kiev, 2003.
15. Convention on the Protection and Sustainable Development of the Carpathians. Kiev, 2003.
16. Protocol on Liability and Compensation to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Lugano, 1999.
17. Convention on civil liability for damages to environment, 1993.

18. Helsinki Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent. Helsinki, 1985<sup>14</sup>.
19. Protocol concerning the Control of Nitrogen Oxides or their Transboundary Fluxes. Sofia, 1988.
20. Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes. Geneva, 1991.
21. Protocol on Further Reduction of Sulphur Emissions. Oslo, 1994.
22. Protocol on Heavy Metals. Aarhus, 1998.
23. Protocol on Persistent Organic Pollutants (POPs). Aarhus, 1998.
24. Protocol to Abate Acidification, Eutrophication and Ground-level Ozone. Gotenburg, 1999.
25. Convention on the Non-Navigational Uses of International Watercourses, 1997.
26. Barcelona Convention on the Protection of the Mediterranean Sea against Pollution, with Protocols, 1976.
27. Agreement between FNTY (Federal National Republic of Yugoslavia) and NR (National Republic) of Romania on hydro-technical issues related to hydro-technical systems and trans-boundary water courses (Bucharest, 1955)
28. Convention between federal government of FR (Federal Republic) of Yugoslavia and government of Romania on exploitation and maintenance of hydroelectric and navigable systems "Iron Gate I" and "Iron Gate II" (Drobeta Turnu Severin, 1998)
29. Agreement between federal government of FRY (Federal Republic of Yugoslavia) and government of NR (National Republic) of Hungary on water resources issues (Belgrade, 1955)

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<sup>14</sup> Points 13 to 19 relate to the Protocols to the Convention on Long-range Transboundary Air Pollution (Geneva, 1979). The convention was ratified in 2001.