NATIONAL ENVIRONMENTAL PROTECTION PROGRAMME

1. INTRODUCTION

The Constitution of the Republic of Serbia ("Official Gazette of RS", no. 98/06) stipulates right on healthy environment as one of the basic rights and freedoms of every citizen. Article 97 of the Constitution of the Republic of Serbia regulates and ensures sustainable development, system of environmental protection and development, protection and development of plants and animals and so on. Law on Environmental Protection ("Official Gazette of RS", no. 135/04, 36/09, 36/09 – sec. law and 72/09 – sec. law) prescribes that National Environmental Protection Plan (hereinafter referred to as: Programme) is to be developed for the period of at least ten years.

1.1 Abbreviations/acronyms and expressions used in the Programme

Abbreviations/acronyms used in the Programme are the following:

BAT	Best Available Techniques
CFC	Ozone Depleting Gases
CENELEC	European Committee for Electro technical Standardization
CMR	Chemicals Classified as Carcinogenic, Mutagenic and Toxic to Reproduction
EEA	European Environmental Protection Agency
EIA	Environmental Impact Assessment
EIONET	European Environment Information and Observation Network
ELV	End-of-Life Vehicles
EMAC	Environmental Management and Control System
EMEP	European Monitoring and Evaluation Program (Monitoring and Evaluation of Long Range Transmission of Air Pollution)
EMC	Environmental Management System
GEF	Global Environmental Facility
GHS	Globally Harmonized System of Classification and Labeling of Chemicals
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IAEA	International Atomic Energy Agency
ICPF	International Cooperation Programme for Forests
IPA	Instrument for Pre-Accession Assistance
IPPC	Integrated Pollution Prevention and Control
IRPA/INRI	International Radiation Protection Association
OECD	Organization for Economic Cooperation and Development
PAH	Polycyclic Aromatic Hydrocarbon
PBT	Persistent Bioaccumulative Toxic Substances
PCB	Polychlorinated Biphenyls
PCDF/D	Polychlorinated Dibenzofurans and Dioxines
PM	Particulate Matters
POPs	Persistent Organic Pollutants
REACH	Registration, Evaluation and Authorization of Chemicals
PRTR	Pollutant Release and Transfer Register
QC	Quality Control
SIDA	Swedish International Development and Cooperation Agency

SWOT	Strength, Weakness, Opportunity and Threat Analysis
VOC	Volatile Organic Compounds
UNECE	United Nations Economic Commission for Europe
UNICEF	United Nations Children's Fund
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization
GDP	Gross Domestic Product
BOD	Biochemical Oxygen Demand
GLP	Good Laboratory Practice
EU	European Union
GMO	Genetically Modified Organisms
ELV	Emission Limit Value
COD	Chemical Oxygen Demand
PUC	Public Utility Company
SSt	Serbian Standard
LEAP	Local Environmental Action Plan
NEAP	National Environmental Action Plan
NEPP	National environmental Protection Programme
NPI	National Plan of Implementation (for EU Integration of the Republic of Serbia)
NSDS	National Sustainable Development Strategy
RES	Renewable Energy Sources
CU	Chemicals Use
RSB	Republic Statistic Bureau
RSSP	Spatial Plan of the Republic of Serbia

Certain expressions have been used in the Programme with the following meaning:

Environment is a set of natural and created values whose complex inter-relations provide conditions and space for life;

Nature is a union of geosphere and biosphere exposed to atmospheric changes and various impacts, and it covers natural resources and values expressed through biological, geological and landscape diversity;

Acquis communitaire is 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;

Biodiversity is diversity of organisms within species, between species and of ecosystems and it includes general variety of genes, species and ecosystems at local, national, regional and global levels;

Economic instruments are the category of instruments aimed at influencing economic agents through changes in financial incentives in order to improve cost-effectiveness of environmental and natural resource management;

Emission is the release and discharge of pollutants in gaseous, liquid and solid form, or emission of energy from the source of pollution into the environment;

Geodiversity is the presence or distribution of various geological elements and 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;

Pollutant level is the concentration of pollutant in the environment which serves to express environmental quality in certain time and space;

Sources of environmental pollution are determined in location terms, and they are spatially limited as point, line and surface sources of pollutants and energy into the environment;

Environmental infrastructure includes facilities for pollution prevention or treatment at the end of the process (wastewater treatment facilities, sanitary landfills, equipment for air pollution reduction);

Environmental capacity is the ability of the environment to accept certain quantity of pollutants without disturbance or occurrence of irreversible damage in the environment;

Cadastre of environmental pollution sources is a set of systematized data and information on types, quantities, manner and points of introduction, release or disposal of pollutants in gaseous, liquid and solid form, or release of energy (noise, vibrations, heat, ionizing and non-ionizing radiation) from point, line and surface sources of pollution into the environment;

Environmental quality is the environmental status expressed through physical, chemical, biological, aesthetical and other indicators;

Monitoring is planned, systematic and continual observation of the state of nature, i.e. parts of biological, geological and landscape diversity, as a part of a comprehensive system of environmental monitoring in space and time;

Biomonitoring is the organized system of biological changes monitoring in time and space which reflects complex of natural and anthropogenic phenomena, impacts and processes in the best possible way;

Best Available Techniques include the most effective and most modern phases in the development of activities and manner of their implementation which indicate practical suitability of certain techniques to establish bases for determination or achievement of emission limit values in order to prevent or, if possible, to reduce emissions and environmental impact in whole;

Regulatory instruments are instruments which serve for the implementation of environmental policy and are used by state administration bodies to order necessary performance to be achieved or technologies to be used in the area of environmental protection;

Operator is any physical or legal entity who, compliant to regulations, manages the plant or complex, or controls it, or is authorized to make economic decisions in the area of the plant technical functioning;

Risk is a measure of certain probability level regarding an activity which may cause direct or indirect environmental hazards, including danger for human health and life;

Rehabilitation, i.e. remediation is a cleaning process or application of other methods to remove pollution from a location, making it safe for future use;

Accident is an abrupt and uncontrolled event occurring due to release, discharge or disperse of dangerous substances in production processes, in use, processing, storing, disposal or long-term inadequate storage;

Interested public is the public which affects or may be affected by decisions made by state authority, or which has interest in that, including civic associations and social organizations which deal with environmental protection and have been registered at the competent authority.

1.2 Contents of the Programme

Environmental planning and management shall be provided for and implemented through application of the Programme.

One of the key issues in a successful Programme is understanding, consensus and ownership among various stakeholders, as well as purposeful management structure which has enabled the effective management process during the development of this Programme. A lot of efforts have been made to address these issues. The Ministry of Environment and Spatial Planning (hereinafter referred to as: the Ministry) and Council for Sustainable Development (established on the basis of the Government Decision dated 16 October 2003) provided political driving force for the process. The Forum created the platform for wide stakeholder participation in the NEPP process. Five two-day Forum meetings were convened between February 2004 and October 2004. The Forum involved more than 150 participants from ministries, institutes, faculties, commercial societies, associations and other stakeholders.

The whole development process of this document (which used to be called NEAP document before the adoption of a set of laws in mid-December 2004, later on re-named into the National Environmental Protection Programme) was available to public through the environmental ministry's website, together with the Methodology of the document development, previously adopted by all stakeholders; the invitation for active involvement was continuously open.

The Working Group held a number of meetings in order to provide technical information for the Programme development process, including identification of the environmental problems and their causes, establishment of the policy aims and development of the policy reforms.

The Government made draft Decision on the adoption of the Programme during its session in June 2006; that Decision was sent to the National Assembly for further consideration. The Programme had not been considered in the National Assembly before June 2007, when it was withdrawn together with other draft documents from the Assembly and sent back to the Ministry to be re-harmonized.

One of the key documents used during the development of the National Sustainable Development Strategy, adopted in May 2008, was the draft Programme. It was also used for the development of many sectoral strategies, which surely contributes to integration of environmental policy into other sectoral policies.

At the end of 2008 The Ministry started to revise previous draft version of the Programme in accordance with relevant national strategic documents and a number of adopted laws and regulations.

The Programme 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 favourable 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 dynamics and manner;
- Financing plan.

On the basis of the National Environmental Protection Programme, the ministry responsible for environmental protection will prepare the Action Plan for its implementation, which is to be adopted by the Government for the period of five years.

In cooperation with other competent ministries, the Ministry shall prepare the Report on the Programme implementation once in two years, which shall be submitted to the Government.

1.3 Purpose and Structure of the Programme

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 Programme was developed with the objective to guide the development of modern environmental policy in the Republic of Serbia over the next decade. The Programme will be implemented through the Action Plan that will provide legal and institutional base for numerous current and future programmes and projects in the area of environmental protection. The Programme is developed to enable improvement of the quality of the environment, and the quality of life for citizens of the Republic of Serbia. In addition, the Programme facilitates the EU approximation process in the Republic of Serbia. The Programme is in accordance with the National Plan of

Implementation for EU integration of the Republic of Serbia, adopted by the Government in October 2008.

The Programme is a tool for addressing priority environmental problems and it should provide answers to the following questions:

- 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. wastewater treatment plants, sanitary landfills, air pollution abatement technologies, transport network, etc.) should be modernized and extended?
- What are the costs and sources of funding?
- How and within what period can this Programme be implemented?

It is essential that the Programme is understood as on of three closely related areas:

- *The applied policy process* with wide support of stakeholders was crucial in building ownership of the document and commitment to its implementation.
- *The Programme* that stipulates the priority policy objectives in the short- (by end of 2014) and medium-term (till end of 2019), and the key policy reforms that are needed to implement those objectives. The Programme 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 Action Plan* is a short-term tool for the National Programme implementation, which is used to elaborate regulatory and institutional activities, monitoring, studies, and project documentation development, economic and financial instruments, information provision, and education, management and capital investments.

1.4 Methodology of the Programme Development

Preparation process of the Programme followed broadly the strategic planning methodology applied to environmental policy making. The process followed three general principles of effective policy making:

- Participation, ownership of the Programme and commitment of stakeholders;
- Comprehensive and coordinated process;
- Planning, resourcing and monitoring.

The gist of the methodology was to set policy goals and identify the means of achieving them. The Programme development 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 Programme sought to achieve a high level of integration with other national policies, strategies and programmes.

The development process of the Programme was a participatory one, and it will require several cycles to achieve higher level of progress in the area of environmental protection (Figure 1.1). The starting point in this first process cycle was to determine management structure (platform) and to achieve agreement upon the methodology and process results. First of all, data were collected and processed, which was followed by identification of key problems in the area of environmental protection. On the basis of the identified problems, general and specific aims of environmental policy were determined for the forthcoming decade.

Considerable 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 prioritized. 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.

Generic costing of the Programme and affordability assessment make integral parts of the Programme.

The following have also been attached thereto: The list of legal acts in the environment sector (Appendix 1) and List of ratified international treaties and multilateral environmental agreements being prepared for ratification (Appendix 2).

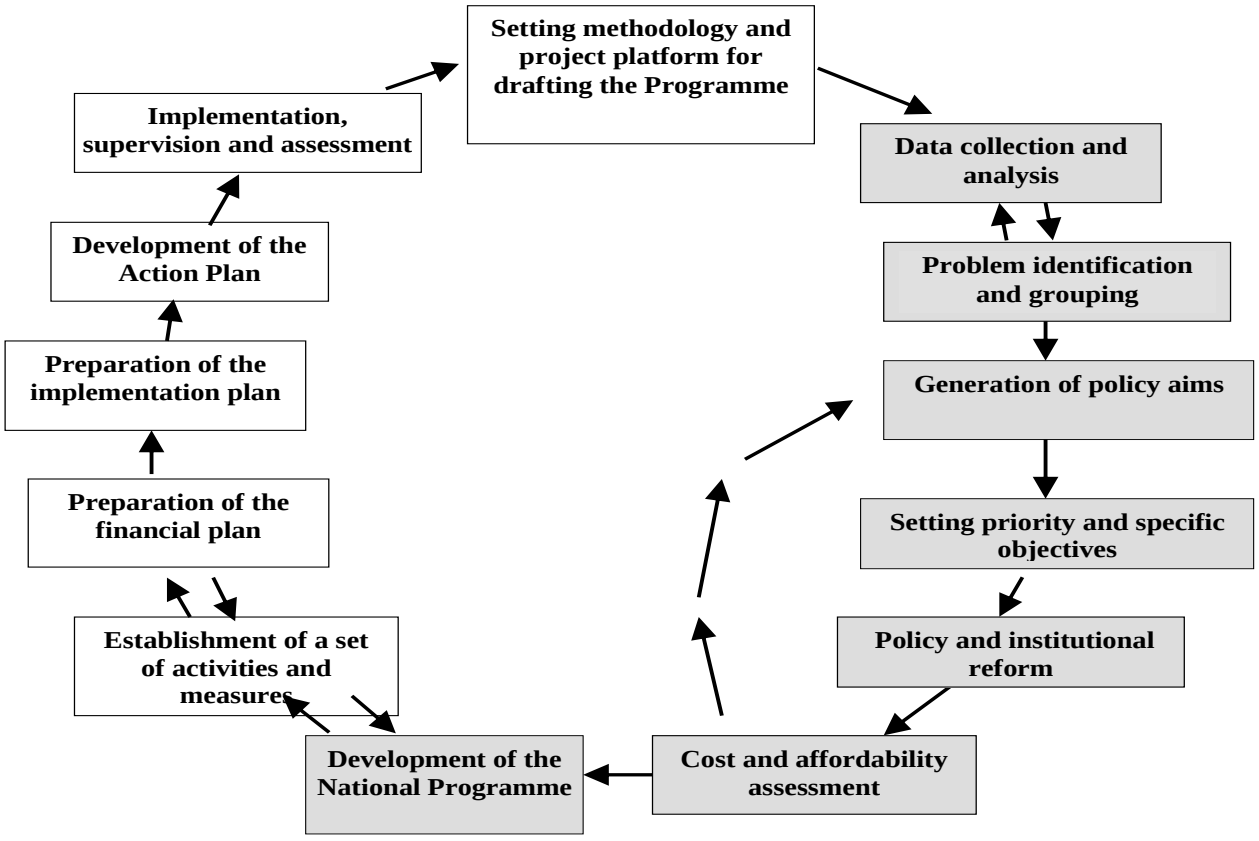


Figure 1.1. Illustration of the Programme and Action Plan cycle in Serbia (the shaded text applies to the Programme development phase)

2. PRINCIPLES OF THE PROGRAMME

The development and implementation of the Programme is based on the following policy principles:

The 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 the Republic 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 a long-term concept that implies continual economic growth which ensures poverty reduction, equitable distribution of wealth, improvements of 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 Programme will provide a roadmap to solve the key national environmental problems in harmony with economic and social development.

The Principle of Preservation of Natural Resources

The achievement of objectives of sustainable development requires respecting of the principle of sustainable use of natural resources and the substitution principle.

Natural resources are used under the conditions and in a manner ensuring the preservation of values of geological diversity, biodiversity, protected areas 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 is specifically addressed by the substitution principle.

The Compensation Principle

In order to determine which measure should be applied to reduce harmful environmental consequences of certain projects, works and activities implemented in nature, ecologically important or protected area, compensation principle is applied. It is implemented to renew or replace damaged parts of nature or habitat, strictly protected wild species or protected wild species and their functions, which are subject to the aforementioned activities.

Compensation is determined depending on anticipated or caused damages in nature, such as: establishment of a new location with the same or similar properties as the damaged one; establishment of another location significant for conservation of biological and landscape diversity, i.e. for protection of natural resource; imposing of the fine equivalent to the value of caused damage in case that compensation measures cannot be applied.

Compensation is implemented when applied rehabilitation measures did not achieve natural recovery and recovery of parts of the nature bearing in mind their function and reference status.

The Principle of Integration

The authorities of the state, autonomous province and local self-government units provide for the integration of environmental protection and enhancement of environmental policy with all sectoral policies, which is achieved by implementing mutually adjusted plans and programmes 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 industry, agriculture, energy, transport, 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 Programme. 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 regulations, 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 rehabilitation and remediation.

The Incentives Principle

The authorities of the state, autonomous province and local self-government units 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 nature of environmental pollution requires that all parties affected or 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 and implementing strategic and legal policy which provides establishment of environmental protection and development and which enables achievement of its clearly stated objectives.

The Prevention and Precautionary Principle

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

The precautionary principle promotes 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 cannot 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 timely and fully informed of the state of the environment and participate in 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 Their Legal Successor

Legal or physical entities that, 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 (liabilities) 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 Legislation (*acquis communautaire*)

Bearing in mind that the Republic of Serbia has been involved in the Stabilization and Approximation Process since 2000, and taking into account that the National Assembly ratified the Stabilization and Approximation Agreement in September 2008, the Programme is one of key documents in the EU approximation process.

The obligation to harmonize legislation of the Republic of Serbia with the EU regulations was first mentioned in the Resolution on the EU Approximation, adopted by the National Assembly in October 2004. The mentioned document contains the provision which states that harmonization of legislation will be a priority in the National Assembly work, while introducing specific procedures for improvements of the mentioned process.

In October 2008, the Government adopted the National Programme for EU Integration of the Republic of Serbia, as a strategic document which covers all the

documents and action plans needed for the EU integration and defines obligations for all players for the period up to the end of 2012.

The EU integration process is composed of three key elements:

- Translation of the EU legislation into national legislation and its efficient application;
- Establishment of appropriate administrative and institutional capacities at all levels in order to ensure appropriate translation and application of the EU regulations;
- Ensuring funds and economic instruments.

Harmonization with the EU legislation is a voluminous and imperative task for a state which aspires for EU membership. Environmental area is continuously developing, extending the scope of the EU regulations due to the need to regulate this area. This requires continuous updating with the EU legislation development in order to enable harmonization of national regulations. This area was divided into the following chapters in the National Plan of Implementation: horizontal legislation, air quality and climate change, waste management, water protection and management, nature protection, chemicals, control of industrial pollution and risk management, genetically modified organisms, noise protection, forestry and civil protection.

Implementation of most complex and financially demanding parts of *acquis* requires certain period of time. Experience of new EU member states has shown that most complex areas of *acquis* are those directives pertaining to air quality, water, waste and industrial pollution.

3. BASES FOR THE PROGRAMME DEVELOPMENT

3.1 Economy and Society

The Republic of Serbia is located in south-eastern Europe in the heart of the Balkan Peninsula, and covers the area of 88,361 km^2. There are two autonomous provinces within Serbia – Vojvodina (21,506 km2) in the north, and Kosovo and Metohia (10,887 km^2) 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 Programme.

Serbia shares borders with seven countries: Albania, Bosnia and Herzegovina, Croatia, Hungary, Romania, Bulgaria, Macedonia and Montenegro.

The population of Serbia is 7.5 million according to the 2002 Census. According to the Republic Statistic Bureau, estimated population of the Republic of Serbia was 7,334,935 on 1 January 2009. Estimations of the same Bureau say that population of Serbia will be reducing by approximately 2% every five years, which means that in 2022 population will be smaller by 6.3% than today. Average age is 40.25, which classifies Serbia into the countries with old population.

In 2000, 52% of the population lived in urban areas. According to the Republic Statistic Bureau, there were 207 urban settlements in Serbia on 1 January 2008, as

well as 5,962 other settlements. The biggest cities are Belgrade, the capital of Serbia (pop. 1,576,124), 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%).

Changes in population of the Republic of Serbia between 1991 and 2002 were the result of effects and intensive forced migrations during the nineties, which in current circumstances may present a significant obstacle for sustainable development. According to data provided by UNHCR, there are 148,000 registered refugees currently, as well as 244,833 unregistered dislocated persons.

Over the longer previous period of time, the main contributor to economic development of the Republic of Serbia was industry, mainly based on clumsy production systems. Heavy industry of the Republic of Serbia is mainly related to mining. Over the several past decades, foundries, processing industry, metallurgy and chemical industry have been developing to great extent, as well as manufacture of vehicles and engines. Other important industries include cement and other construction materials, fertilizers, electric equipment, wood processing, paper, leather and fur production, wool and cloths, rubber, textile, food and beverages.

Agriculture is one of key components in the economic development of the Republic of Serbia. Its position in the national economy is specific, since in addition to economic impact, it has extraordinary social and environmental effects. It participates with about 11% in the country GDP (about 18% if we add food processing industry); it employs approximately 23% of overall number of employees or 17% of active population, while its share in export amounts to approximately 20%. Agricultural land covers 57.6% of overall territory of the Republic of Serbia. Most significant agricultural areas are located in Vojvodina.

The major decline in production and gross domestic product during the nineties (market disintegration, economic sanctions, impoverishment of population, high unemployment, bombing of a part of important infrastructural and industrial facilities, etc.) significantly reduced opportunities for environmental investments. Current environmental costs amount to only 0.3% of GDP, whereat GDP per capita in 2000 was only 50% of the one from 1989.

The Republic of Serbia had high actual GDP between 2001 and 2007, whose average value was 5.6%. GDP per capita increased from 1,750 Euro in 2001 to 3,970 Euro in 2007. Growth of GDP is relatively widely distributed across various activities, where services take first position. In 2008, the Republic of Serbia had significant GDP growth of 5.4%, which was the result of high increase in GDP of 7.2% in the first half of the year and slower growth of 3.8% in the second half of the year, particularly in the fourth quarter (2.8%). *Gross Domestic Product* fell in the first half of 2009 by 4.1% compared to the same period of previous year. It is encouraging that registered fall in GDP was smaller in the second quarter of 2009 than in the previous three quarters, and industrial production started to recover in August and September 2009.

According to macroeconomic estimations for the period between 2010 and 2012, economy of the Republic of Serbia will register average annual GDP growth of 3.2%.

It is also expected that in the same period the economy will recover after the fall in commercial activities in 2009, which amounted to 3.0%.

According to three-year estimation, industry will be able to reach the 2008 level only in 2012. According to data obtained from final statements for 2007, small and medium enterprises sector participates in GDP creation with approximately 60%, in employment with about 70%, in economic investments with approximately 50% and in export with approximately 50%.

Law on Privatization ("Official Gazette of RS" no. 38/01, 18/03, 45/05, 123/07 – and 123/07), entered into force on 7 July 2001, which introduced privatization as obligation for all public enterprises. In addition to public capital, the subject of privatization is also the state capital, expressed in bonds and shares. About 3,000 public enterprises have been privatized so far.

In the forthcoming med-term period, the Republic of Serbia will use the EU financial aid, as a part of IPA implementation, for all IPA components. Signing of the Framework Agreement on Cooperation Rules established legal basis for determination of the EU contribution and contribution from the beneficiary country in co-financing the projects funded by the EU, implemented in the year in which the budget of the Republic of Serbia is adopted.

Serbian export is characterized by unfavorable sectoral structure, composed of raw materials, semi-products and products of lower processing phase.

3.2 Natural Resources

Natural resources are either renewable or non-renewable geological, hydrological and biological resources which may be used or utilized directly or indirectly, and that have real or potential economic value, or natural resources as parts of nature which deserve special protection.

According to the *National Forests Inventory of the Republic of Serbia* published by the Ministry of Agriculture, Forestry and Water Management in 2009, out of the total territory of the Republic of Serbia, 29.1% is covered by forests, while the remaining part of woodland, which according to international definition includes shrub land and scrub, covers 4.9% of the territory, which totals at 34.0% or 36.3% in respect to the productive land of Serbia. As for the forest structure, according to its stands and tree species, the most prominent ones are deciduous (59%), followed by mixed deciduous stands (29.3%), pure stands of coniferous trees (8.7%), mixed stands of deciduous and coniferous trees (2.4%) and mixed stands of coniferous trees (0.6%). The National Forests Inventory of the Republic of Serbia lists 49 species of trees, whereat deciduous species are dominating (40) in comparison to coniferous (9). Predominant species in Serbian forests are the following: beech, cerris, Sessil oak (*Quercus petraea)*, Italian oak (*Quercus frainetto*), hornbeam, etc. Wooden mass volume amounts to 333,404,423 m^3 or 159m^3/ha, while total volume increment amounts to 8,222,129 m^3 or 3.9 m^3/ ha.

AP Vojvodina has the most fertile agricultural land (83.5% of its territory is used as agricultural land). The main agricultural products are maize, wheat, barley, sunflower, soy, potatoes, tobacco, sugar beat and fruit.

The Republic of Serbia has significant metallic mineral raw material base (copper, lead and zinc, nickel and cobalt, iron, tin, bauxite, antimony, molybdenum,

gold, etc.), energy mineral raw materials (coal, oil, natural gas, and so on), and non-metallic mineral raw materials (magnesite, dunite, dolomite, limestone, barite, quartz, phosphate, fire-resistant and ceramic clay, gypsum, asbestos, fluorites, feldspath, volasonite, diatomite, zeolite, boron minerals, petruric mineral raw materials, and so on).

Metallogenic provinces which can be found in the Republic of Serbia are Dinara, Serbian-Macedonian, Carpathian-Balkan and Dakian, which cover significant balance and potential deposits of non-ferrous and ferrous metals.

Out of a total of 10 metal mines in the Republic of Serbia, 8 have been privatized. RTB Bor is still state-owned mining complex, while about 70 non-metal mines have been privatized. Coal production in the Republic of Serbia is state-owned.

Coal basins are: Kolubara, Kovin and Kostolac (lignite); Sokobanja, Sjenica, Lubnice, Rembas and Krepoljina (dark coal) and Ibar (stone coal). Raw oil and gas are produced in Vojvodina mainly, and in Stig to some smaller extent. Exploitation of non-metallic mineral raw materials, especially deposits of natural construction materials for cement industry and technical-construction stone is very intensive. Cement raw materials are exploited in the areas of Beocin, Kosjeric and Novi Popovac. Numerous deposits of brick clay are found in Vojvodina. Utilization of mineral raw materials is done through open and underground exploitation. Large open pits (Kolubara and Kostolac coal basins) cover vast areas changed due to intensive ore exploitation and processing. Large unregulated pits and disposal sites-tailing ponds have been formed, which pose high risk related to soil, water and air pollution.

Most important rivers in the Republic of Serbia are: Danube, Sava, Drina, Morava and Tizsa. 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^3 of water, the Adriatic around 2 billion m^3, and the Aegean Sea about 0.5 billion m^3. About 92% of the available water resources originate outside of Serbia. The inland water flow in Serbia reaches approximately $16x10^9$ m^3 annually, which amounts on average to about 5.7 l/s/km^2 or 1,500 l/inhabitant per year. Transit waters are significant and amount to about $162 \cdot 10^9$ m^3/annually or 5,163 m^3/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 low-mineral, thermal and thermal-mineral water. The most significant potential 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/inh. The estimated potential volumes of groundwater are estimated at approximately 60,000 l/inh, but the estimated quantities may be increased by approximately 30,000 l/inh through artificial fertilizing (of the groundwater aquifer). 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/inh.

3.3 Legal and Institutional Framework for Environmental Protection Management

The legal 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 the Republic of Serbia consists of a large number of laws and regulations. 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 units.

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, but it was significantly improved in 2009, through adoption of the second set of environmental laws (16) ("Official Gazette of RS", no. 36/09, Annex 1), which present great improvement in harmonization of environmental regulations with the European directives.

The Ministry has wide scope of competences defined by the Law on Ministries ("Official Gazette of RS", no. 65/08), as follows:

- Environmental protection systems and sustainable use of natural resources (air, water, land, minerals, forests, fish, and wild flora and fauna species);
- Inspection in the area of sustainable use of natural resources and environmental protection and in other areas as prescribed by law;
- Estimation of groundwater reserves and preparation of standards for geological maps;
- Preparation of programmes for geological investigations aimed at sustainable use of natural resources and detailed research for groundwater;
- Ensuring various conditions for implementation of those programmes;
- System for protection and improvement of environment;
- Provision of bases 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 of Serbia;
- 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;
- Production and trade in poisons and other dangerous substances except for drugs and precursors;
- Chemical management;

- Waste management except for radioactive waste;
- Trans-boundary waste movement, and trans-boundary movement of protected flora and fauna;
- Spatial planning and urban development;
- Determination of conditions for construction;
- Regulation of residential relations and residential business;
- Civil engineering;
- Construction land;
- Municipal infrastructure and municipal activities;
- Engineering geodesy;
- Inspection in the area of urban development, construction and municipal infrastructure.

Environmental Protection Agency, as an authority within the Ministry, has the following responsibilities and competences:

- Development, harmonization and management of the national environmental information system (monitoring of conditions of environmental media, the development of the cadastre of polluters, etc.);
- 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 into the area of environmental protection;
- Cooperation with the European Environmental Agency and the EIONET.

Provincial secretariat for environmental protection and sustainable development performs activities related to: drafting of the environmental protection programmes and sustainable development programmes in the province and provides measures for application thereof, monitoring of status and information sub-system, issuance of consents on environmental impact assessment in the province territory, consents on programmes related to conservation of and development of flora and fauna, forests and water, construction and agricultural land, as well as consents on urban development plans in the national park and province territories; inspection in all environmental areas except for the area of dangerous substances and biodiversity conservation, as well as all other matters of interest for the province, in line with law. The province is competent for strategic assessment of plans and programmes and for issuance of integrated permits for the plants and activities on the province territory.

According to the Law on Competences of the Autonomous Province of Vojvodina adopted on 30 November 2009 ("Official Gazette of RS", no. 99/09), AP Vojvodina will, through its authorities and in line with law, perform the following activities related to environmental protection:

1) regulate, improve and provide environmental protection for the territory of AP Vojvodina;

2) adopt law on placement of certain resource under protection, in compliance with the law which pertains to nature protection;

3) adopt environmental protection programme in its territory in accordance with the National Programme, action and rehabilitation plan and its interests and specificities;
4) adopt plans and programmes on natural resources management in compliance with strategic documents;
5) perform control over the utilization and protection of natural resources in AP Vojvodina;
6) provide continual environmental control and monitoring and adopt monitoring programme in its territory which must be in compliance with the monitoring programme adopted by the Government for the two-year-period;
7) provide conditions related to environmental protection and measures as requested by the authority in charge of preparation and adoption of spatial and urban development plans, based on the conditions and opinions from competent professional organizations;
8) participate in preparation and adoption of spatial and urban development plans and other plans as well;
9) adopt external contingency plan, which is a part of an overall contingency plan based on competences contained in regulations which pertain to protection and rescuing;
10) in case of an accident, proclaim status of environmental endangerment in AP Vojvodina, in compliance with the law on environmental protection;
11) establish budget fund in compliance with regulations related to the budget system, which will be financed from the revenues generated in AP Vojvodina.

Chemical Agency was established in 2009 on the basis of the Government Decision ("Official Gazette of RS", no. 78/09) in order to provide administrative conditions for quality, efficient and safe chemical and biocide products management. Legal basis for the establishment of this Agency was provided in Article 5 of the Law on Chemicals ("Official Gazette of RS" no. 36/09). The Chemical Agency is particularly responsible for drafting of bylaws needed for implementation of the Law on Chemicals and Law on Biocide Products ("Official Gazette of RS", no. 36/09), maintenance of the Integral Chemical Register, implementation of procedures related to import and export of certain dangerous chemicals, permitting in trade and use especially of dangerous chemicals, approvals for use of surfactants in detergents, development and implementation of projects related to monitoring of proper placement on the market and use of chemicals to make sure that they do not have any harmful effects for human health, environment and property, issuance of documents on placement of certain biocide product on the market, assessment of biocide product on the basis of technical file, provision of information and professional guidelines to commercial entities, local self-government units and inspectors, cooperation with the European Chemical Agency, agencies from other countries and secretariats of international conventions which regulate chemical management, implementation of activities which enable provision of information to public about the impact of chemicals to human health and environment, measures for reduction of risk and safe use of chemicals.

Institute for Nature Protection of the Republic of Serbia is a professional institution in charge of protection and enhancement of the natural heritage of Serbia through numerous activities, out of which we can mention the following: development

of studies on protection which serve to determine values of those areas proposed for protection status and management which should be applied in those areas, research activities and biodiversity and geodiversity studying, professional supervision in protected areas and draft measures, development of databases related to the status of nature ecosystems and resources in Serbia and maintenance of the register of endangered species; participation in the development of spatial plans, provision of conditions for spatial-planning documents and giving opinion on environmental impact of urban development plans, on forest, water management and fishery bases and other investment-technical documentation; opinion in permitting procedure for collection of protected species for commercial purposes.

On the basis of the Law on Competences of the Autonomous Province of Vojvodina from 2009, AP Vojvodina establishes the Provincial Institute for Nature Protection through its authorities, in order to enable performance of activities related to nature protection and conservation of natural resources which are located on the territory of AP Vojvodina.

Environment Protection Fund (hereinafter referred to as: Fund) was established on the basis of Article 90 of the Law on Environmental Protection. The aim of the Fund's establishment is to provide financial means for environmental incentives and enhancement in the Republic of Serbia. The Fund performs the activities related to project management and financial mediation in the area of conservation, sustainable use, protection and enhancement of environment and use of renewable energy sources in compliance with the National Environmental Protection Programme and other strategic plans and programmes, as well as concluded international agreements. The Fund's revenues are collected from charges on trade in wild flora and fauna on the basis of the Regulation on control of use and trade in wild flora and fauna ("Official Gazette of RS" no. 31/05 and 45/05), and charges based on the "polluter pays" principle on the basis of the Regulation on types of pollution, criteria for calculation of charges on environmental pollution and obligated entities, amount and manner of charging ("Official Gazette of RS", no. 113/05 and 6/07).

The Fund finances action and rehabilitation plans, especially the preparation of implementation and development of programmes, projects and other activities. The Law on the Environment Protection Fund ("Official Gazette of RS", no. 72/09) regulates the position, activities, organization, revenues, purpose and manner of the funds utilization, as well as all other issues important for the Fund's operation. New mechanisms for utilization of the Fund's means have also been introduced through incentives, introduction of which had been stipulated by the environmental laws set adopted in June 2009.

Republic Water Directorate, being an administrative authority within the Ministry of Agriculture, Forestry and Water Management, performs the activities related to state administration and professional activities which pertain to: water management policy, multipurpose use of water, water supply except for water distribution, protection against water, implementation of water protective measures and planned rationalization of water consumption, regulation of water regimes; monitoring and maintenance of water regimes for those water bodies which make and cross state borders, as well as other activities defined by law. The Law on Waters stipulated the establishment of Public Water Management Enterprise "Srbijavode"

which is responsible for water related activities. Certain competences in the area of water management were transferred to AP Vojvodina in 2002 on the basis of the Law on Determination of Certain Competences of the Autonomous Province of Vojvodina ("Official Gazette of RS", no. 6/02), through the establishment of PWME "Vode Vojvodine". The aforementioned enterprises, *inter alia*, manage water resources: water, water land and water infrastructure.

Other ministries with environmental competences include: Ministry of Agriculture, Forestry and Water Management – Forest Directorate, Directorate for Plant Protection (control of production, trade, import, storage and application of plant protection products and plant food products), Directorate for Veterinarian Medicine; Ministry of Economy and Regional Development (industry, integrated development of tourism and complementary activities); Ministry of Health (implementation of sanitary regulations related to environmental protection); Ministry of Infrastructure (road, air, railway and water transport); Ministry of Mining and Energy (energy efficiency, permits for exploitation of mineral resources except for ground waters, renewable energy sources); Ministry of Trade and Services, and so on.

The Republic Hydro-Meteorological Institute is a specialized institution performing the functions which include: meteorological, meteorological-radar, agro-meteorological and hydrological observations and analytical-forecast system; systematic meteorological, meteorological-radar, agro-meteorological and hydrological observations and measurements and implementation of prescribed and harmonized programmes for control air, surface and ground water quality; maintenance of databanks related to measured and observed hydrological and meteorological conditions; monitoring, analysis and forecasting of weather state and changes, climate and water changes, including air and water quality; development of methods, operational observations and warnings about occurrence of atmospheric and hydrosphere disasters; determination of the degree of hail threat and actions against hail clouds, including other forms of artificial impact to weather conditions; research of atmospheric and hydrosphere processes and development of methods and models for weather, climate and water forecasting; weather modifications; development of proposals for utilization of the Sun's energy potentials and wind potentials; hydro meteorological support to river transport; realization and maintenance of etalons and calibration of meteorological and hydrological instruments; cooperation in the area of international hydrological and meteorological information systems; fulfillment of international obligations in the area of meteorology and hydrology, as well as other activities prescribed by law.

Institutes for Public Health cover monitoring of ambient air in local urban network in agglomerations and quality of surface waters in those parts of watercourses which run through urban areas, they monitor hygienic status of drinking water and environmental noise. The institutes measure air quality in 27 cities (52 control points).

Local self-government is implemented in municipalities, cities and the City of Belgrade, i.e. in local self-government units in compliance with the Law on Local Self-Government ("Official Gazette of RS", no. 129/07). Each local self-government unit is responsible for quality and efficient performance of their original, as well as the entrusted activities. The original activities are those implemented by the local self-

government unit on the basis of the Constitution and law in order to implement functional local self-governance. In other words, these are the activities of direct interest for citizens, and they are as such defined by law as original activities. According to laws which regulate local self-government and municipal activities, the municipality takes care about environmental protection, it also adopts programmes on utilization and protection of natural resources and environmental protection, as well as local action and rehabilitation plans in compliance with strategic documents and their own interests and specificities, it is responsible for treatment and transport of atmospheric and wastewaters, maintenance of utilities in cities and settlements, maintenance of landfills and it determines special environmental charges.

The Republic of Serbia may entrust certain responsibilities from its competence to local self-government units on the basis of law, while autonomous province can do that on the basis of a decision. The funds for performance of entrusted activities are provided by the Republic of Serbia or autonomous province. Local self-government units are entrusted with the activities based on environmental laws which pertain to environmental impact assessment, strategic impact assessment, integrated permitting, waste management (inert and non-hazardous one), air protection (local network of measurement stations, air quality plans, short-term action plans), protection against noise (acoustic zoning, development of strategic noise maps and action plans) and so on. Also, local self-government units are entrusted with inspection activities.

4. EXISTING STATUS OF THE ENVIRONMENT

4.1 Water

4.1.1 State of water and water supply

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^3/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, Tizsa, and other watercourses.

Ratification of the Danube River Protection Convention and Framework Treaty on the Sava River Basin covers the area of joint plan development related to river basins management, especially those with international character.

Monitoring and water quality control is implemented by the Republic Hydro meteorological Bureau (RHMB). The monitoring and water quality control is implemented through sampling and physical-chemical analyses of water in the field, physical-chemical, chemical, biological and radiological analyses of water in laboratories, and sampling, physical-chemical and chemical analyses of sediments.

The national network of stations in which systematic monitoring is performed (analyses and control of surface and ground waters and sediment), extraordinary monitoring and monitoring of water quality in watercourses which make or cross state

borders include 134 points along the river courses and canals, 33 springs, 4 lakes and 25 accumulations and 68 piezzometers. The environmental laboratory of the RHMB is accredited in accordance with the SRPS ISO/IEC: 17025: 2006 standard.

Surface water quality in the Republic of Serbia is not at satisfactory level. Examples of very clean water – classes I and I/II – are rare and they are found in mountain regions, e.g. along the rivers of Djetinja, Rzav, Studenica, Moravica and Mlava in Central Serbia. The most polluted watercourses are Stari and Plovni Begej, Vrbas-Becej canal, Toplica, Veliki Lug, Lugomir, Crni Timok and Borska River.

The Danube-Tizsa-Danube canal and secondary irrigation and transport canal are also very polluted in Vojvodina due to discharges of untreated industrial and municipal wastewaters and run-off waters from agriculture. Begej is classified among most polluted waters in Serbia, and its low water quality is primarily caused by transboundary pollution. The Begej River enters into Serbia as IV class river.

In addition to high level of pollution, quality of the Danube remains within classes II-III, mainly due to large dissolving capacity. Construction of the dam and establishment of accumulation on the Danube and HEPS of Djerdap caused a range of negative environmental impacts, such as depositing of various sediments containing certain pollutants. Its tributaries contribute with approximately 20 million m^3 of sediment annually. Toxic pollutants, released from large industrial centers (Novi Sad, Pancevo, Smederevo and Belgrade) and wastewaters from the upstream countries, loaded with organic pollutants and heavy metals, are retained in accumulation Djerdap lake.

Ground waters from alluvial aquifers are under direct impact of surface river waters so their quality depends on these waters' quality. In addition, hydro morphological pressures in river courses (lowered river beds with consequent lowered water level) affect quantities of ground waters from alluvial aquifers. Waters from karst aquifers are characterized by exceptional quality, very low mineralization, but even within the karst environment there are problems of turbid waters in hydrological maximum periods, as well as unfavorable conditions of protection against pollution, which requires special prevention in potential deposits and in those that are being exploited. Springs in tertiary deposits are characteristic in terms of water layers which are formed mainly in sandy horizons in alternation with clay of low porosity, mainly down to 150-250 meters in depth, where feeding is difficult, as well as protection against pollution.

The Republic of Serbia, proportionally to the territory it covers, belongs to rich countries of Europe in terms of available hydro geological resources which still have not been reliably defined in the sense of rational, planning and sustainable use. This is primarily the consequence of insufficient hydro geological researches applied and non-existence of adequate ground water monitoring (primarily of deep aquifers).

Determination of ground water reserves and quality is essential for the country from the aspect of sustainable use and management of this very important resource. According to the Law on Ministries, the Ministry is responsible for collection, processing and storage of data related to ground water reserve balance through application of Geological Information Systems of Serbia (GeolISS), approvals for research, provides consent to exploitation projects and maintains the Cadastre of Research and Exploitation Groundwater Aquifers of the Republic of Serbia.

Within the implementation of strategic project "Research, optimal use and sustainable management of ground water resources of Serbia" researches are being done related to assessment of regional ground water springs for water supply – regulation of aquifers and increase of capacities, monitoring and protection of ground water resources, as well as the assessment of geothermal energy resources and mineral water resources.

Territory of the Republic of Serbia is composed of six hydro geological wholes of specific geological composition and special hydro geological properties. Overall available ground water potential is estimated at approximately 67.5 m^3/s, out of which alluvial aquifers bears the highest capacity of approximately 44 m^3/s, followed by karst aquifers with approximately 14 m^3/s, and aquifers which belong to the so-called "slowly-renewable" aquifers (tertiary deposits) with approximately 9.5 m^3/s.

There are about 1,200 registered points of mineral, thermal and thermal-mineral water in the Republic of Serbia. Springs and wells with extremely high temperature are found in the area of Vranjska and Josanicka banja and wells in Bogatic and Sjerinjska banja, as well as more than 10 wells in Vojvodina. Mineral waters are mainly used in industrial production for bottling, while thermal and thermal-mineral waters are used for balneological and recreational purposes. Thermal waters are used as sources of geothermal energy to some smaller extent. It has been estimated that out of the registered warm water potential, only negligible percentage is being utilized (about 1% of renewable reserves).

Ground and surface waters are being used for public water supply. Surface waters are abstracted from watercourses and accumulations (overall capacity of springs is approximately 250 million m^3/yr). Ground waters are dominantly used for public water supply.

The capacity of the existing ground water springs used for water supply (according to data provided in the Water Management Base of the Republic of Serbia in 2002) amounts to approximately 23 m^3/s or 1/3 of the available potential, out of which the population uses about 45%, industry and public consumption take about 25%, while the remaining 30% presents consumption in water processing and losses. Irreversible losses in water supply are estimated at about 20% of abstracted water. Average specific consumption of water per capita is approximately 350 l/inh/day in the Republic of Serbia.

Percentage of households using the public waters supply network was 69% in 2002, 78.31% in 2008 (RSB). This percentage is slightly higher in AP Vojvodina, and it goes up to 93.38.

Quality of drinking water in Serbia is generally unsatisfactory. Water quality control and reporting on its hygienic and bacteriological appropriateness in according to regulations in place falls under responsibilities of public health institutes and other authorized institutions. According to the findings of the Institute for Public Health of the Republic of Serbia "Dr Milan Jovanovic Batut", out of 54,130 samples of drinking water submitted for physical-chemical analysis in 2008, 7,631 or 14.09% of samples did not satisfy respective standards. The primary problems with physical and chemical water quality parameters are increased turbidity and higher concentrations of ammonia, nitrate, nitrite, iron and manganese, as well as increased consumption of

potassium permanganate. Data about chemical contamination related illnesses were not registered.

61,943 samples of water were submitted for microbiological analysis in 2008. Out of that number, 3,360 or 5.42% did not meet quality criteria. Most common causes of microbiological inappropriateness are increased number of aerobic mesofile and total coliform bacteria, presence of coliform bacteria, E.coli and streptococcus of faeces origin.

4.1.2 Water quality problems

As for water pollution in the Republic of Serbia, key sources of pollution are untreated industrial and municipal wastewaters, agricultural run-offs, leachate from landfills , as well as pollution related to river transport and thermal power plants operation. According to data provided by the Republic Statistic Bureau, 33% of households were connected to public sewage network in 2002, and 35.03% in 2008. In comparison to the number of households connected to public water supply system, only 43.02% are connected to public sewage system. In the Republic of Serbia, approximately 75% of urban population is connected to public sewage system, while the same indicator is only 9% for rural population. Percentage of households connected to sewage network with appropriate municipal wastewater treatment system was 5.30% in 2002 and 6.0% in 2008.

Quantities of industrial wastewaters discharged directly into the watercourses of the Republic of Serbia were 3.072 million m^3 annually according to data provided by the Republic Statistic Bureau in 2007, while approximately 366 million m^3 were discharged annually from public sewage systems from settlements. Out of the mentioned quantity, approximately 204 million m^3 of industrial wastewaters and about 54 million m^3 of wastewater from households and other non-financial sector are treated. The Danube River basin receives about 80% of industrial wastewaters of the country.

According to data provided by the Water Management Base of the Republic of Serbia[1] (2002), it was estimated that total emission of particulate matters in recipients amounted to 1,549,531 kg/day or 12,301,223 equivalent inhabitants (EqInh). Total emission of nitrogen amounted to 111,374 kg/day, while total emission of phosphorus amounted to 36,764 kg/day (Table 4.1).

Table 4.1 Total emission as per type of wastewater in the Republic of Serbia

[1] Available data on water pollution are from 1991. It is deemed that pollution has been reduced since 1991 because of significant reduction of industrial activities

Wastewater type	Discharge of wastewater (1,000 m^3/day)	Particulate matters (kg/day)	Population equivalent (PE)	Total nitrogen (kg/day)	Total phosphorus (kg/day)
Municipal wastewaters	1,016	269,242	4,874,209	48,663	14,623
Industrial (predominantly biodegradable substances)	997	802,846	6,814,743	16,918	5,377
Industrial (predominantly inorganic substances)	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 Management Base of the Republic of Serbia, 2002

Dumpsites in Serbia are estimated to produce 890,000 m^3 of leachate containing about 41,590 tones of organic and inorganic pollution, 389 tones of nitrogen and 426 tones of phosphorus, as well as heavy metals including copper, zinc, nickel and chromium.

Quality of drinking water is characterized with significant regional discrepancies 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, which primarily refers to water tested in rural areas and at public wells. More than 75% of springs in Vojvodina are ground water springs with a standing problem of elevated contents of humic substances, particularly in Banat, with high contents of ammonia, iron, manganese, sodium and very toxic arsenic. Large portion of pollution originates from the application of agro technical measures applied in agricultural treatments. 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 and exploitation of sand and gravel from alluvial deposits; 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 is responsible for the adoption of the Systematic monitoring programme, and Republic Hydro meteorological Bureau is in charge of its implementation.

In the area of waters, data are collected in regular statistic researches annually and they refer to the abstraction and manner of utilization of ground, spring and surface waters, treatment type and discharge of water according to the point of generation and discharge. The data pertain to water quantities from the own watercourses (industry and agriculture – irrigation) and from public water supply systems (households, companies and institutions), as well as quantities of wastewater

discharged (from the industry and sewage systems). Technical data on irrigation systems and data on damages occurred due to water effects are collected for three-year period. Statistic researches are only partially harmonized with the Water Framework Directive (Directive 2000/60/EC).

In order to achieve full harmonization of national legislation in this area with *acquis communitaire*, it is planned to adopt new Law on Waters and new Law on Meteorological and Hydrological Services and Air and Water Quality Monitoring, as well as related bylaws.

Legislation related to drinking water quality is not harmonized with the Directive on quality of water for human use.

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
- Floods causing high damages
- Contamination of aquifers used for water supply
- Pressure on the environment and natural resources in areas of the accumulations impact including: deposition of bed load and suspended solid in accumulations, changes in water regimes in surrounding area, impact to biodiversity, etc.
- Uncontrolled exploitation of mineral raw materials (sand and gravel) from alluvial deposits
- Insufficient data on balance reserves of ground waters as documentation which should serve as the basis on which sustainable use of such important resource is determined
- Over-exploitation of certain ground water springs
- Uncontrolled leakages of polluted mining waters
- Erosions of unprotected tailing ponds
- Incomplete monitoring of water

4.1.3 Causes of pollution

Competences in the area of waters have been divided between various state administration bodies over the past period, and cooperation and contacts between them were quite limited. Such status significantly slowed down the application of the integrated water management principle. Protection of water is still not based on the water basin protection principle.

Water pollution in Serbia is caused by activities in different sectors of the economy (industry, energy generation, agriculture, transport, mining etc.), as well as by untreated municipal wastewaters.

Absence of standards for wastewater discharge is a big issue. Standards that are being applied are those which pertain mostly to water quality, both surface and ground ones.

It is worthwhile to point out inconsistent implementation of the "polluter pays" and "user pays" principles, i.e. charges for water use and protection. Water prices are not calculated on the basis of full cost recovery. 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.

One of the greatest causes of pollution is inadequate sewage infrastructure, i.e. collection and treatment of wastewaters. Inadequate and insufficient maintenance and investments over the past period led to considerable deterioration of a great deal of sewage infrastructure. Particular hot spots are main collectors and pumping stations. Breakdowns and disruption in operational processes are common and evident, while spillages of wastewaters are dangerous for human health. Use of porous septic pits is very common in rural areas.

Biggest cities in the country, Belgrade, Novi Sad and Nis, discharge untreated wastewaters into the recipients. Some of the existing treatment plants in the Republic of Serbia stopped their operation, and some perform mechanical treatment only, and most of them face frequent disruptions occurring due to maintenance problems and lack of funds. The result of the aforementioned is incomplete utilization of the existing capacities.

Agricultural activities, water transport, floods, and transboundary pollution also have negative and deteriorating effects on water quality in the Republic of Serbia in addition to municipal and industrial wastewaters.

One of the causes which can lead to pollution of ground water springs is the consequence of over-exploitation, i.e. higher degree of exploitation than the recharge capacity of the spring is. This particularly pertains to Vojvodina (where there are sub-arthesian and arthesian aquifers), which may cause penetration of thermal-mineral waters and polluted waters from the "first aquifer" into the basic water complex.

Tailing ponds formed due to mining and processing activities are also considerable source of water pollution (flotation tailing ponds of Bor, Majdanpek, Rudnik, Veliki Majdan, Zajaca, Raska, Vranje, etc.), landfills formed in metallurgy processing of mineral raw materials and ash disposal sites in energy generation in thermal power plants.

The early warning system of industrial accidents on water is being developed. Action plans in the event of pollution due to industrial accidents exist; the procurement of relevant equipment is under way. The public water management company Srbijavode is in charge of these activities.

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

Causes of problems:

- Incompatibility of standards with the EU directives in the area of environmental protection and insufficient enforcement of the existing legislation
- Lack of ELV for effluent

- 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
- Insufficiently researched hydro geological ground water parameters, i.e. absence of data on balance reserves for the whole Republic of Serbia
- Insufficiently developed sewage system
- Low tariffs for municipal and industrial wastewater treatment
- Transboundary pollution
- Low water prices
- Inadequate protection of water (groundwater, surface water, reservoirs and watercourses), especially water supply aquifers
- Non-existence of planning documentation on zones of sanitary protection of water supply springs
- Overexploitation of certain ground water springs
- Insufficient and inadequate treatment of drinking water
- Poor condition of drinking water distribution network and high water losses
- Low energy efficiency in drinking water treatment systems
- Inadequate landfilling of municipal and industrial waste
- Uncontrolled use of fertilizers and plant protection products
- Uncontrolled exploitation of mineral raw materials (sand and gravel) from alluvial deposits
- Uncontrolled discharge of polluted mining waters
- Erosion of unprotected tailing ponds
- Inland water transport
- Overexploitation of groundwater resources
- Insufficiently efficient flood protection systems.

4.2 Air and Climate Change

4.2.1 Emissions to air

Law on Air Protection (“Official Gazette of RS”, no. 36/09), adopted in May 2009, comprehensively regulates air quality management, as well as measures for prevention of pollutant emissions. The Law also provides basis for adoption of bylaws which will regulate control of GHG emissions and phasing out of ozone depleting substances.

The poor quality of ambient air in a number of areas and towns in the Republic of Serbia results from emissions of SO2, NOx, CO, soot, particular matter, GHG etc. The air quality deteriorates particularly during unfavorable weather conditions and during the heating season.

Specific pollutants, emitted from certain industrial processes such as hydrocarbons, fluorides, chlorine, heavy metals from production and combustion

processes (Ni, Mn, Cr, Cd, Hg, Pb, As, etc.) are not so widespread in ambient air, except for industrial areas.

The results obtained from measurements held in 2008 have shown that annual value of sulphur dioxide exceeded the allowed limit, 50 μg/m^3, only in Bor, where it was 127 μg/m^3. Excess of maximal daily limit for Serbia, 150 μg/m^3, during 2008 were most common in Bor, 96 days, followed by Kostolac with 9 days. Fewer excesses were registered in Belgrade and Loznica.

Maximal daily concentrations of sulphur dioxide during 2008 were registered in Bor, 1,089 μg/m^3, in Kostolac 220 μg/m^3. In Belgrade, in Omladinskih brigada street, the maximum amounted to 163 μg/m^3.

Annual values of smoke (soot) in 2008 exceeded the allowed limit of 50 μg/m^3 only in Uzice (PIO – 86 μg/m^3, PHI – 59 μg/m^3). Number of days in which daily concentration of smoke exceeded the limit of 50 μg/m^3 in 2008 was the highest in Uzice (PIO – 249 μg/m^3, PHI – 112 μg/m^3) and in Ivanjica – 72. Highest daily concentrations of smoke in 2008 were registered in Uzice – PIO 563 μg/m^3, Uzice – PHI 437 μg/m^3, Belgrade – PHI 293 μg/m^3.

Excess of emission limits for NO_2 of 60 μg/m^3 was not registered in 2008 in any of the measurement points. Highest annual values were registered in Belgrade – PHI and in Omladinskih brigada street – 48 μg/m^3, and in Cacak – city centre – 46 μg/m^3. Excess of maximally allowed daily limits, according to the national regulations, of 85 μg/m^3 was registered at the same measurement points in which maximal annual values were registered in 2008; in Belgrade – Omladinskih brigada street there were 26 days in which limit values were exceeded, in Cacak 15 days, Belgrade – PHI 11 and in Kraljevo 2 days.

Limit value prescribed in the Republic of Serbia for particulate matters is 200 mg/m^2/day annually. During 2008, annual concentration of total particulate matters exceeded limit values in Kostolac – 991 mg/m^2/day, in Smederevo – 533 mg/m^2/day at the city level. Excesses in other cities and towns were lower.

During 2008, slight increase in ground level ozone concentration was registered in comparison to the previous period. Medium daily limit values of 85 μg/m^3 were exceeded in Novi Beograd in 2008 – 16 days. Maximal hourly concentration of ground level ozone (167 μg/m^3) was registered on 17 July 2008 in Belgrade, in Omladinskih brigada street.

In addition to the state monitoring network, air quality monitoring is performed in 7 automatic stations maintained by the Environmental Protection Agency, whose responsibility is to collect data from the aforementioned stations located in Bor (2 stations), Smederevo (3 stations), Belgrade (2 stations) and Beocin (1 station). The state monitoring network is in AP Vojvodina supplemented with 6 automatic stations.

Air monitoring system was established in the Republic of Serbia in 2009, and it includes 28 new automatic measurement stations and reference laboratory.

4.2.2 Problems of air quality

The main sources of air pollution in Serbia include: the energy sector (thermo power plants, district heating plants), oil refineries, chemical industry, metal

processing industry, individual heating boiler plants, traffic, inadequate storage, waste dumpsites including flotation tailing ponds etc.

The old vehicle fleet still uses leaded fuel and low-quality motor fuels (diesel fuel with high sulfur content). It is planned to adopt Technical regulation on pollutant emissions from non-point pollution sources by the end of 2011, while Technical regulation on emission limit values for pollutants in liquid fuels is planned for the adoption by the end of 2012.

Pollutant and GHG emissions into the air were not given enough attention in the Republic of Serbia in the previous period. Two conventions, introducing the reporting obligation, were ratified: *Convention on Long-Range Transboundary Air Pollution – CLRTAP* with *EMEP Protocol* (1987) and the *United Nations Framework Convention on Climate Change – UNFCCC* (1997) with Kyoto Protocol (2007). CLRTAP convention has 11 sectors according to the reporting structure. Currently, the reporting is covering three sectors only (combustion in industry, industrial combustion and combustion in processing industry). Balancing methodology which is applied in preparation of the national report is not harmonized with the EU practice.

Data about the consumption of fossil fuels are collected through several researches conducted at annual level and are prepared for the Convention on Long-Range Transboundary Air Pollution (CLRTAP) for calculation of SO_2 and NO_x emissions, which falls under responsibility of the Republic Hydro meteorological Bureau.

The estimated values of SO_2 and NO_2 emissions (Gg), according to EMEP methodology and using the statistic data for 2006 and 2007 are presented in the table below.

	2006		2007	
	NOx	SOx	NOx	SOx
	Gg NO_2	Gg SO_2	Gg NO_2	Gg SO_2
Electric and heating energy generation	47.93	375.75	47.99	374.3
Processing industry	2.8	23.91	2.34	18.26
TOTAL	50.73	399.66	50.33	392.56

Preliminary inventory of polychlorinated dibenzofurans (PCDF/D) is the integrated part of the POPs Chemicals Inventory within the National Implementation Plan for the Stockholm Convention. Adoption of the Bylaw on methodology for data collection for the National Inventory of uPOPs is planned for 2010. Potential sources of PCDF/D are found in uncontrolled combustion at dumpsites, in metallurgy etc.

4.2.2.1. Climate change

The Republic of Serbia has been a member of the *United Nations Framework Convention on Climate Change – UNFCCC* since 10 June 2001. Kyoto Protocol entered into force in the Republic of Serbia on 17 January 2008.

The Republic of Serbia, as a non-Annex I country (developing country), is not obligated to implement quantified GHG emission reduction in the first commitment period (2008-2012). At the same time, Republic of Serbia has other obligations related to the development of national reports (communications), periodic reporting of the UNFCCC bodies, international cooperation in the area of climate researches and systematic monitoring, transfer of knowledge and cleaner technologies, adoption and implementation of mitigation measures, education, trainings and public access to information related to causes and possible anthropogenic impacts to climate change.

Taking into account the obligations related to UNFCCC and Kyoto Protocol, as well as ever-growing awareness about this global problem, climate change has recently been given higher attention at the national level.

In order to fulfill obligations towards the UNFCCC, drafting of the First National Communication has started, and it is planned to finalize it by December 2010 at latest.

The basic aim of the drafting is to strengthen technical and institutional capacities that would deal with climate change issues and their inclusion into sectoral and national development priorities. Basic activities include: development of GHG inventory; programmes of adaptation measures and mitigation measures.

Bearing in mind binding contents of these national communications, this document may be created only as a result of joint efforts made by all relevant authorities and organizations of the Government, as well as public, private and NGO sectors.

In addition to the development of the national communication, a number of climate change related workshops, trainings and seminars have been organized in the previous two-year period for a number of various stakeholders, cooperation with relevant institutions at national and regional levels has been improved considerably, as well as the international cooperation; also, a number of projects have been initiated and implemented.

Adoption of the Kyoto Protocol created the opportunity for the Republic of Serbia to contribute to global reduction of GHG emissions through reduction of "local" environmental pollution through implementation of CDM projects.

Development of the National Strategy for Inclusion of the Republic of Serbia into the Clean Development Mechanism for the areas of waste management, agriculture and forestry is in its final phase and its adoption is expected in 2010. The Strategy will provide information about total and priority potentials for implementation of CDM projects in the Republic of Serbia.

Designated National Authority (DNA) for the implementation of CDM projects, a prerequisite for participation in this set of projects, has been fully operational since 21 November 2008.

In addition to the activities aimed at GHG emission reduction, it is also essential for the Republic of Serbia to implement activities related to climate change impacts and adaptation to changes climate conditions. This is supported with the fact that some parts of Serbia are more and more often affected by floods, land erosions, landslides, draughts and other disasters of atmospheric and hydrological origin, which all cause high economic damages.

Ministry of Mining and Energy has prepared the Strategy on Application of CDM in Energy Sector of the Republic of Serbia.

Taking all the aforementioned in account, the Republic of Serbia has initiated the so-called Belgrade Initiative for stronger sub regional cooperation in SEE in the area of climate change. The initiative received full support from the UNECE VI Ministerial Conference "Environment for Europe".

As a part of Belgrade Initiative and within the Republic Hydro meteorological Bureau, a Sub regional Centre for Climate Change was established for SEE. Coordination, implemented by this Centre, a Framework Regional Action Plan for adaptation to changed climate conditions was developed for SEE region (the development of this Action Plan was attended by appointed representatives of Albania, Bosnia and Herzegovina, Macedonia, Montenegro and Serbia). Further implementation of the plan should provide for better adaptation to changed climate conditions both at regional and national levels.

Taking into account that climate change affect numerous sectors and systems in the Republic of Serbia to great extent, and bearing in mind that preliminary analyses and climate scenarios show that even more serious negative impacts are expected in the future, it is systematic dealing with this problem only that will ensure sustainable development at national level. That systematic effort should include measures for GHG emission reduction and measures for adaptation to changed climate conditions as well. It is therefore necessary to deal with climate change issues systematically and continuously and to place such approach among strategic priorities of the state policy.

Within the *CARDS* project "Building Environmental Capacities 2003", it was estimated that total annual damages resulting from air pollution, including GHG emissions, in the Republic of Serbia range between 447.2 million EURO and 1,370.1 million EURO, which is equal to GDP of 1.8% - 5.5%.

4.2.2.2. Ozone depleting substances

The Republic of Serbia is signatory of the Vienna Convention on Protection of Ozone Layer and Montreal Protocol on ODS, including all four amendments to the Protocol. According to provisions referred to in Montreal Protocol, Republic of Serbia belongs to Article 5 countries – developing countries. With the assistance of Multilateral Fund, various projects are being implemented aimed at gradual reduction to complete phase out of ODS. The National Ozone Office, formed within the Ministry, coordinates activities in these projects and ensures fulfillment of all obligations of the Republic of Serbia related to the Convention and the Protocol. One of the most important activities of the Office is permitting for import and export of ozone depleting substances in order to provide detailed control over the consumption of these substances and reporting of competent authorities towards the Protocol about these data.

In compliance with the provisions referred to in Montreal Protocol, 1 January 2010 is the date when certain ODS will be banned for use. These substances are listed in Annex I, group A. The Republic of Serbia is finalizing the project of the National Plan for Phasing Out of CFC (fully halogenated hydrocarbons) in several investment projects, while the remaining obligations pertain to training for service technicians

who handle ODS, as well as training for Customs officers for identification of these substances.

In addition, preparation of the National Plan for Gradual Phase Out of HCFC (hydrochlorofluorocarbons) is ongoing, as well as several individual projects for phasing out of carbon tetrachloride used in laboratories and activities related to public awareness raising and promotion of the importance of the ozone layer protection.

Problems:

- Air pollution in areas with power generating and industrial plants caused by industrial emissions (SO_2, NO_x, CO, CO_2, PAH, particulate matter, soot, etc.)
- Air pollution in urban areas caused by traffic (NOx, SO_2, ground level ozone, lead, particulate matter, CO, CO_2 etc)
- High concentrations of soot in urban areas during the heating season caused by emissions from municipal and individual heating installations
- Air pollution caused by uncontrolled combustion at waste dumpsites, burning of harvesting waste (PCDF/D and other emissions)
- Lack of systematic monitoring and reporting on GHG emissions
- Incomplete emission monitoring and monitoring of air pollutant levels
- Inadequate handling with ODS in servicing processes

4.2.3. Causes of air pollution

The principle cause of air pollution from point sources in Serbia is outdated technology and lack of gas scrubber installations, low energy efficiency of the existing obsolete facilities in the energy and industry sector, as well as poor quality heating fuel. In addition, one of the causes is insufficient application of Best Available Technologies and lack of abatement installation in stationary sources. The main causes of the mobile air pollution include poor quality of engine fuel (leaded petrol), out-of-date vehicles and generally poor maintenance, vehicles without catalysts, as well as inadequate application of technical standards for vehicles.

Systematic monitoring of air quality is implemented in measurement points network in the Republic of Serbia, but data from this network are shown as medium daily values of pollutants. It is necessary to modernize this network in order to obtain real time concentration values, which would enable timely reaction to change and exceeded limit values.

Although they are still in their initial phase, detailed inventories of pollutants, GHGs and uPOPs chemicals have not been established yet, so that volume of available data on these substances is still small.

Causes of problems:

- Obsolesce technologies, low energy efficiency and lack of gas scrubber installations in industry and energy sectors;
- Insufficient application of BAT;
- Use of poor quality heating fuels;
- Distribution (concentration) of thermo energy plants using lignite as fuel;
- Poor control system for combustion processes in thermo energy plants;
- Low quality engine fuel;
- Obsolesce and inadequate maintenance of vehicle fleet and widespread use of old vehicles;
- Absence of the national inventory of GHGs;
- Absence of relevant planning documents in the area of climate change;
- Incomplete air quality monitoring network;
- Lack of economic incentives for reduction of emissions into air;
- Incomplete register of air pollutant emissions;
- Incomplete implementation of the project of the National Plan for CFC Phasing Out in cooling sector;
- Insufficient training for service technicians aimed at prevention of leakages of ODS;
- Absence of centers for collection, recovery and processing of ODS.

4.3 Nature, Biodiversity and Geodiversity

4.3.1 Current status

Biodiversity is a set of genes, species and ecosystems. Quantifying of biodiversity values for certain territory is the first and most important step in is conservation, protection and development. The most common type of biodiversity evaluation is establishment of the number of species per area unit in certain territory. Modern biodiversity evaluations for certain territories, as well as selection of species and habitats intended for protection must be based on fundamental researches and knowledge of taxonomy, biogeography and ecology. The ecosystem status is the key indicator of anthropogenic impacts and natural processes, as well as climate change effects, and their monitoring includes long-term monitoring over a set of ecological parameters. Ecological hazard and risk assessment now implies monitoring of the ecosystems status holistically, because the ecosystem integrity is deemed the measure of its ecological status.

The great scope of biological diversity in the Republic of 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.

In terms of floristic division of the Republic of Serbia territory, based on vegetation distribution, there are 5 floristic-vegetation regions in Serbia (Macronesian-Mediterranean, Mid-European, Pontic, Boreal and Mid-South European Highlands).

Almost all characteristic terrestrial biomes of Europe can be found in Serbia, i.e. 4 out of 12 terrestrial biomes of the world (zoonobime of deciduous forests, steppe, zoonobiome of conifer boreal forests and zoonobiome of highland "tundra").

Vegetation of the Republic of Serbia is characterized by the presence of almost 4,000 taxa as species or sub-species (3,600 species of vascular flora and about 400 species of moss) and 2,370 plant communities. It is estimated that there are about 1,000 flora communities in Serbia. The Balkan endemits make up 8.06% of the flora in Serbia or 287 taxa which are particularly significant, and local endemits make up 1.5% or 59 species. Floristic wealth of the Republic of Serbia is completed with approximately 406 species of lichen and approximately 1,200 species of fresh water algae, while kingdom of fungi has about 700 registered species.

The number and diversity of fauna is also very high. Although it is not possible to provide exact number of insect species present in Serbia, according to total number and relative representation of species, especially wealth of different range endemits, the Republic of Serbia, together with wider Balkan area, is the area with widest diversity of insects in Europe. 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.

According to other data, out of a total of 1,150 species of land vertebrates of Europe (fresh water fish and cyclostome, amphibians, reptiles, birds and land mammals), there are more than 579 species living in Serbia or more than 50% of European vertebrates.

The total area of protected areas is 5.86% of the total land area in Serbia. There are 463 protected natural resources (5national park, 16 nature parks, 16 landscape protected areas, 72 nature reserves, 312 nature monuments and 42 protected areas of cultural-historic values), as well as 215 protected plant and 429 animal species as natural rarities. Certain type of protection, actually control of use and trade, has been also introduced for 122 species of fungi, plants and animals.

Legal basis for the establishment of public interest for proclamation of protected areas used to be the Law on Environmental Protection ("Official Gazette of RS", no. 66/91 and 135/04) before the adoption of the Law on Nature Protection ("Official Gazette of RS", no 36/09), as well as other laws regulating the area of nature protection before the adoption of new law, such as the Law on National Parks ("Official Gazette of RS", no. 39/93). A three-degree protection regime was applied in protected areas: 1st degree protection regime, a strict protection regime according to the "wildlife" conservation model, 2nd degree protection regime, a transitional regime according to the "semi-wildlife" conservation model and 3rd degree protection regime, a more liberal protection regime with controlled use of natural resources. Established on the basis of law, special public companies manage the national parks, while other protected areas are managed by public enterprises, public organizations, hunters' associations, ecological and similar organizations to which management had been entrusted on the basis of the document on proclamation of the protected area,

compliant with law, bylaws, spatial plans for subject areas, management plans for subject protected areas, plans and programmes for use of natural resources etc.

According to criteria referred to in the Convention on Wetlands of International Importance, especially as habitats for wetland birds (Ramsar Convention), special nature reserves have been protected: Obedska bara, Ludasko jezero, Stari Begej – Carska bara, Slano Kopovo, Gornje Podunavlje and Zasavica, Vlasina, as landscape of special characteristics, as well as Labudovo okno and Pestersko polje. According to the Convention on Protection of World Cultural and Natural Heritage within the UNESCO programme MAB (Man and the Biosphere), the Golija nature park is placed within the biosphere reserve "Golija – Studenica". On the basis of the Convention on Conservation of European Wild Flora and Fauna and Natural Habitats (Bern Convention), there are 61 identified potential Emerald areas in Serbia. In addition, 42 areas have been selected as areas of special importance for birds (Important Bird Areas), 40 selected areas for butterflies (Prime Butterfly Areas) and 61 internationally important plant areas (Important Plant Areas).

The following planning documents have been prepared in the Republic of Serbia: Action Plan for Control of Introduction, Monitoring and Suppression of Allochtonous Invasive Species and Implementation of Bern Convention; Action Plan for Conservation of Wetlands in Serbia in order to implement the Convention on Wetlands of International Importance; Action Plan for Sturgeon Species (*Acipenseridae*) Management; Action Plan for Conservation of Brown Bear (*Ursus arctos*), Wolf (*Canis lupus*) and Lynx (*Lynx lynx*) in Serbia in order to implement Bern Convention.

Establishment of the ecological network in Serbia is prescribed by the Law on Nature Protection. The ecological network is defined as a set of mutually related or spatially close protected areas, which enables free gene flow, contributing significantly to conservation of nature balance and biological diversity, with the internal parts are connected by natural or artificial ecological corridors. It should comprise ecologically important areas of international and national importance (international conventions, relevant EU directives, list of endangered species and habitats).

NATURA 2000 is an EU ecological network which includes areas important for conservation of endangered species and habitats. This programme, presenting the basis of the EU nature conservation, emanated from the Birds Directive and Habitat Directive. Protection mechanisms for NATURA 2000 areas include adoption of management plans and implementation of any plan or activity which may itself or in combination with another plans/activities significantly affect the conservation aims of certain NATURA 2000 area. It is obligatory to implement monitoring of the qualification species and habitats status in NATURA 2000 areas.

As a part of IPA 2007, a two-year twinning project NATURA 2000 will start in January 2010, which will be implemented by a consortium of state authorities representatives addressing this area from Austria and Greece.

Geodiversity, which presents diversity of geo materials, phenomena and processes in under pressure of anthropogenic activities in Serbia (mining, urban development, industrialization, agriculture etc.). Absence of land recultivation upon the exploitation of mineral raw materials, uncontrolled leakages of polluted mining

waters, erosions of unprotected tailing ponds, construction of various structures without previous geo-engineering bases and planning documentation, application of agro-technical measures in agriculture (leading to ground water pollution), along with natural geological processes (landslides, drifts, earthquakes, floods etc.) are all factors which affect the current poor status in this area.

Implementing the REC recommendation which pertains to conservation of geological heritage and areas of special interests, adopted by the EU Council of Ministers in May 2004, the Inventory of Geo-Heritage of Serbia was developed in 2005. This Inventory includes approximately 650 geological, paleontological, geo-morphological, speleological and neo-tectonic structures or: 130 facilities of historic-geological and stratigraphic heritage, 58 structures of petrological heritage, 192 structures of geo-morphological heritage, 42 structures of neo-tectonic activities and geo-physical heritage, 80 structures of speleological heritage, 19 structures of hydro-geological heritage, 18 structures of pedological and geo-archeological heritage, 13 groups of structures with climate specificities, as well as 99 structures of *ex-situ* geo-heritage. In addition to the aforementioned, it should be stated that there are 80 structures of geo-heritage located within protected areas, mostly with speleological character. All these structures are of scientific and education importance, although "geotourism" is still not so widespread type of tourism in Serbia.

Landscape diversity, a blend of natural and created values, is very important in the area of nature protection and environmental protection in general. It is also important from the aspect of culture and cultural heritage and it presents an important economic resource and element of sustainable development. Sustainable use of landscape includes protection and development of landscapes through planning and implementation of comprehensive measures which prevent unwanted changes, degradation and destruction of natural or created landscapes, with an aim to conserve and sustain significant properties and character of the landscape, their diversity, uniqueness, aesthetical value and to enable permanent usability of natural resources for human benefits.

In the so far applied approach, the landscape of the Republic of Serbia has not been treated in adequate way, so there is no inventory or classification of landscape types. Landscape typology as a complex system has not been investigated enough. Landscape protection has been focused to valuable nature areas or direct environment of cultural resources.

4.3.2 Pressure on nature, biodiversity and geodiversity

Pressure on bio- and geodiversity is most strongly reflected by the uncontrolled overexploitation of natural resources which are of limited capacity. Particularly strong negative impacts are those originating from human activities, related to forest ecosystems and other vulnerable habitats (wetlands, steppe and forest-steppe, sand areas, continental salty areas, highland habitats etc.).

Monitoring over the status of natural resources, environment and human activities in protected areas identified the following problems, among which the following are most influential: illegal construction, overexploitation of mineral raw materials and inappropriate utilization of other natural resources (forests, land, water

and aquatic areas), inadequately established utility infrastructure (unregulated wastewater treatment system, removal of litter, inadequate water supply system, etc.), unregulated and excessive traffic, noise, air pollution, etc. Urgent management problem is also seen in illegal construction of facilities which, in addition to degradation of natural and cultural resources and environmental quality in protected areas, causes a range of problems related to provision of utilities (water supply and sewerage, electricity supply, collection and evacuation of waste, etc.). The damage made to nature and investors' arbitrary behaviour disturb the whole environmental protection system.

On the basis of the managers, Institute for Nature Protection and inspectors' reports, large number of various facilities of different type and dimensions has been registered, ranging from holiday houses, wooden temporary facilities, bungalows, car camps, boats, ski-cafés, trailers, over large hotel and other facilities covering sometimes even thousands of square meters, to marinas, pontoons, road constructions, quays and so on. Construction, reconstruction or upgrade of the aforementioned facilities was started or even finished without valid approvals, with a range of noticed breaches or inconsistencies in implementation of the adopted spatial and urban development plans and relevant regulations applied in construction permitting procedure. In addition, hierarchy prescribed by law and professional logics in time schedule related to adoption of plans are not applied to full extent. The example for this is the Detailed Regulation Plan in Touristic Centre "Suvo rudiste" in Kopaonik National Park.

Problems:

- Fragmentation of ecosystems and disturbance and change in natural habitats
- Inadequate management in protected areas
- Degradation and change of land use, especially at the expense of forests, swamps and marshes, etc.
- Intensive exploitation of forests, hunting and fishing fauna
- Uncontrolled collection of wild flora, fauna and fungi for commercial purposes without ensuring adequate protection measures
- Use of inappropriate methods and chemicals for pest control
- Incomplete monitoring
- 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 areas (wastewater, municipal 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, landslides, drifts, floods), accidental pollution, etc.
- Geological hazards (landslides, earthquakes, drifts, floods

4.3.3 Causes of stress on nature, biodiversity and geodiversity

The stress on biodiversity in Serbia is inflicted by institutional, financial, economic and other lacks. Serbia does not have a comprehensive National Biodiversity Strategy and related Action Plan, and there is no National Strategy of Sustainable Use of Natural Resources either.

The Republic of Serbia Spatial Development Strategy compliant with the Government Decision about its development ("Official Gazette of RS", no. 119/08) has been drafted. The inventory of biodiversity in Serbia has not been completed, which is particularly important in relation to endangered species and habitats. The Republic of Serbia is not sufficiently covered by protected areas.

Management of protected areas suffers from underdeveloped information system and inadequate economic activities within the protected areas. It should be taken into account that economic activities have negative impact on overall biodiversity status, habitats of natural rarities and endangered species and landscapes in protected areas, as well as in Serbia in general. Negative consequences particularly affect the status of forest ecosystems and specially sensitive ecosystems (wetland habitats, steppe and forest-steppe, sands, continental salty areas, highland habitats, etc.), i.e. they result in biodiversity losses: 600 plant species and 270 animal species within the endangered category, and they also affect refugial habitats of relict and endemic species and living communities.

Forest resources management (which includes collection of plants, medical herbs and fungi) is primarily focused on economic gain, neglecting the conservation of forest habitat structure and processes. The control over the introduction of invasive species is insufficient and it results in pressures on autochthonic species and habitats.

Causes of problems:

- Irrational / unsustainable use of natural resources
- Lack of the National Biodiversity Strategy and related Action Plans
- Lack of the National Geodiversity and Geo-Heritage Strategy and related Action Plans
- Insufficiently efficient implementation of environmental and nature protection regulations
- Insufficient and inadequate recultivation of degraded areas
- Lack of a unified information system and indicators for biodiversity monitoring within and outside protected areas
- Inadequate system of land use regulation and inefficient implementation of spatial and urban development planning
- Absence of efficient cross-sectoral cooperation in the area of biodiversity protection and non-compliance of biodiversity protection criteria in relevant sectoral development policies
- Inefficient system and mechanisms for national parks management, Ramsar areas management, biosphere reserves management and other protected areas management
- Inadequate management of forest ecosystems in protected areas
- Ineffective system of control over collection and trade in plant and animal species and fungi
- Lack of appropriate economic and financial instruments for evaluation of biodiversity, geodiversity, nature protection and protected areas management
- Lack of a national strategic framework for conservation and sustainable use of biodiversity, geodiversity and landscape diversity in Serbia
- Lack of adequate geoengineering bases for different stages of planning, designing and construction

4.4 Forests

4.4.1 Current status

According to the *National Forest Inventory of Serbia*, completed in 2006, published in 2009, a forest includes all inventory units covering an area larger than 0.5 ha, with forests trees whose crowns cover more than 10% of the area, whereat those trees must be able to reach at least 5m in height at the time of their harvesting maturity. Forests cover 29.1% of the total territory of Serbia, while the remaining woodland, which according to the international definition includes bushes and shrubbery, covers 4.9% of the territory, which gives a total of 34.0% or 36.3% in comparison to the productive land area in Serbia. Compared to the post-war period, the area covered by forests increased by approximately 1,000,000 ha. Total area covered by forests in Serbia amounts to 2,252,400 ha. Out of that area, 1,194,000 ha are state-owned forests or 53.0%, while 1,053,400 ha or 47.0% are privately-owned ones. Compared to the

global aspect, forest coverage is close to the world level, and it makes up 30%, but it is significantly lower than the European level, which reaches 46%. The lowest coverage degree in Serbia is in AP Vojvodina, where it amounts to 6.4%.

The forests status is characterized by their unfavorable structure. With respect to that aspect, three categories of forests have been identified in state-owned forests, as well as their percentage in terms of coverage: high naturally renewed stands (37.1%), sprouting naturally renewed stands (51.5%) and cultures – artificially erected stands (11.4%). As for privately-owned forests, the dominating ones are sprouting stands (79.4%), high stands cover 16.9%, while cultures and artificially renewed stands cover 3.7%.

Substantial participation of low-productive forests, in addition to economic significance, is seen in its CO_2 absorbing potential, which is in synergy with the production of wooden mass.

Geographic position, variety of climate, edaphic or habitat conditions in Serbia have conditioned the presence of numerous forest phytocenoses, which indicates considerable abundance of biodiversity in Serbian forests.

About 22% of the total area covered by forests and woodland is designated for special purposes such as various regimes of protection. 4.5% of forests are under strict protection regimes. Taking into account that more than 90 % of these forests are state-owned, this means that nearly 35 % of the state-owned forests are under protection according to the regulations pertaining to protection and utilization of forests and environmental protection. About 48 % of all state-owned forests have the priority protection function, while the remaining forests have the priority productive function.

The Government adopted the Forestry Development Strategy of Serbia in 2006, which defines the status and development goals in the sector, guided by their sustainable utilization and improvement of their status, taking into account all the functions of forests and their importance for the society in general.

One of the tasks of the document *The National Millennium Development Goals in Serbia*, adopted by the Government in 2006, is to reduce number of households using solid fuels for heating to 25% of a total number of households by 2015.

The percentage pf households using solid fuels for heating with respect to a total number of households was 60% in 2002, while in 2007 it was 54.2%.

4.4.2 Pressure on forests

The relation between the man, society and state and forests is primarily conditioned with its natural laws: large and open space, long-term productivity and renewability. These characteristics indicate the need and possibility for sustainable use, permanent existence and relatively slow improvements. Due to increased pressures and requirements put on forest ecosystems and resources, it is necessary to make efforts in preventing adoption and implementation of harmful decisions made by other sectors (economy, transport, tourism and others), which may result in degradation of forests, primarily through environmental impact assessment and better cross-sectoral cooperation aimed at settlement of such conflicts. The pressures that were put of forest management by current social-political circumstances in the country, regardless the ownership, have left negative consequences in Serbian

forestry. Particular environmental danger is seen in fires in open space, especially in forests complexes. Forest fires are a global problem, they destroy whole ecosystems and make huge environmental damages.

Problems:

- Insufficient level of forest cover in certain parts of Serbia (Vojvodina)
- Illegal harvesting, conversion of forests and woodland into land for other purposes
- The process of global defoliation
- Inadequate forest management]
- Pressures from other sectors
- Fire and natural disasters (torrents, drought, strong winds, snow)

4.4.3 Causes of stress on forests

According to the Republic of Serbia Spatial Plan, there is the insufficient level of forest coverage with respect to multifunctional use of Serbian forests. Also, there is a need to ensure better environmental protection and qualities.

Global effects of the current status of forests and insufficient forest coverage at the national level are limitation factors in environmental quality. In addition to global and permanent disturbance in biological stability of forest ecosystems, all present damages will inevitably cause: reduced forest increment and productivity, premature harvesting, loss of production ability and use of this resource.

Causes of problems:

- Irrational use and over-exploitation of forests
- Excessive use of wood for heating
- Inadequate forest monitoring
- Clearance of forests for other sectors: agriculture, industry, infrastructure, urban development, etc

4.5 Soil

4.5.1 Quality of soil

Soil of the Republic of Serbia is very heterogeneous as a result of different geological base, climate, vegetation and pedofauna. In order to conserve diversity within the integrated environmental protection, it is necessary to monitor status and manner of land use, to identify sensitive and loaded areas, to define degree and properties of soil pollution.

Soil quality is endangered by uncontrolled and inadequate waste management. Nearby large industrial establishments (Bor, Pancevo, Novi Sad, Smederevo,

Belgrade, Kragujevac, Rudnik, Ljubovija, Raska, Majdanpek, Vranje), large areas of land are contaminated by various pollutants originating from production processes.

Along the roads, especially the main ones, soil quality is poor due to transport activities, especially due to depositing of pollutants from exhaust gases (lead and PAH).

Soil in urban and industrial areas are very different from the soil in natural environment. Soil in urban areas tend to be limited for use due to soil pollution, sometimes even completely destroyed. Such soil can have adverse effects for human health due to the accumulation and release of heavy metals, nitrites, pesticides and organic pollutants.

Occupation of land through expansion of artificial areas and related infrastructure is the main reason for change in the way of land use in Serbia. Such changes lead to degradation of biodiversity through reduction of species number and habitats, as well as through fragmentation of landscapes.

The total area of land in Serbia which changed its use between 1990 and 2000 amounted to 1.1% of total observes territory. The greatest changes are seen within the artificial areas category, where we noticed increase of 3,947 ha. Agricultural areas reduced by 8,473 ha in the same observed period.

The existing programmes and obtained data indicate the need for better defining and monitoring of hot-spots through the development of inventories of contaminated land and mechanisms for the application of adequate technologies for their rehabilitation and remediation.

The main aim of the progress within sustainable use of land in Serbia should include better integration of soil protection into sectoral, local and regional plans and policies, implementation and more comprehensive application of best available techniques and processes of rehabilitation and remediation.

Problems:

- Degradation of land due to exploitation of mineral raw materials and lack of recultivation in degraded areas;
- Insufficient and inadequate recultivation of degraded areas
- Land pollution as a consequence of industrial, mining, agricultural and transport activities and energy
- Historic land pollution
- Uncontrolled change in land use
- Unsustainable land use
- Loss of agricultural land due to wind and water erosion, and due to landslides and drifts
- Lack of systematic monitoring of soil quality

4.5.2 Causes of land degradation

Soil pollution is caused by localized pollution sources, such as industrial plants, and by non-point pollution from atmospheric rainfall, such as acid rain, chemicals

dispersion from farms and by land erosion. Local soil pollution is present in the areas with intensive industrial production, inadequate waste disposals, mines, in accident sites.

The main natural processes of land degradation are water and wind erosion; losses of organic substances; compression through increase in volume weight and decrease in land porosity; salinization through accumulation of soluble salts in soil; landslides caused by slope sliding, i.e. medium fast or fast movements of soil masses and stone material.

Occurrence and development of erosion processes are also among the reasons for land degradation, i.e. deterioration of its quality. It is estimated that erosion processes (of different development phases) present on approximately 80% of agricultural land in Serbia. Land degradation is to great extent caused by the activation of landslides and drifts, and their various forms. About 25-30% of Serbian territory are potentially unstable areas, while 8-10% of the territory is caught by active sliding processes. Damages made by landsliding in South Serbia in 2006 are estimated at 25,000,000 Euros. The most common erosion in central parts and highlands is water erosion (erosion processes caused by water), while in AP Vojvodina it is typical to have eolic erosion, i.e. erosion processes caused by wind. About 85% of agricultural land in AP Vojvodina is affected by eolic erosion, which causes an average loss of more than 0.9t of soil per hectare annually.

Exploitation of mineral materials, especially in open cast mines, leads to complete land degradation. This phenomenon is particularly obvious in Kolubara and Kostolac basins where exploitation of lignite is performed, which is deposited under best quality soil.

Out of the total Serbia's territory, 86.4% of land is affected by degradation of various types and intensity. More than 70% of territory is affected on slopes exceeding 5%. In highlands we mainly have water erosion, while eolic erosion is more common for lowlands. According to the existing calculations, 37,300,000 m^3 of deposit are formed in Serbia every year, out of which 9,350,000 m^3 (25%) are deposited in water reservoirs or other aquatic ecosystems.

Special type of degradation occurred during NATO air raids in the form of mechanical damages made to land, depleted uranium pollution, pollution of land with oil derivatives.

Industrial landfilling has also brought a new set of risks of erosion. Unlike the classical land erosion, here we have introduction of eroded material from landfills into watercourses, which can contain biological, chemical, hence toxic pollution.

Inadequate agricultural practice also affect soil quality, including uncontrolled and inadequate application of artificial fertilizers and pesticides, as well as the absence of irrigation water control (most commonly these waters are considerably polluted). The widespread use of leaded fuel causes soil pollution with lead along the main roads. Poor waste and chemicals management practice causes land degradation (by occupying the space and through the emission of harmful and dangerous substances which infiltrate in soil profile).

Acidification of soil occurs due to natural pedogenetic processes, but also due to anthropogenic impacts, partially due to intensive use over the previous period without

the application of appropriate agrotechnical measures, and partially due to global acidification processes as a non-point form of land degradation.

Land in the Republic of Serbia is among the affected areas according to various climate change scenarios (global, regional), with a number of registered drought years over the past two decades. The consequences of these processes are seen in changes such as: increased air temperature, reduction of rainfall, occurrence of extreme rainfall, physical deterioration of land, increased erodibility of land, reduced protection provided by vegetation and impediments in natural and artificial recovery of vegetation (primarily in forests).

Climate variability and changes in our area indicate realistic expectations of extreme climate conditions: droughts, intensive heat waves, short but very intensive rainfall, and others. Knowing their impact, as well as processes for their reduction, to characteristics of forest ecosystems, water resources and land degradation processes, indicate the necessity to get involved into international research programmes of multidisciplinary character.

The United Nations Convention to Combat Desertification (UNCCD) is the first international legal instrument which regulates issues of desertification and consequences of droughts as global problems within the environmental and sustainable development frameworks. The Republic of Serbia ratified this Convention in November 2007, and it belongs to Annex V of Central and Eastern Europe.

Desertification as a process may be defined as land degradation in arid, semi-arid and dry sub-humid areas as a consequence of various factors. These factors primarily include climate change and anthropogenic activities. The aims of the Convention to Combat Desertification are in synergy with the Convention of Biological Diversity and the UN Framework Convention on Climate Change.

The main aim of the Convention is to suppress desertification and to mitigate consequences of drought in the countries heavily affected by droughts and desertification, through the activities implemented at all levels which are in accordance with the agreements on international cooperation and partnership in order to achieve sustainable development in the affected areas.

Causes of problems:

- Lack of adequate legislation in the area of land protection and monitoring harmonized with the EU regulations
- Application of obsolete technology in industry
- Low level of environmental awareness among farmers
- Lack of the cadastre of landslides and unstable terrains
- Manners of land use which provoke land erosion
- Lack of a strategy for prevention of desertification and degradation risks
- Inadequate waste and chemicals management
- Use of leaded fuel
- Lack of quality standards for non-agricultural land
- Lack of the cadastre of contaminated areas
- Lack of plans for rehabilitation and remediation of contaminated locations

- Undeveloped verification system for historic pollution in privatization process, i.e. in ownership change
- Insufficient studies, i.e. lack of data about geodynamics of soil under certain human activities
- Lack of land monitoring system at regional level
- Geological processes: landslides, earthquakes, drifts, torrents, etc.

5. CROSS-SECTORAL CAUSES OF ENVIRONMENTAL DEGRADATION

5.1 General Causes of Environmental Problems

1. *Lack of strategic and planning documents* in the area of environmental protection and sustainable utilization of natural resources defined by the Law on Environmental Protection and special laws
2. *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.
3. *Insufficient institutional capacity*. The institutional capacity is insufficient to carry out wide ranging reforms of environmental policy, i.e. environmental legislation. Due to insufficient institutional coordination, both horizontal and vertical, adoption and implementation of strategic documents, laws and other regulations is difficult. There is an evident lack of capacity at local level to implement four laws adopted in 2004. New environmental laws adopted in 2009 enabled further transmission of competences to local level in terms of decentralization in implementing policy and regulations would require adequate capacity building.
4. *Ineffective system of monitoring and reporting*. Lack of adequate monitoring criteria and indicators. The environmental monitoring system is still inadequate. It is reflected by lack of accredited laboratories, insufficient standardization and quality control of analyses.
5. *Inefficient environmental enforcement* resulting from legal gaps and inconsistencies, insufficient institutional capacity, weak efficiency of inspection supervision and long court procedures.
6. *Ineffective system of environmental financing and lack of economic incentives*. The state budget is the main source of environmental funding, as well as revenues collected from environmental charges and taxes and international aid (donations, loans). The level of the budget investment is low, on average (2001-2008) 0.3% of GDP annually. Revenues from environmental charges and taxes are considerable and they make up a part of the Fund's assets. Funding by industry and the private sector is very low due to lack of economic incentives. 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.

7. *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. 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 mechanisms to promote public participation in environmental decision making.

5.2 Waste

Poor waste management is still one of the major environmental problems in Serbia, and those problems mainly originate from the so far social attitude to waste. High costs, irrational organization, low service quality and insufficient care for the environment are results of this smashing situation in waste management organization.

Local landfilling was virtually the only way of waste management in Serbia until recently, whereat these local landfills did not satisfy even basic hygiene and technical-technological conditions, except for very few of them; in addition, some of the existing disposal sites are practically filled up. The construction of sanitary landfills was initiated over the past several years, and some of them have already been started-up (Vranje, Pancevo, Lapovo). The National Waste Management Strategy was adopted in 2003, and it is a basis for rational and sustainable waste management, it contains general principles of the EU legislation in the area of waste management. The revision of this strategy is in its final phase. The existing landfills – dumpsites are facilities with significant negative environmental impacts. They have direct negative impact to air, ground and surface waters and soil. Waste itself is a loss of matter and energy, but it also requires large additional volume of energy and labour force for its collection, processing and landfilling.

In 2005, the Environmental Protection Agency implemented the project "Innovation of the Cadastre of Polluters in Serbia". According to the obtained data, there are 164 landfills in Serbia used by municipal utility companies for waste disposal. Out of total number of municipalities, there are 15 which do not dispose of waste at their own territory, but they use disposal sites of some other municipality.

In 2009, the Sector for Control and Supervision of the Ministry made an inventory of wild dumpsites in Serbia. The overall number of recorded locations was about 4,500. in most of the cases, wild dumpsites are located in rural areas, quite commonly along the river courses and roads, out of which larger percentage is located on slopes and foots of road embankments. Such dumpsites are most commonly difficult for removal.

In 2006 the Environmental Protection Agency collected data about municipal waste quantities, as well as about the number of households generating this waste. The obtained data were significantly different from municipality to municipality, on the basis of which it was clearly determined that the performed estimates were mainly inadequate and that they do not reflect real picture of waste generation.

Municipal waste quantities are calculated at annual level on the basis of waste measurements in referent municipalities. Based on the results of those measurements, it may be concluded that urban residents generate an average quantity of 1 kg of waste per capita daily, while rural residents generate an average of 0.7 kg of waste/inhabitant/day. As for Belgrade, generation of waste is 1.2 kg waste/inhabitant/day. On average, every inhabitant of Serbia generates 0.87 kg of municipal waste daily (318 kg/year).

It has been estimated that about 60% of municipal waste is collected in organized way in Serbia. The collection is organized mainly in urban areas, while rural areas are less covered.

Organization of hazardous waste management in Serbia is still at low level and it requires integrated approach in all phases – from the moment of its generation, through collection, transport, treatment to final disposal. There are facilities for treatment of certain waste streams (batteries, electronic and electric waste, waste oils, old cars). There are no facilities for permanent storage of hazardous waste, and temporary disposal is usually carried out within the establishment in which such waste had been generated, quite commonly in inadequate manner.

Within the CARDS project "Building Environmental Capacities in 2003", it was estimated that inadequate waste management (including air emissions and leachate landfill waters, emission from uncontrolled burning of waste in individual gardens, landfilling of fly ash and loss of resources) causes annual damages ranging between 98,000,000 and 276,000,000 Euros in Serbia, which equals 0.4%-1.1% of GDP. A part of this project was also the development of the *Inventory of Waste Generated by IPPC Operators in Serbia*.

In the first half of 2008 a database was formed containing dangerous substances located at the operators. The database was developed on the basis of collected data from 400 operators that deal with dangerous substances.

According to data provided by the Ministry/Environmental Protection Agency, about 5,200,000t of hazardous waste was generated in 2007, and about 5,700,000t in 2008. Out of that quantity, fly ash generated in thermal power plants makes up more than 5,000,000t. Hazardous waste is generated by non-IPPC operators as well. Due to their number and wide range of their business, these operators generate significant part of hazardous waste. The ash generated in power plants can be treated and re-used or used for other purposes, can be recycled, i.e. it can be treated to obtain raw material for production of the same or other product, as a secondary raw material.

In the first half of 2009, a database was formed containing data about dangerous substances in the establishments, developed on the basis of data collected from 600 operators that deal with dangerous substances.

A preliminary POPs inventory, developed within the POPs project, contains the inventory of abandoned pesticides in Serbia, on the occasion of which it was established that there are 6.25t of POPs pesticides in Serbia, as well as 167.38t of other abandoned pesticides and 42.935t of pesticides of unknown composition, which makes up 216.56t.

Also, as a part of development of this preliminary inventory of POPs chemicals, its was established that there are about 260t of PCB waste in Serbia and about 3,500t

of PCB devices still in use, which makes up approximately 3,760t. In addition, according to the preliminary inventory, 482t of PCB waste has been exported so far.

Adoption of the Law on Waste Management and the Law on Packaging and Packaging Waste ("Official Gazette of RS", no. 36/09) provided for legal basis for the establishment of an integrated waste management system, i.e. packaging and packaging waste management system. Within a year from the entrance into force of these laws, bylaws will be drafted, which will completely regulated area of waste management.

Bylaw on methodology for the development of integrated Cadastre of polluters ("Official Gazette of RS", no. 94/07) regulates the area of waste management reporting and it is harmonized with the Directive 91/692/EEC, and partially harmonized with the Commission Decisions 97/622/EC and 2005/270/EC.

The main problems with industrial hazardous waste are in the quantities thereof which are not stored in accordance with law, and lack of systematic solution for the problem. Export of hazardous waste for its final disposal reaches percentage of about 6%. In December 2008, the Government of the Republic of Serbia adopted the Statement about the construction of the facility for physical-chemical treatment of hazardous waste, and in June 2009 the Government adopted the Statement about temporary storage of hazardous waste generated by the unknown owner.

Extraction of recyclable components from waste, as well as recycling, is prescribed by law. Development of recycling industry supported by the Ministry and Fund created conditions for new employment.

Serbian does not have facilities for waste incineration, and use of waste as alternative fuel (waste tires, "SRF" fractions of solid non-hazardous waste) has started in some cement factories.

It has been estimated that all healthcare institutions in Serbia generate about 48,000t of medical waste, of which 20% is infectious waste. The estimated quantities of infectious medical waste generated in healthcare institutions, without private sector and veterinarian medical institutions, are based on estimates of generation of 0.7kg waste per ward bed daily. A part of this waste is treated in 78 autoclaves located throughout Serbia.

Causes of problems:

- Poor waste treatment and disposal infrastructure
- Co-disposal of solid municipal waste and hazardous municipal waste
- Poor communication and coordination between local self-government units with regard to municipal waste management problems
- Lack of an organized system of collection, transport and disposal of waste, especially in rural areas
- Limited capacity for waste recycling
- Lack of separate plants for storage, treatment and disposal of hazardous waste
- Insufficient capacities for special waste streams management (waste batteries, waste oils, PCB, pesticide waste and pesticide containers, medical

waste, slaughterhouses waste, electronic and electrical waste, end of life vehicles, waste tires, etc.)
- Depreciated charges for collection and disposal of municipal waste
- Inefficient public utilities
- Lack of funds
- Low level of public awareness regarding waste management
- Lack of geological, geoengineering and hydro geological bases for micro locations of municipal and hazardous waste
- Insufficient use of mineral raw materials (geological materials) during the construction of facilities for disposal of various types of waste, as well as rehabilitation of polluted areas

Environmental impacts:

- Pollution of surface and groundwater, and soil by leachate
- Air pollution caused by uncontrolled burning of dumpsites and waste in containers, and gas emissions of PCDF/D
- Emission of methane contributing to greenhouse effect
- Landscape degradation by improper waste disposal

5.3 Chemicals

Chemical industry plays significant role in overall industrial production and it meets national needs for wide range of products. According to data for 2006, greatest share in chemicals production in Serbia belongs to the production of oil derivatives and bitumen materials (62.1%), followed by the production of industrial chemicals (27.2%) and artificial fertilizers (8.7%), while production of chemicals for mass consumptions takes final position together with pesticide production with 1.9% and 0.1% respectively.

Adoption of the Law on Chemicals and Law on Biocide Products, harmonized with the EU regulations (Regulation EC 1907/2006 (*REACH*), Regulation EC 1272/2008, Regulation EC 440/2008, Directive 67/548/EEC; Directive 99/45/EC; Directive 2004/42/EC; Regulation EC 689/2008 and Regulation EC 648/2004, Directive 98/8/EC, Regulation EC 1896/2000, Regulation EC 1687/2002, Regulation EC 2032/2003, Regulation EC 1048/2005) created a new legal framework for the establishment, maintenance and improvement of chemical management system and biocide management system in Serbia, provision of high level of protection of human health and environment, as well as improvement of free trade with the EU and other countries, ensuring competitiveness of our economy and encouraging development of safer alternatives. This system will be more closely regulated through relevant bylaws. The enforcement falls under the competence of the Ministry through environmental inspectors, but it partially relies on trade inspection, i.e. local self-government units inspectorates.

Regulations pertaining to chemicals management before May 2009 did not define criteria for chemical classification in the manner that was consistent with the EU regulations and they did not precisely define technical details needed for chemical classification. This caused numerous problems in classification, hence inadequate labeling of chemicals which resulted in inadequate information provision to end users about intrinsic properties of chemicals. Such approach in national regulations turned out to be unsustainable in practice because division of responsibilities for classification among state authorities, producers and distributors was not adequate, which created "bottlenecks" in classification. New Law on Chemicals provided for legal basis for prescription of details about classification, packaging and labeling in bylaws which will be in accordance with relevant EU regulations.

In addition to inadequate classification, labeling and packaging, one of significant reasons for non-information of professional users was lack of obligation for creation of appropriate safety data sheet, which will be prescribed by relevant bylaw to the Law on Chemicals.

The EU experience has shown that restrictions and prohibitions of production, placement on the market and use of chemicals are regulatory measures which most significantly contribute to reduction of presence of most dangerous chemicals in the environment, as well as to reduction of their impacts to human health. New Law on Chemicals and related bylaw will take provisions of Annex 17 of REACH Regulation which pertain to restrictions and prohibitions of certain chemicals.

Besides, the Law on Chemicals stipulates the possibility to prescribe measures for risk reduction in use of substances of high concern (*PBT*, *CMR* and similar).

At this moment there is no a comprehensive database about the chemicals on the market in Serbia, which is also a lack in proper chemicals management. Therefore, one of priority actions is to establish and develop an information system for chemicals management which will enable formation and permanent updating of database on chemicals, biocide products and plant protection products on the market, i.e. an Integrated Register of Chemicals, as well as planning of preventive measures for reduction of risk and implementation of inspection supervision.

In order to control certain restrictions which are in accordance with the EU regulations, as well as to control classification, labeling and packaging, it is necessary to develop a special inspection methodology, which implies specific professional knowledge, currently not possessed by the inspection, so it is necessary to organize and implement special training courses for inspectors.

Also, there is no monitoring over the trade and use of particularly dangerous chemicals at this moment, which would minimize possibility that such chemicals become available to general population. The Law on Chemicals stipulates permitting for legal entities that perform distribution, or for physical entities that use particularly dangerous chemicals. Taking into account that permits for distribution and use of particularly dangerous chemicals will be issued to legal or physical entities by local self-government units which have not been entrusted such activities so far, it is necessary to implement appropriate training courses in local self-government authorities.

It is also necessary to improve professional knowledge among producers and distributors of chemicals, especially knowledge about classification and labeling, risk assessment and regulatory toxicology, which is currently at very low level.

The Law on Chemicals provides for legal framework for the establishment of a Chemicals Agency which performs the activities in accordance with law. This Agency will perform professional, development and regulatory activities in the area of chemicals management, but it is also necessary to work on administrative and professional capacity building.

In addition, it is necessary to establish a Joint Authority for Chemicals Management in order to enable better cross-sectoral linkages for the development of the Integrated Programme for Chemicals Management and related Action Plans.

The Laws on Ratification of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and Stockholm Convention on Persistent Organic Pollutants ("Official Gazette of RS", no. 38/09 and 42/09) have been adopted. Provision of the Law on Chemicals have fully enabled implementation of the Rotterdam Convention and implementation of the provisions referred to in the Stockholm Convention pertaining to prohibitions, restrictions and criteria for checks whether chemicals have properties of persistent organic pollutants, while the other parts of the Convention will be implemented through other special laws. Also, a draft National Implementation Plan for Stockholm Convention has been prepared, which contains preliminary inventories of POPs chemicals and action plans for reduction of certain POPs emissions.

The Law on Biocide Products is harmonized with the Directive 98/8/EC, and it provides for legal basis for creation of a new management system for biocide products, which will me more closely regulated through bylaws and ensure high level of human health and environmental safety in placement of biocide products on the market. Also, risk and danger assessment before placing some biocide product on the market, as well as checks in permitting procedures for placement of a biocide product on the market will encourage development of safer, alternative biocide products.

Until June 2009, when Law on Plant Protection Products was adopted ("Official Gazette of RS", no. 41/09), the area of PPP management had not been regulated in accordance with the EU system, and it was not compliant with the integrated management principles in combating pests and with best environmental practices. The register containing data about the production, trade in and application of plant protection products does not exist. Implementation of the Law on PPP and detailed regulation of this area through related bylaws is responsibility of the Ministry of Agriculture, Forestry and Water Management.

According to the EU regulations, all laboratory researches needed for issuance of a ruling for placement of biocide products on the market, as well as plant protection products, must be performed in those laboratories which operate in compliance with good laboratory practice (GLP). The Ministry of Health is responsible for regulation and enforcement in this area. The Ministry of Health has published the GLP Guidelines, but it still has not prescribed the procedure for laboratories that are supposed to get the act that they operate in accordance with good laboratory practice that would be recognized by OECD. New regulations, which will regulate this area in appropriate way, are being prepared.

Causes of problems:

- Bylaws to the Law on Chemicals and Law on Biocide Products have not been adopted yet, which leads to:
  - Lack of adequate classification and labeling of chemicals and distribution of responsibilities for classification of chemicals between state authorities and producers, i.e. distributors
  - Lack of adequate restrictions and prohibitions of production, placement on the market and use of chemicals and biocide products
  - Lack of information systems and comprehensive database of chemicals, biocide products and plant protection products on Serbian market, as well as of their intrinsic properties and impact to human health and environment
  - Lack of risk control in use of substances of concern, lack of monitoring over trade and use of particularly dangerous chemicals
  - Lack of an Integrated Chemicals Management Programme aimed at implementation of strategic chemicals management
  - Lack of an inter-sectoral authority for coordination of different ministries' activities and other state authorities' activities in the implementation of strategic chemicals management principle
  - Types of biocide products are not precisely addressed in regulations, nor are the procedures and requirements pertaining to submission of general data, i.e. technical files and risk assessment related to biocide products
- Insufficient professional knowledge pertaining to classification and labeling, risk assessment and regulatory toxicology, lack of specific knowledge for implementation of inspection supervision, especially in the area of classification and labeling, as well as in the area of restriction and prohibitions of chemicals and biocide products
- Users of chemicals are not adequately informed and educated about their intrinsic properties and measures which should be implemented in order to reduce risks in use of chemicals and in handling them
- Lack of conditions which would enable laboratories to get certificates of compliance with good laboratory practice

Environmental impacts:

- Soil and water pollution due to inadequate storing of chemicals
- Air, water, soil and food contamination due to uncontrolled and inadequate use of dangerous chemicals

5.4 Chemical Accidents

Chemical accident is any sudden and uncontrolled event which occurs due to release, discharge or dispersion of dangerous substances in production, use, processing, storing, disposal and long-term maintenance.

The Law on Amendments of the Law on Environmental Protection entered into force on 23 May 2009, and Law on Ratification of the Convention on Transboundary Effects of Industrial Accidents entered into force on 25 May 2009 ("Official Gazette of RS", no. 42/09), which created new legal framework to regulate chemical accident in Serbia in the manner harmonized with the EU regulations in place (Directive 96/82/EC – *Seveso* II directive and the aforementioned Convention).

Adoption of bylaws, actually three regulations, will provide for full transposition of Seveso II directive into the national legislation.

In order to identify locations which present highest potential chemical risks, a Preliminary List of Seveso II Establishments was developed in 2008, including first and second tier establishments, containing 132 companies which are obligated to develop Safety Report and Contingency Plan, i.e. that are obligated to develop the Accident Prevention Policy. These are the companies which perform different industrial activities and which may have certain types of dangerous substances in their locations in quantities that exceed the prescribed ones. Some of them are:

- NIS a.d. Novi Sad, organizational parts Oil Refinery in Pancevo and Oil Refinery in Novi Sad
- HIP Azotara – artificial fertilizers
- HIP Petrohemija – petrochemical products
- Bor (Mining and Smelter Complex Bor)
- Sabac (HI Zorka – artificial fertilizers, PVC, pesticides)
- Sremska Mitrovica ("Matroz" – pulp and paper production)
- Belgrade (Prva iskra Baric – basic chemicals, TPP "Nikola Tesla" A and B,...)
- Subotica (Zorka Holding – artificial fertilizers, inorganic acids; Azotara – nitrogen and complex fertilizers)
- Loznica (production of pulp, synthetic fibers and plastic materials)...

Companies which do not operate, but they store certain quantities of dangerous chemicals in their locations, whereat such substances are left over from previous business activities, are also listed in the Preliminary List of Seveso II Establishments and they are also subject to the above mentioned obligations.

Chemical accidents that have happened over the past several years are the following:

- Fire in transformer station (with later spillage of PCB) in foundry Lola Ribar in Zeleznik, Belgrade (2002)
- Spillage of 200-300 l of 5% HF and HCl solution in TPP Nikola Tesla near Obrenovac, during the reconstruction and cleaning of boiler and block V system (2004)
- Spillage of ammonia in agricultural complex PKB, orchard plantations in Bolec (2005)
- Spillage of 96% of sulphur acid in sulphur acid plant in Bor (2005)

- Release of ammonia in Vitasok plant – PKB, orchard plantations in Bolec (2005)
- Explosion and complete destruction of octogene installation for production of pentrite explosive in Prva iskra Baric (2006)
- Explosion in military warehouse for explosives in Paracin (2006)
- Fire in production facility in Nevena Kolor in Leskovac (2006)
- Discharge of a mixture of ash and water into the watercourse of the Turija River (2007)
- Fire in the smelter plant installation in "Radijator" factory in Zrenjanin. This fire caught 600 capacitor batteries filled with PCB (2008)
- Fire in the installation for raw material heating for production of dimethoate insecticide in Galenika Fitofarmacija (2008)
- Evaporation of technical 57%nitrogen acid due to failure in loading of vehicle tank in HIP Azotara Pancevo (2008)
- Explosion of a mixture for production of amonex 2 explosive in "Trayal" factory (2008)
- Leakage of oil and contamination of surrounding soil 3m in depth due to damage in oil pipeline Novi Sad – Pancevo near the village of Glogonj, Pancevo (2008)
- Fire in "Viskoza" factory in Loznica, in wool art plant for production of silk and cellophane. The subject location also contained 500t of carbon disulfide, but it did not caught fire (2008)
- Leakage of ammonia from vehicle tank owned by "Patenting" Belgrade, in front of the "US Steel Serbia" gate in Radinac, Smederevo (2009)
- Explosion and fire of single-base nitro-cellulose powder in a part of a subterranean production complex of "Prvi partizan" a.d. Uzice, located in industrial zone of Krcagovo (2009).

Out of 42 accidents happened in 2008, 14 occurred during the transport of dangerous substances (33%). Over the past five years, twelve people dies in chemical accidents, while even more were injured and intoxicated. Material damage was also made in those accidents. However, the environment was not significantly endangered in any of the cases.

In March 2009, the Government adopted the Statement about the establishment of a special division for emergencies within the Ministry of the Interior and about the establishment of a unified integrated system of protection and rescue in Serbia to ensure reaction in case of fire, natural disasters and technical-technological accidents. This integrated system, which stipulates transfer of a service for information provision and civil protection from the Ministry of Defense to the Ministry of the Interior, will ensure more efficient engagement of all players involved in chemical accident response.

There are 12 Institutes for Public Health in Serbia which are always stand-by and ready to react in case of an accident, to go to the field and perform measurements of pollutants in water, air and soil. The City Institute for Public Health in Belgrade and Institute for Public Health in Pancevo are equipped with a mobile unit for reaction in case of a chemical accident.

In July 2009, the Ministry published a manual "Accident Response Guide" (translation of American manual *Emergency Response Guidebook - ERG2008*) intended for inspectors, firefighters, police and all other services whose members are

first at the accident site when accidents happen during transport of dangerous substances. The manual is useful in identification or generic classification of substances and it contains instruction for protection of the participants and residents in the first phase of emergency response.

Oil and chemical spills from vessels in navigable watercourses are significant sources of pollution. The Law on Chemicals will establish a unified chemicals management system in Serbia, and it will also provide high level of protection of human health and environment. It will improve free trade in chemicals with the European Union countries as well.

Causes of problems:

- Inadequate and insufficient implementation of regulations related to accident risk management
- Incomplete harmonization of regulations with the EU legislation in this area
- Lack of a risk management system
- Insufficient coordination between the participants in risk management system (industry, competent authorities and organizations, etc)
- Inappropriate storage of chemicals and hazardous waste
- Obsolete industrial technologies
- Insufficient technological discipline and training
- Poor organization and implementation of preventive measures, as well as careless and inappropriate handling with chemicals and hazardous waste
- Poor status of transport infrastructure and vehicles

Environmental impacts:

- Soil and water pollution due to release of dangerous substances
- Air pollution due to release of dangerous substances

5.5 Noise and Vibrations

Causes of environmental noise are all types of transport (road, railway and air), as well as operation of industrial facilities. Various local sources cause noise, such as catering services and craft workshops, and similar facilities.

The Law on Protection against Environmental Noise entered into force on 23 May 2009 (“Official Gazette of RS”, no. 36/09), which created legal basis for regulation of the area of noise in Serbia in the manner that is consistent with the EU regulations in place (Directive 2002/49/EC relating to the assessment and management of environmental noise). According to this Law, the related bylaws should be adopted within a year from the entrance of the Law into force. Article 40 of this Law ensured the extension of validity of the Regulation on allowed level of

environmental noise ("Official Gazette of RS", no 54/92) until the adoption of stipulated bylaws.

Drawing up of strategic noise maps is stipulated by the EU regulations, which will be the basis for the development of action plans for noise.

Before the adoption of the Law on Protection against Environmental Noise, this area had been regulated by the Law on Environmental Protection ("Official Gazette of RS", no 135/04), extending validity of provisions referred to in the Law on Environmental Protection ("Official Gazette of RS", no. 66/91) through its Article 129, which regulated protection against noise.

The Law on Protection against Environmental Pollution regulates: environmental subjects for protection against noise, measures and conditions of protection against environmental noise, measurements of environmental noise, access to information about environmental noise, enforcement and other issues important for protection of human health and environment. The adoption of bylaws according to the schedule prescribed by the mentioned Law, this area will be closely and comprehensively regulated.

Monitoring of noise is performed at major crossways in larger cities, since in most of the cases, noise originates from traffic. For example, the City Institute for Public Health Belgrade has been measuring noise levels since 1976. at the beginning, noise was measured several times a day at 10 points, while nowadays measurements are done at 24-hours time in 30 points, of which according to latest data, occasional excess in limit values (as prescribed by the Regulation on allowed level of environmental noise) was recorded at 26 points. Monitoring of noise is performed in Novi Sad and Nis at 18 and 11 points respectively.

Vibrations have not yet been regulated and there are no any regulations adopted within environmental protection area which regulate this area.

Causes of problems:

- Obsolete production technologies
- Old vehicles with high noise level
- Irregular maintenance and servicing of devices which may be source of noise (elevators, sub-stations, etc.)
- Inconsistency in spatial planning aimed at definition of zones which regulate area of noise
- Inadequate locating of industrial establishments, workshops and catering facilities in urban areas
- Regulations are not updated and application of standards in the area of noise are not applied adequately
- Inconsistent application of regulations in construction and projects of protection against noise
- Noise protection after the construction has been completed is not checked
- Non-compliance with the obligation to possess a document on source of noise or measurement of the noise source power
- Insufficient control of noise level emitted by motor vehicles
- Insufficient network of streets with automatic regulation of traffic and

synchronization of traffic lights in certain routes
- Insufficient monitoring of noise in larger cities (Belgrade, Nis, Subotica, Novi Sad)
- Lack of regulations pertaining to vibrations.

Environmental impacts:

- Endangerment of human health, especially children's health
- Deterioration in quality of life
- Reduction of property value in residential zones affected by noise and vibrations

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 $3x10^{15}$ Hz.

Competence over the protection against ionizing radiation and nuclear safety is shared between several sectors. It covers various issues and is under responsibility of ministries of science, environmental protection, health, interior and defense.

As for this area, Serbia is obligated to fulfill the obligations emanating from the ratified international agreements, specifically:

- Law on Ratification of the Vienna Convention on Civil Liability for Nuclear Damage ("Official Gazette of SFRY" – International Agreements, no. 5/77)
- Law on Ratification of the Convention on Early Notification of a Nuclear Accident ("Official Gazette of SFRY" – International Agreements, no. 15/89);
- Law on Ratification of the Convention on the Physical Protection of Nuclear Material ("Official Gazette of SFRY" – International Agreements, no. 9/85).

The National Assembly of the Republic of Serbia adopted the Law on Ionizing Radiation and Nuclear Safety on 12 May 2009 ("Official Gazette of RS", no. 36/09), harmonizing the regulations in this area with the EU legislation. The adopted Law created legal basis for the establishment of an independent regulatory body – Agency for Protection against Ionizing radiation and Nuclear Safety of Serbia.

The basic reason for adoption of new law was the need to harmonize regulations in this area with the EU legislation, implementation of more stringent regimes of nuclear and radiation safety in our country and achievement of the level which can respond to growing safety needs which occurred due to significant changes over the past two decades. Besides, it was necessary to ensure legal basis for the establishment of an independent regulatory body, i.e. the Agency, which will improve efficiency in controlling and supervising safe application of ionizing radiation sources and will define legal framework for the establishment of state infrastructure needed for the implementation of this Law and efficient enforcement. The Law is based on specific, internationally accepted principles, and it contains highest standards prescribed by leading global organizations in the field, such as: International Atomic Energy Agency (IAEA), Agency for Nuclear Energy of the Organization for Economic Cooperation

and Development (ANE-OECD), International Commission for Radiological Protection (ICRP), World Health Organization (WHO), International Labor Organization (ILO), United Nations Food and Agriculture Organization (FAO) and others.

The Law on Protection against Ionizing Radiation and Nuclear Safety stipulates that management of nuclear facilities in Serbia will be entrusted to Public Company for Nuclear Facilities Management. The PC for Nuclear Facilities Management in Serbia includes all nuclear facilities and installations of the Institute for Nuclear Sciences "Vinca" and hydro-metallurgical installation of the Institute for Technology of Nuclear and Other Mineral Materials.

Based on the prescribed provisions of the Law on Protection against Ionizing Radiation and Nuclear Safety, the Government has made a Decision about the establishment of a Public Company for Nuclear Facilities Management ("Official Gazette of RS", no. 50/09) and Decision about the establishment of the Agency for Protection Against Ionizing Radiation and Nuclear Safety of Serbia ("Official Gazette of RS", no. 76/09), which is currently being established.

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 were subject to the Law on Protection from Ionizing Radiation ("Official Gazette of FRY", no. 46/96 and "Official Gazette of RS", no. 85/05 and 101/05), which are not in place any more. Professional 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 1,500 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 is performed by the Institute for Occupational Health "Dr Dragomir Karajović" from Belgrade. The monitoring has been performed for the past 40 years, and since 1996 it has been performed in compliance with the Decision on systematic monitoring of the content of radionuclides in the environment ("Official Gazette of FRY", no. 45/97).
According to the researches made by the then Yugoslav Army, after the NATO air raids, four sites have been identified in the territory of the Republic of Serbia (excluding Kosovo and Metohia) which were contaminated by depleted uranium ammunition, specifically: within the territory of the municipality Bujanovac two sites Bratoselce and Borovac, in the municipality Vranje site Pljackovica, and in the municipality Presevo site Reljan. Rehabilitation of contaminated sites was performed between 2002 and 2007. The funds for rehabilitation of these sites were provided from the state budget. Radioactive waste and the contaminated soil collected during the remediation procedure are stored temporarily in the Institute of Nuclear Sciences "Vinca". No presence of depleted uranium has been registered in the samples of soil after the rehabilitation and samples of water and food outside the remediated locations. After the performed rehabilitation, it was planned to establish monitoring system for radioactivity, which will enable monitoring of radioactivity in samples of water, soil, bioindicators-lichen and moss, other plants, food and fodder, which will provide for long-term monitoring of possibly lingering radiation risks.

The main source of radiation in Serbia is radioactive waste temporary stored in the Institute of Nuclear Sciences "Vinca" in two storage facilities for solid waste and one storage facility for liquid radioactive waste (H1 and H2). 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 H2 facility. The remaining capacity of the new facility is approximately 200 drums of 200-litres capacity, which is sufficient for two to three years. In addition, there are four underground storage tanks, containing 500 m^3 of liquid radioactive waste. The storage of radioactive waste does not meet the legal requirements. The physical-chemical characteristics of the radioactive waste are not known. Neither intermediate nor low-level radioactive solid and liquid waste is pre-treated or treated. In order to rehabilitate the current status, facility H3 has been constructed, which is a safe storage facility for old sealed sources of ionizing radiation. Radioactive waste treatment facility has also been constructed.

Key problem of nuclear safety and security in Serbia is the problem of spent nuclear fuel of the research reactor RS in the Institute for Nuclear Sciences "Vinca". The project of repatriation of fuel, from Vinca to the Russian Federation, involved the International Atomic Energy Agency (IAEA), and this project is the greatest active action of the kind implemented by IAEA within its programme of technical assistance to its parties. The IAEA, INS "Vinca" (this will be taken over by the Public Company for Nuclear Facilities Management in Serbia as legal successor) and consortium of 3 Russian companies entered into a contract on re-packing and transport of fuel into the Russian Federation.

The Agency for Protection against Ionizing Radiation and Nuclear Safety of Serbia will perform regulatory activities, including the development of bylaws as prescribed by law, except for inspection, which will remain within the Ministry (implementation of protective measures related to ionizing radiation) and Ministry of Science and Technological Development (implementation of nuclear safety measures and radioactive waste management).

Non-ionizing radiation is electro-magnetic radiation of photon energy exceeding 12.4 eV. They include: UV radiation (wavelength of 100-400nm), visible radiation (wavelength 400-780 nm), IR radiation (wavelength 780 nm – 1 mm) , radio-frequency radiation of 10 kHz – 300 GHz, low frequency electro-magnetic fields 0-10 kHz and laser radiation. Non-ionizing radiation includes ultrasound or sound whose frequency exceeds 20 kHz, although this is not EM radiation. According to definition, a source of non-ionizing radiation is a device, installation or facility which emits or may emit non-ionizing radiation. Such sources are various objects of everyday use, starting from the area in which we live and work, to modern communication technology. The sources are numerous: cordless telephones, computers, PC game consoles, TVs, irons, microwave ovens, extension cables, electric cookers, refrigerators, freezers, different UV radiation or treatment lamps, electric lines, transformer units, transport vehicles which use electricity (electric trains, trams and trolley buses), TV and radio transmitters, radar transmitters, mobile phones base stations, high voltage transmission lines of over 110 kV, transformer stations, and numerous devices in industry.

Adoption of the Law on Protection on Non-Ionizing Radiation ("Official Gazette of RS", no. 36/09) regulates conditions and measures for protection of human health and environment from harmful effects of non-ionizing radiation in use of non-ionizing sources. The Law on Protection against Non-Ionizing Radiation is based on the knowledge gained so far in the area of protection against non-ionizing radiation and on data about regulations and their contents in this area of the EU member states and other countries.

In order to implement the Law on Protection against Non-Ionizing Radiation, related bylaws have been developed. They, and other technical regulations, contain certain standards which become binding ones on the basis of the Law on Standardization. The Law on Protection against Non-Ionizing Radiation and related bylaws are based on relevant regulations of the Council of Europe dated 12 July 1999 no. 1999/519/EC, World Health Organization (WHO) and International Commission on Non-Ionizing Radiation Protection (*ICNIRP*).

Based on the abovementioned bylaws, sources of non-ionizing radiation of special interest have also been defined. Users of such sources are obligated to obtain a ruling for use of the source from the Ministry of Environment and Spatial Planning, and if such source is located in Vojvodina, the ruling is issued by the competent authority of the Autonomous Province.

Zones of increased sensitivity to non-ionizing radiation are: residential zones in which people can stay for 24 hours a day: schools, pre-school facilities, daycares, maternity hospitals, hospitals, touristic facilities, children's playgrounds, undeveloped areas intended according to urban development plans for the aforementioned purposes, in compliance with recommendations of the World Health Organization.

There are no institutions in Serbia that are authorized to perform measurements in the area of non-ionizing radiation. The control of sources of non-ionizing radiation is not organized, and measurements are performed only as requested by legal and private entities.

Causes of problems:

- Inadequate monitoring network of radioactivity
- Lack of database on sources of ionizing (RAIS programme 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, abandoned sources in industry and sources discovered in scrap metal
- 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 contingency plan
- Lack of plan for protection from ionizing radiation

- Lack of authorized institution for measurements in the area of non-ionizing radiation

Environmental impact:

- Local contamination caused by inadequate storage of radioactive waste

5.7 Environmental Degradation Impact to Human 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.

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 (NOx), 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 troposphere 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. This should be supplemented with climate change impacts to human health, where it is necessary to determine these impacts at national level and prepare measures/actions in terms of adaptation to change climate conditions.

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 kidneys, liver, brain, heart and cardiovascular system 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. Average annual values were below ILV at three measurement points and they were less than 1.0 $\mu g/m^3$. The highest hourly value of lead concentration was 1.73 times higher than ILV and it was measured at one measurement point. 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.

Inadequate 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.

Consequences of noise may be observed through anxiety, annoyance, sleeping disorders, but also damages to hearing, headache and increased risk of hypertension.

Summarizing the adverse effects of environmental factors to human health, in Serbia the priority is given to reduction of environmental risk factors to human health by signing the Declaration of the 4th Ministerial Conference on Environment and Health "Future of Our Children".

Taking over the obligations imposed by this document, Ministry of Health and the Ministry appointed national coordinators who will monitor the process towards the 5th Ministerial Conference. The Government designated the National Working Authority composed of representatives from competent ministries, institutions, WHO office, UNICEF, as well as associations; the Environmental and Children's Health Action Plan for Serbia for the period 2009-2019 has been adopted.

The priorities in this document pertain to 4 basic regional aims established in the Conference Declaration: water and utilities; accidents, injuries and physical activity; air quality and reduction of children's exposure to physical, chemical and biological agents. Long-term goals are classified into medium-term ones and certain activities for each of them have been proposed.

Related to the whole process of reduction of environmental risks to human health, harmonization of regulations in this area has started, as well as the establishment of a system for implementation and observation of relevant regulations, education has started for healthcare and teaching staff and other people employed by education and upbringing institutions, parents and tutors are also being educated about the environmental impacts to children's health. Capacities for cross-sectoral cooperation and environmental and health information exchange have been established, as well as better coordination between competent sectors. Local communities are also involved in the activities stipulated in the Environmental and Children's Health Action Plan.

A three-year project was initiated in 2009 within the Ministry, titled "Analytical Research of Pollution Impacts to Population in Selected Urban Areas (Pancevo, Vrsac, Bor)".

Summary of the 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
- Occasional waterborne epidemic and diseases caused by poor drinking water quality
- Epidemic risk to population due to contamination of groundwater and scavenging at dumpsites
- Threat to human health (stress, hypertension, insomnia, loss of productivity) in urban and industrial centers caused by traffic noise during work
- Acute and chronic diseases caused by ionizing and non-ionizing radiation

6. ECONOMIC SECTORS AND THEIR ENVIRONMENTAL IMPACTS

6.1 Industry

Industrial production contributes to environmental pollution in several ways. In addition to pollutant emissions and waste disposal, there is an important factor of energy and raw materials use, taking into account high industrial energy demand (it uses up approximately 35% of total consumption of final energy).

At the beginning of 1990s, there was a sharp fall in industrial production by approximately 60%. Despite the fact that numerous measures have been applied, industrial production is still below its level from 1990, and in 2007 it amounted to 50.2% of its level in 1990.

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 the Republic of Serbia and represented 18.1% of the gross domestic product, according to data for 2006, although share of industrial production in GDP has been falling since 2001. According to quantified data for industrial products for 2006, 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.

In the second half of 2008 there was a slow down in all industrial activities except for agricultural production. Between August and December 2008 industrial production fell by 3.4%, with specially sharp fall in processing industry production and large exporters' activities. In the fourth quarter of 2008 construction activities slowed down, as well as transport and tourism. This meant that domestic economy went into the recession by the end of 2008 and beginning of 2009.

Physical volume of industrial production in the first ten months of 2009was reduced by 14.0% compared to the same period the year before. The sharpest fall was

registered in processing industry, and it amounted to 18.1%. Construction activities, measured by as-built value, was actually reduced by 22.4% in the first semester of 2009, while physical volume of transport was reduced by 14.6% in the same period, all compared to the same time period in the previous year. Agriculture, including hunting, forestry and fishery, registered increase in GDP in the first quarter (1.6%), and in the second quarter of 2009 as well (3.2%).

According to macroeconomic estimates for the period between 2010 and 2012, the economy in Serbia will register an average annual increase in GDP rate of 3.2%. It is also expected for the same period that the economy will recover after the fall in economic activities registered in 2009, which amounted to 3.0%.

There is generally poor technical state in many industrial facilities. Obsolete 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, electro-precipitators and flue gas desulphurization 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 problem is also seen in low interest in introduction of cleaner technologies into the existing production processes, as well as in absence of application of best available techniques in the existing plants.

On the other hand, there are industrial establishments where significant improvements have been observed, such as cement plants (*"Titan", "Holcim", "La Farge"*), which invested significant sums after the privatization process into installation of precipitators, continual emission monitoring, closing down of raw material storages, transport of raw materials from mines, etc. *"US Steel"* from Smederevo developed a 50m US$ worth Environmental Action Plan for the period 2007-2010 intended for environmental improvements at the location in Smederevo. The Action Plan is being implemented (installation of precipitators, reconstruction of furnaces, waste recovery and re-use, etc.). Since their privatization, mines and smelter plant *Zajaca* invested significant sums into a new rotary furnace and appropriate precipitators, as well as into a new installation for recycling of spent lead batteries.

The first development document, adopted by the Government in 2006, which defines general development priority of the country in comprehensive manner, and which at the same time takes into account the EU standards, is the National Strategy of Economic Development of Serbia for the period 2006-2012.

Main characteristics of industrial policy in Serbia are the following: completion of privatization process, increased competitiveness of Serbian economy, improvement of working environment, investment growth (national and international), placement of industrial production structure on new bases, as well as promotion of small and medium enterprises and entrepreneurship.

In 2007 the Government adopted the Regional Development Strategy of the Republic of Serbia for the period 2007-2012, which is the first strategic development document in the area of regional development which consistently and

comprehensively defines basic development priorities of the country regional development and ways of their implementation in the forthcoming years.

In July 2009 the National Assembly of Serbia adopted the Law on Regional Development ("Official Gazette of RS", no. 51/09) which divided the Republic of Serbia into seven statistic regions: Vojvodina, Belgrade, Western, Eastern, Central, Southern Region and Kosovo and Metohia. This Law also regulates criteria to classify these regions into developed and underdeveloped ones.

The Law states that the Assembly will adopt a plan for definition of priorities in regional development for the forthcoming ten years, which will be prepared by the relevant ministry. The Law regulates the establishment of the National Council for Regional Development with a five-year mandate. It is also stated that the Government will establish the National Regional Development Agency which will perform development and professional activities related to regional development, as well as Regional Councils for each region. The Law also states that the Government establishes incentive measures to encourage regional development related to improvement of economy, development of towns and municipalities, environmental improvements and development of underdeveloped areas.

Regional development will be financed from the state budget, autonomous province budget, local self-government budgets, as well as from pre-accession EU funds, international donations and development loans granted by international financial institutions.

Causes of problems:

- Low energy and raw materials efficiency, and disproportionally high level of industrial waste generation by production unit
- Lack of energy management system at local levels
- Low efficiency of public lighting system
- Lack of standards for effluents discharged to receiving waters
- Insufficient monitoring of environmental pollution emissions
- Obsolete technology, outdated industrial plant and insufficient incentive measures for introduction of cleaner technologies into industrial production
- Low level of BAT application in industrial processes
- Inadequate environmental management in industrial establishments
- Negligible number of companies have introduced and implemented environmental management system
- Poor financial situation in the establishments polluting the environment and lack of funds intended for environmental rehabilitation and recultivation
- Absence of incentive policy to reduce industrial pollution
- 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

- Inadequate handling of chemicals

Environmental impacts:

- Excessive industrial emissions of particulate matters, SO2, NOx, VOC, PAH and other pollutants
- Contamination of soil, surface and groundwater with dangerous substances
- Pollution of surface and groundwater by untreated industrial wastewaters

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 are concentrated in the Bor district, and exploitation is performed by state-owned company RTB Bor. This mining and smelter plant complex consists of the Copper Mine Bor, Copper Mine Majdanpek and Smelter and Refining Plant. Copper Mine Majdanpek is located in Majdanpek, while Copper Mine Bor and Smelter and Refining Plant are located in Bor. The average copper content in the open cast mines and in the underground mines reaches 0.35% and 0.7% respectively. Apart from copper, silver, gold, platinum and palladium are also recovered. On the basis of geological researches performed in Bor basin so far, it has been estimated that there is a considerable mining potential (the remaining economic reserves are substantial); however, it is necessary to invest considerable amounts in preparation and initiation of potential mining activities in prospective deposits, so it is not very likely to expect that the country will be able to invest such amounts in the opening of new mines at this moment. There is a possibility to select a solvent strategic partner for the investment in this area – a valid concept according to the present Government Strategy of RTB Bor Group Restructuring.

Exploitation of lead and zinc ore is currently performed only in Rudnik Mine near Gornji Milanovac and in Grot Mine (Blagodat, Kriva Feja) near Vranje. The average contents of lead in Blagodat and Grot Mines are 3.88% and 2.26% respectively. The average contents of zinc in Blagodat and Rudnik Mines are 3.53% and 2.15% respectively. In addition to lead and zinc, gold, silver and cadmium are also extracted.

The extraction of smaller quantities of crude oil and gas is concentrated in AP Vojvodina. The extraction of building materials, such as cement raw materials (limestone and marl) is dominant near Beocin, Kosjeric 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, Rapocevo, Kosjeric, Novi Pazar etc. Clay for brick production is exploited mostly in Vojvodina near Kanjiza, Kikinda, Novi Becej, 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 destruction and degradation of soil. Most of the soil has been degraded through open cast mining of copper and coal. Huge areas are covered with flotation, metallurgic or mine tailings, which are in most cases disposed off in inadequate dumpsites. It is estimated that the dumpsites in Serbia contain:

- 1.4 to 1.7 billion tones of overburden tailings
- About 700 million tones of flotation and separation tailings

With regard to the mining – smelter basin of Bor and environmental problems occurring due to the existing way of disposal of flotation, metallurgical and mining tailings, an international project "Regional Development of Bor" was initiated, which involves loans granted by the World Bank (IDA and IBRD) in total amount of 42.34, US$ (through a combination of IDA loan amounting to 10m US$ and IBRD loan amounting to 32.34m US$) for rehabilitation of flotation tailing ponds in Bor (Veliki Krivelj, Staro Borsko jaloviste and other locations used for disposal of mining waste) and other locations degraded as a consequence of mining activities performed within RTB Bor, which do not serve for copper production anymore. Upon the verification of the decision on the above mentioned crediting, verified by the National Assembly of Serbia, the project started to be effective on 16 December 2008.

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. Recultivation of soil is performed according to recultivation projects, which are approved by the Ministry.

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 tailing ponds. There have been cases when over 100 million tones of flotation tailings flooded an area due to failure breaks of flotation dams, polluting watercourses and groundwater significantly. Water pollution is also caused by the abandoned mining facilities which have uncontrolled spillages of mining water loaded with harmful substances.

New Law on Mining is under preparation, which will contribute to better organization of mining enterprises, leading to modernization and recultivation of certain mines in Serbia.

Causes of problems:

- 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 disposal of mining waste
- Uncontrolled spillages of mining waters from abandoned mining facilities
- No selective excavations and no disposal of the excavated material
- Negative impacts to flora and fauna near mining basins
- Lack of wastewater treatment

Environmental impacts:

- Air and surface and groundwater pollution caused by tailings generated in mineral ore exploitation and processing (particulate matters, heavy metals, SO_2)
- Water and soil pollution caused by untreated mining waters from active and abandoned mining areas
- Lowering of groundwater table
- Soil degradation and contamination
- Environmental degradation in protected areas
- Accident risk related to tailing ponds
- Soil and groundwater pollution caused by temporary disposals of drill-in fluids occurred during the development of oil drills

6.3 Energy

Energy sector is a key one, both from the economic development and environmental aspects. Environmental pollution may be found virtually in all energy branches, and in all phases – from generation to the consumption phases. The Republic of Serbia does not have enough resources to meet its own needs, so it is oriented to the import of larger part of strategic fuels (oil, gas and quality coal), as well as a part of energy related equipment, especially state-of-the-art one – efficient and environmentally friendly.

Environmental pollution has become a priority in the Electric Power Industry of Serbia's business policy after a range of years in which available funds were invested only into maintenance of production capacities. Since 2003 to the present day, a number of projects have been implemented which have been directly aimed at abatement measures in EPIS thermal power plants: six electro precipitators have been replaced, which was the investment of 35.2m Euros, implementation of a project addressing replacement of the existing ash and slag transport and disposal system at disposal sites located in the establishment itself. On 30 October 2009 a new system for collection, transport and disposal of ash and slag was started-up in TPP Nikola Tesla B, block 2 (620 MW of power) in Obrenovac, and in May 2010 such facility will be

installed in block 1 as well (also of 620 MW of power). It is worthwhile to say that problem of fly ash will be definitely solved after the implementation of all those activities in the newest CS TPP Nikola Tesla. The funds needed for this project (1st and 2nd phase) were donated by the European Union in the amount of 28m Euros and Electric Power Industry of Serbia and CS TPP Nikola Tesla in the amount of 3m Euros. In addition, in order to reduce air pollution, surface and groundwater pollution, a database was developed with regard to ground stability in the power plants location, as well as mechanisms for waste management. Total investments made so far have amounted to 117m Euros.

The Energy Strategy of Serbia, the Programme of the Energy Strategy Implementation and Agreement on Sale and Purchase of the Oil Industry of Serbia's (NIS) Shares will focus the investments to increase in environmental safety in production processes. Reconstruction and modernization of the NIS a.d. Novi Sad technological complex are aimed at enabling the production of engine fuel compliant with Euro-5 standards. According to the existing general design, the Programme of reconstruction and modernization will include considerable investments, out of which environmental protection projects will take 60,000,000 Euros.

In order to implement the programme of reconstruction and modernization of the NIS a.d. Novi Sad technological complex, a contract was entered into on 17 September 2009; the contract regulates the construction of a mild hydro cracking and hydro-finishing complex, and is more than 396m Euros worth (450m US$). The contract stipulates construction of five new plants, as well as modernization, reconstruction and construction of another 19 facilities of commercial infrastructure, needed to enable functioning of the hydro cracking and hydro-finishing complex. The contractual works will be entrusted to one of the biggest global companies in the area of energy – "*CB&I Lummus*".

The Law on Energy ("Official Gazette of RS", no. 84/04), adopted in 2004, meant the beginning of reform processes in energy sector, and its aim was to ensure conditions for development and more efficient operation of all those parties involved in energy business. The aim of the Law was also to harmonize this regulation with the EU legislation.

The Law on Rational Use of Energy is currently being drafted, and its finalization is expected for mid-2010. The adoption of the Law on rational Use of Energy and related bylaws will prescribe standards of energy consumption, introduce the energy management principle, it will prescribe obligation of energy revisions implementation, incentives and other measures for the increase in energy efficiency and rational energy consumption, and it will create legal basis for the application of *acquis communautaire* on energy efficiency, primarily the Directives 2002/91/EC on energy efficiency in buildings, 2006/32/EC on energy efficiency in final energy consumption and energy services, 2004/8/EC on co-generation, 92/75/EC on energy labeling of household appliances and other guidelines related to energy labeling of household devices.

In addition, Law on Energy is currently being amended, which will create legal basis for the establishment of the Energy Efficiency Fund, whose operation will have key impact to the increase in energy efficiency in Serbia, along with the application of the Law on Rational Energy Use.

In compliance with the set of environmental laws entered into force in December 2004, PC EPIS is obligated to adjust operation of its installations with the provisions referred to in the mentioned laws by 2015. This means that according to the national legislation, being harmonized with the EU regulations, new and existing revitalized facilities will have to apply protective measures according to best available techniques (BAT):

- It is necessary to install desulphurization and denitrification facilities, as well as highly-efficient electro precipitators in all new and revitalized thermal power plants; it is also necessary to construct wastewater treatment plants, introduce new appropriate ash transport and disposal solutions, and so on;
- Consequently, it is necessary to apply recultivation measures in mining sector;
- It is necessary to implement protective measures stipulated by projects in hydro energy sector related to protection of accumulations and banks, rehabilitation and revitalization of the existing state;
- It is necessary to implement operational adaptation to the requirements contained in the UN Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol, use of Clean Development Mechanism (CDM) created to support sustainable development of the developing countries, as well as preparation of for the application of other flexible mechanisms;
- Use waste materials as much as possible (ash, gypsum, clay, gravel, sand, oil, tires, alternative fuels, etc.) generated in EPIS activities; such materials can be used as secondary raw materials.

The Law on Ratification of the Agreement on the Establishment of Energy Community entered into between the European Union and Albania, Bulgaria, Bosnia and Herzegovina, Croatia, Former Yugoslav Republic of Macedonia, Montenegro, Romania, Serbia and the United Nations Interim Administration Mission in Kosovo in accordance with the Resolution 1244 of the UN Security Council ("Official Gazette o RS", no. 62/06), established a unified legal basis for trade in electricity and natural gas in South-East Europe and EU.

Through ratification of this Agreement, the Republic of Serbia accepted the obligation to use renewable energy sources to greater extent in accordance with the EU Directives: 2001/77/EC, 2003/30/EC, 2009/28/EC. Technically usable energy potential of renewable energy sources in Serbia is significant and it is estimated at more than 4.3m toe annually – of that amount, approximately 2.7m toe belongs to utilization of biomass, 0.6m toe in unused hydro potential, 0.2m toe in the existing geothermal springs, 0.2m toe in wind energy and 0.6m toe in solar radiation, all at annual levels. This potential has been negligible used so far. In order to improve utilization of renewable energy sources, Republic of Serbia became a member of the International Renewable Energy Agency (IRENA) in January 2009, which enabled it to use technology transfer and financial consulting related to renewable energy. In order to increase use of renewable energy sources in Serbia, the Government adopted the Regulation on conditions which have to be met in order to become privileged electricity generator through use of renewable energy sources and cogeneration of electric and heating energy; the Regulation was adopted in 2009.

A Working Group for Energy Efficiency has been established within the Secretariat, and this WG has explored possibilities to include *acquis communautaire*

on energy efficiency into the Agreement and it identified three Directives which have to be applied by the Agreement signatories: Directive 2002/91/EC on energy efficiency, Directive 2006/32/EC on energy efficiency in final consumption of energy and energy services, and Directive 92/75/EC on energy labeling of household appliances and other guidelines related to energy labeling of household devices. In accordance with the mentioned, the Council of Ministers made a Decision in December 2009 on application of the abovementioned Directives by the Agreement signatories. Among its other activities, this Working Groups is currently preparing the Action Plan for the increase of energy efficiency in Serbia. The finalization of this Action Plan is expected in 2010.

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.

The Republic of Serbia is obligated to meet the environmental requirements according to the Agreement on the Establishment of Energy Community (Annex II – Directive 85/337/EC dated 27 June 1985, Directive 97/11/EC dated 3 March 1987, Directive 2003/35/EC dated 26 May 2003, Directive 1999/32/EC dated 26 April 1999 and LCP Directive 2001/80/EC dated 23 October 2001). In order to achieve emission limit values for particulate matters prescribed by the EU regulation (50 mg/Nm^3) in the EPIS thermal power plants, it is necessary to reconstruct another six electro precipitators, which is an investment of 33.5m Euros (the remaining two blocks in TPP Nikola Tesla, blocks B1 and B2 in TPP Nikola Tesla B, TPP Morava, as well as blocks B1 and B2 in TPP Kostolac). According to the Agreement on the Establishment of Energy Community, Serbia is obligated to apply the LCP Directive by 31 December 2017.

The Electric Power Industry of Serbia has allocated funds amounting to 49.3m Euros for environmental purposes to be implemented by 2011.

On the basis of the Government Statement made in June 2009, the Government is currently negotiating with the Government of Japan about the "Yen loan" worth about 200m Euros which would be invested in desulphurization installations in TPP Nikola Tesla A (optionally in TPP Nikola Tesla B).

Throughout 2008, 70.2% of electric energy was produced in lignite-fired power plants, while 28.8% was produced in hydro power plants and 1.0% in thermal power plants – heating plants. Apart from hydro energy and symbolic utilization of geothermal energy (potentials are substantial), small quality of biodiesel is produced in Serbia, and biomass is utilized to certain extent as well. Energy losses in transmission are about 3.6%, while distribution losses amount to 13.8%, which is a consequence of poor maintenance and equipment obsolescence (distribution network and transformer stations). Some transformer stations (TPP NT) still use PCB (pyralen oil) as cooling fluid, which will be removed from all the facilities within the Electric Power Industry of Serbia in 2010-2011. Not only does this technological obsolescence of all parts of the energy system condition energy efficiency, but it also presents serious environmental pressure.

Thermal power plants in Kolubara and Kostolac lignite basins are large environmental polluters. The existing precipitators were reconstructed or replaced in the period between 2004 and 2007.

Data related to 2008 which pertain to harmful substances emitted from energy facilities within the Electric Power Industry of Serbia are provided in Table 3.

Table 3

Harmful substances – quantities

Thermal energy commercial societies	t / year			
	Particulate matters	**SO_2**	**NO_x**	**CO_2 x 10^3**
CS TPP Nikola Tesla	**15,306**	**153,916**	**40,638**	**23,018**
CS TPP Kostolac	8,263	108,960	17,362	5,748
CS TPP-HP Panonske	662	1,111	30	353
TOTAL	**24,231**	**263,987**	**58,030**	**29,119**

CS TPP Kostolac				
Emission values at annual level				
Part of the commercial society	**t/ year**			
	Particulate matters	**SO_2**	**NO_x**	**CO_2 x 10^3**
TPP Kostolac A				
Block A1	826	13,227	1,726	755
Block A2	1,715	36,168	5,059	1,628
Total	**2,541**	**49,395**	**6,785**	**2,384**
TPP Kostolac B				
Block Б1	1,865	28,117	5,335	1,584
Block Б2	3,857	31,453	5,242	1,779
Total	**5,722**	**59,570**	**10,577**	**3,364**

CS TPP NIKOLA TESLA				
Emission values at annual level				
Part of the commercial society / Plant	t/year			
	Particulate matters	**SO_2**	**NO_x**	**CO_2 x 10^3**
TPP Nikola Tesla A				
BLOCK A1	1,760	13,971	2,605	1,535
BLOCK A2	521	6,824	2,478	1,391
BLOCK A3	1,615	13,673	3,529	2,323
BLOCK A4	528	12,272	3,549	2,640
BLOCK A5	334	26,865	5,182	2,396
BLOCK A6	669	8,103	1,395	1,197
T O T A L	5,427	81,707	18,738	**11,482**
TPP Nikola Tesla B				
BLOCK Б1	1,009	25,351	9,485	4,956
BLOCK Б2	2,564	24,759	7,777	4,258
У К У П Н О	3,574	50,110	17,263	**9,214**
TPP Kolubara A				
BLOCK A1	221	2,338	531	791
BLOCK A2	1,510	1,408	239	
BLOCK A3	292	557	145	
BLOCK A4	1,438	1,970	396	
BLOCK A5	1,409	9,578	1,585	838
TPP – HP Kolubara B – under construction				
T o t a l	**4,870**	**15,851**	**2,896**	**1,629**
TPP Morava				
BLOCK A1	**1,436**	**6,248**	**1,742**	**694**
T O T A L	1,436	6,248	1,742	**694**
CS TPP NIKOLA TESLA TOTAL	**15,306**	**153,916**	**40,638**	**23,018**

CS TPP Kostolac **Total**	**8,263**	**108,960**	**17,362**	**5,748**

CS PANONSKE ELEKTRANE				
Emission values at annual level				
Part of the commercial society / Plant	**t/year**			
	SO_2	**NO_x**	**dust**	**CO_2 x 10^3**
TPP – HP Novi Sad	266	389	7	207
TPP – HP Zrenjanin	272	641	10	124
TPP – HP Sremska Mitrovica	124	81	13	22
CS PANONSKE ELEKTRANE **T O T A L**	**662**	**1,111**	**30**	**353**

Concentrations of particulate matters and sulphur oxides in flue gases generated by thermal power plants considerably exceed emission limit values prescribed by the national, but also the EU regulations, while concentrations of nitrogen oxides exceed emission limit values only in blocks of more than 300 MW of capacity. Electrostatic precipitators which have not been reconstructed operate below their designed dedusting levels. Operational adjustments are currently being applied to other electrostatic precipitators, harmonizing their operation with the EU requirements. Continual measurements of air emissions are presently being introduced. These measurements are already implemented in certain TPP blocks.

Lignite-fired TPPs generate more than 5.5 million tons of fly ash annually, 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 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. 3,184,522 tons of ash were disposed to ash disposal sites of TPP Obrenovac (Nikola Tesla A and B) in 2006, while 3,245,751 tons were disposed in 2007.

Among larger accidents reported over the past several years, the following can be mentioned:

- Spillage of larger quantity of ash from the disposal site into the watercourse, TPP Kostolac (in 2002 during the floods in the area) and
- Air pollution caused by fly ash due to improper management of ash disposal site, as well as due to unfavorable meteorological conditions at the time in TPP Nikola Tesla Obrenovac (2002).

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 67% of fuel consumption, followed by 19% liquid fuel (heavy oil) and 14% 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_2, NO_x, CO and particular matters 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 centralized 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, particular matter, CO, SO_2, NO_x) within the city. The boiler houses and utility plants do not have dedusting systems or they are not maintained adequately, so particulate matter emission often exceeds the ELV.

The total installed processing capacity of oil refineries in Serbia, which are a part of the "Oil Industry of Serbia" (NIS) is about 7.8m tones per year (4.8m tones in Pancevo and 3m tones in Novi Sad). The current operating capacity is reduced to 6.6m tones (4.8m tones in Pancevo and 1.8m tones in Novi Sad) due to the NATO air raids in 1999. The oil pipeline network is 155 km long.

Oil refining processes also cause significant air pollution due to volatile organic compounds and other aromatic hydrocarbons emissions. About 63m Euros were invested in Oil Refinery in Pancevo between 2004 and 2009 into environmental protection projects (reconstruction of all reservoirs, reconstruction of car and railway filling stations, installation of continual emission meters, etc.), while approximately 13m Euros were invested in Petrohemija into environmental protection projects in the same period. Sludge from oil refineries also poses environmental risks. The NATO air raids of the Novi Sad oil refinery endangered the water abstraction points of Novi Sad.

Transport of oil and oil derivatives by pipelines is deemed the safest transport way from the environmental aspect. The advantages of this type of transport are reflected in: reduced emissions of aromatic hydrocarbons into the air (because of fewer decanting operations) and reduced CO_2 emissions into the air. Public Company Transnafta developed a project in 2008 and initiated the installation of a fiber optic cable along the oil pipeline which will enable early detection and instant reaction in case of potential leakages of crude oil from the pipeline, i.e. application of best available techniques in order to protect environment. The so far investments have amounted to 119m RSD out of 240m RSD of planned investment value.

Generally speaking, the energy sector may have significant impact to increase of GHG concentrations, which should be particularly taken into account in strategic planning in the sector.

Among a number of priorities, the Energy Development Strategy of Serbia until 2015 ("Official Gazette of RS", no. 44/05) recognizes the rational use of quality fuels and increase of energy efficiency in production, distribution and consumption among end-users, and it particularly stresses the importance of utilization of renewable energy and new, more efficient and environmentally friendly energy technologies and devices/equipment in energy use.

Based on the Programme of implementation of the Energy Development Strategy of Serbia until 2015, increased use of renewable energy, both electrical and heating one, as a strategic goal of the document must rely upon those energy resources with highest potential, specifically: biomass, small watercourses and wind energy to some smaller extent.

Causes of problems:

- Poor enforcement of emission limit values for SO2, PM, VOC and NOx
- 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
- Low energy efficiency in transport
- Low energy efficiency in utility services
- Lack of energy management system
- Lack of financial, fiscal and other incentives for application of energy efficiency measures
- Disparity between prices of energy and fuels
- Charging systems for consumed heating energy is not applied according to the real consumption in accordance with the appropriate tariff systems
- Low awareness level about energy efficiency
- Education curricula do not contain areas such as energy efficiency and renewable energy
- High losses in heating distribution network
- Obsolescence and inefficiency of electrostatic precipitator installations
- Lack of abatement technologies for desulphurization and denoxification of flue gasses, especially in the thermo power plants and oil refineries
- Insufficient incentives for the economy to introduce cleaner production
- Low level of BAT application in production processes
- Insufficient use of alternative and renewable energy
- Lack of standards for renewable and alternative energy sources
- Excessive use of fossil fuels
- Lack of wastewater treatment plants
- Lack of quality standards for wastewater discharged into the recipient
- Insufficient and inadequate mentoring of environmental pollution emissions
- Lack of incentive policy for abatement of pollution from the energy sector
- Inadequate waste management from energy sector, including hazardous waste
- Inadequate transport and disposal of fly ash and poor maintenance of disposal sites
- Lack of technology for production of unleaded fuel in compliance with the EU requirements
- Insufficient environmental management in refineries
- Insufficient implementation of protective measures in the existing hydro energy plants

Environmental impacts:

- Air pollution by particulate matters, SO2, NOx and CO2 from the energy

sector
- Contribution to the greenhouse effect through CO2 emission
- Air and water pollution caused by ash heaps
- Risk of accidental spillages from ash heaps
- 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
- Soil degradation near thermo power plants caused by fly ash and heavy metals
- 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. The agricultural sector participates in GDP with approximately 11% (about 18% including food processing industry).

The Agricultural Development Strategy of Serbia was adopted in 2005. New Law on Agriculture and Rural Development was adopted in May 2009 ("Official Gazette of RS", no. 41/09).

Republic of Serbia has 5,093,192 ha of agricultural land, which makes up 57.6% of its total territory. Arable land and gardens are dominating with 3,302,089 ha or 64.8%. Monitoring the agricultural land between 2000 and 2008, it was noticed that areas covered by arable land, gardens and vineyards have reducing trend, while areas covered by meadows have increasing trend. Areas covered by pastures were reducing between 2006 and 2008. most important agricultural areas are located in Vojvodina (83% of total territory of the Province).

In terms of ownership structure, about 93% of the arable land is privately owned; state farms cover 7% 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.

Changes in the structure of arable land between 1997 and 2008 show reductions in share of areas covered by grain crops from 64.4% in 1997 to 58.7% in 2008, which is again more by 1.8% than in 2006. Share in areas covered by industrial crops increased from 8.9% in 1997 to 12.6% in 2008, but with the decrease noticed in comparison to 2006.

Cattle breeding, in terms of number of heads of domestic animals, includes mostly poultry, pigs, sheep, cows, goats and horses. A fall in number of cows is noticed in Serbia between 2000 and 2008, while their number in 2008 was somewhat

lower than in 2007 and it was 1,057 thousand heads. Number of pigs reduced in 2004-2005 after three years of stagnation (2001, 2002 and 2003). Increase was noticed in 2007, while it fell again in 2008 and it was 3,594 thousand heads. Total number of sheep reached 1,605 thousand heads in 2008. After the period 2000-2004, when we had reducing trend with poultry, increase in their number was noticed in 2005, which continued in 2006 as well. Their number reduced again in 2007 and 2008, and in 2008 it amounted to 17,188 thousand heads.

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. In comparison to 2007, we could notice reduced production of nitrogen and phosphorous fertilizers in 2008 on one hand, while on the other there was increased production of complex and mixed fertilizers.

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.

Monitoring of environmental impacts from the agricultural activities in Serbia is mainly done through monitoring of pressures on soil and water. These pressures are not evenly distributed, but they are complex and present in its wider area.

Republic of Serbia is one of major polluters of the Danube in terms of nitrogen and phosphorous pollution. The large part of this pollution originates from cow and pig farms, as well as from slaughterhouses and meat processing industry. The project DREPR was implemented between 2004 and 2009, which was aimed at reduction of the Danube River pollution and its tributaries with nutrients originating from livestock and slaughterhouses. The project was implemented in municipalities of Sabac, Pozarevac, Vrbas and Novi Sad, where co-financing was provided for farms and slaughterhouses interested in the construction of storage and treatment facilities for manure and other waste from slaughterhouses. These facilities have been constructed at about 60 farms, 3 slaughterhouses and 3 rendering plants. This project also included training for introduction of good agricultural practice, promotion of environmental protection and reduction of the Danube River pollution with nutrients.

There are still no complete data about environmental pressures, especially soil and groundwater pressures caused by plant protection products. Fragmented husbandries, lack of education among farmers and lack of funds are basic reasons for non-application of “good agricultural practice” which would be focused to reduction of biological, chemical and physical land degradation.

There are no reliable data about the consumption of plant protection products in the Republic of Serbia. This is the reason why data about the produced pesticides and other agricultural chemicals are shown, and it is noticed that production has reduced in comparison to 2007.

6,288.61 tons of pesticides was imported in 2008 in the form of final preparations. 2,148.7 tons of active substances and pre-concentrates were also imported in the same period.

Regionalization of agricultural production and uneven consumption of plant protection products have led to occurrence of local and regional hot-spots. This problem is present in the Republic of Serbia, which increases the need to identify areas under risk.

General state in the agricultural sector may significantly affect the increase in GHG emissions. The agricultural sector may suffer huge damages and be one of the most affected by climate change, so adequate planning of adaptation measures in the area of agriculture can be identified as priority activity.

Organic (alternative, ecological, biological) agriculture was developed as a response to more and more obvious environmental degradation, deterioration of food quality and higher risks for human health. This agriculture implies that it is necessary to harmonize development with the market demands and environmental protection and with reduction of food quantity for the sake of its quality. It also implies that it is necessary to reduce use of agrochemicals, and to favorize agricultural techniques which utilize natural resources in most optimal way. According to the available data, the area under organic production in the Republic of Serbia was 595.81 ha in 2008, out of which 330.36 ha were certified areas, while 265.45 ha were in conversion procedure. According to latest available data, 0.61% of arable land is irrigated in the Republic of Serbia, which is a total of 25,763 ha, out of which 3,675 ha are in Central Serbia, and 22,088 ha are located in Vojvodina.

Causes of problems:

- Lack of systematic control of application of fertilizers and plant production products
- Inadequate management of soil fertility and application of mineral and organic fertilizers
- Inadequate manure management in large livestock farms, which results in environmental pollution; agricultural and forestry practices which abet soil erosion
- Low level of environmental awareness among farmers
- Regionalization of agricultural production and uneven application of plant protection products, which results in occurrence of local and regional hot-spots;
- Lack of systematic monitoring of soil status
- Areas under risk of soil and groundwater pollution resulting from excessive use of fertilizers and plant protection products are not identified
- Areas under risk of erosion, reduction of organic substances, salinization, landslides and soil tamping are not identified
- Biogas and biomass are not used

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
- Eutrophication of watercourses in areas sensitive to nitrate pollution
- Chemical (mainly nitrate) and bacteriological contamination of shallow

aquifers
- GHG emissions
- Erosion and landslides

6.5 Forestry, Hunting and Fishery

6.5.1 Forestry

Over the past thirty years, Serbian forestry was characterized by the application of methodologically and technologically modern stands inventory of forests, harmonized with the European standards and able to provide reliable data for the development of Special Bases for Forest Management and Programme for Privately Owned Forests Management. It was also characterized by the absence of regional and national inventories, so in order to establish the status of forest funds at the forest area and national levels the procedures applied were methodologically disputable, and they had direct negative implications to reliability of planning documents based on the information base created in such way.

Reliable information base for the higher level planning, with respect to the forest area, is ensured by the national (large area) forest inventory. Thanks to the donation of the Kingdom of Norway, in cooperation between the Norwegian Forest Group (NFG) and Faculty of Forestry in Belgrade, a pilot project was initiated in 2003. The title of the project was *The National Forest Inventory of Serbia. The National Forest Inventory of Serbia* was published in 2009.

The Government of the Republic of Serbia adopted the Forestry Development Strategy in 2006.

Forests are significant ecological, economic and social potential of Serbia. At the same time, increase in forest coverage can provide for significant reduction in GHG concentrations, bearing in mind that forests absorb air pollutants, or to be more precise, they absorb some GHGs. 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 make up 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 363 million m^3, and the current volume increment is estimated to be above 9 million m^3. An average harvesting level in Serbia is about 2.5 million m^3, and the level of afforestation was 4,783 ha in 2006. 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 2006 included: illegal harvesting 7,455 m^3, damage by insects 1,402 m^3, damage by natural disasters 9,172 m^3, damage by plant diseases 7,933 m^3 and by fire 1,080 m^3 or about 494 ha. In 2007, fire caught areas of about 16,000 ha of forests.

6.5.2 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 8,828,588.29 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 (hunting associations), PC "Srbijasume", PC "Vojvodinasume", Public Enterprises for National Parks, the Army etc.

Taking into account the status of hunting in the Republic of Serbia, 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:

- Low 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
- Lack of adequate game species monitoring
- Inadequate management of certain game species
- Uncontrolled use of chemicals in agriculture
- Insufficient development of hunting monitoring
- Emission of harmful substances

Environmental impacts:

- Pressures on biodiversity
- Endangerment of certain game species in terms of their number and distribution
- Worsening of forests health status

6.5.3 Fishery

The Law on Protection and Sustainable Use of Fish Fund ("Official Gazette of RS", no. 36/09) regulates management of fish fund in fishing waters, which also includes protection and sustainable use of fish fund as natural resource and good of general interest.

Serbia is relatively rich in rivers and lakes. Major part of Serbian rivers belongs to the Black Sea, Adriatic Sea and Aegean Sea basins. Ichthyofauna of Serbian waters includes about a hindered fish species, which somewhat exceeds 50% of overall European ichthyofauna. The richest ichthyofauna is the one found in the Danube watershed, but according to the importance and conservation status, ichthyofauna of the Adriatic and Aegean Sea basins also very significant. Out of seven endemic fish species of the Danube basin, five live in the Republic of Serbia.

The Ruling in determination of fishing areas ("Official Gazette of RS", no. 115/07), six fishing areas have been established in Serbia. Four of them are located in Central Serbia, one in AP Vojvodina and one in Kosovo and Metohia. Ten users have been granted the right to use five fishing areas in Central Serbia, and eight users have been granted the right to use fishing areas in Serbia-Vojvodina.

The Law on Protection and Sustainable Use of Fish Fund established the obligation for users to submit annual reports about the use of respective fishing area. The report is submitted to the Ministry and Environmental Protection Agency.

Causes of problems:

- Low level of professional capacities among fishing areas users
- Insufficient judicial practice and slow settlement of the filed reports in this area
- Inadequate management of certain species;
- Uncontrolled release of harmful substances into fishing waters and excessive presence of pesticides in groundwater
- Social status of residents
- Water eutrophication
- Insufficiently developed monitoring

Environmental impacts:

- Pressure on biodiversity
- Endangerment of certain fish species in terms of their number and distribution

6.6 Transport

The Republic of Serbia has relatively extensive transport infrastructure network. However, the state of transport infrastructure is at generally unsatisfactory level. The situation is particularly bad with railway infrastructure. Vehicles are characterized by technological obsolescence, poor status, insufficient number and high degree of immobilization. As for river transport, difficulties are particularly obvious, while greatest problems of road transport are seen in poor maintenance and need for reconstruction of the existing and construction of new road infrastructure, as well as low level of transport safety in road network.

The total length of road network was 38,799 km in 2006. road network includes 5,122 km of main roads, 10,448 km of regional and 23,229 km of local roads. Most of larger cities do not have by-pass roads.

The total length of railways reached 3,819 km in 2006. 30% of railway network 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. The average age of railway rolling stocks exceeds 30 years.

Serbian navigable rivers are 959 km long. The main navigable river is the Danube (588 km) followed by the Sava (207 km) and the Tizsa (164 km). In addition, the Danube-Tizsa-Danube Canal provides navigable waterway. The main inland ports include Belgrade, Novi Sad, Pancevo, Apatin, Backa 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 Nis. Air transport is not extensive, and it participates in overall passenger transport with approximately 1.5%, and with 0.013% in overall cargo transport.

Out of a total of 1.5m passenger vehicles in Serbia, about one million was manufactured 15 and more years ago, and most of them use leaded fuel. Passenger vehicles make up about 80% of total number of motor vehicles. The age of vehicles is worrying, both from the transport safety and environmental aspects. The Republic of Serbia is one of a few countries, beside Bosnia and Herzegovina, Montenegro and Albania, which has not banned use of leaded engine fuels yet.

Taking into account the constant growth of road transport and fact that certain results have been achieved through application of measures related to technical conditions (introduction of EURO standards for vehicles into a permitting system for international transport), it is necessary to define rules which pertain to vehicle testing and it is also necessary to intensify supervision over the stations which perform technical checks for cargo vehicles and buses participating in international transport.

Road vehicles are considered a major contributor to air pollution in Serbia, especially in larger cities. Emissions from vehicle exhausts contribute to SO_2, CO, NO_x, O_3 precursors, 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 imission 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 registered buses using natural gas in Belgrade and Novi Sad, and "Zastava" from Kragujevac has started to manufacture cars using natural gas.

The Development Strategy of Railway, Road, Waterway and Airway Intermodal Transport in Serbia for the period 2008-2015 was adopted by the Government of the Republic of Serbia in December 2007.

Causes of problems:

- Obsolescence, low energy efficiency and poor technical status of vehicles
- Insufficient use of gas and other alternative fuels
- Excessive reliance on road transport
- Insufficient urban and rural road network for the increasing volume of traffic including insufficient number of by-pass roads
- Insufficient integration of energy efficiency principle into the transport management and organization system
- Poor enforcement of the regulations on exhaust gases emissions from motor vehicles
- Unharmonized national fuel quality standards with the EU regulations in terms of excessive content of sulfur, lead, benzene and PAH
- Insufficient technology for recovery of fuel vapor 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 (CO, NO_x, VOC, heavy metals, particulate matter and O_3)
- GHG emissions in exhaust gases
- 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 Urban development and spatial planning

Spatial and urban development plans are among strongest instruments which should provide for rational organization, regulation, use and protection of space. They are the key link in environmental management system, especially in the area of protection and rational utilization of natural resources. They serve to integrate environmental protection, economic and social development, hence they play crucial role in implementation of sustainable development concept.

The uncontrolled urban development 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 of RS" no. 47/03 and 34/06), Law on Environmental Protection 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 organization and development in the Republic based on the harmonization and integration of spatial aspects of different sectoral strategies, plans and programmes.

The implementation of the RSSP recommendations has not fulfilled the expectations. Since its adoption, it has 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.

Certain novelties were introduced by the Law on Planning and Construction ("Official Gazette of RS", no. 72/09), which prescribed the development of a Republic of Serbia Spatial Plan instead of the Spatial Development Strategy, as it was prescribed by the Law on Planning and Construction from 2003. This Law regulates conditions and manner of spatial planning, regulation and use of construction land and building construction; enforcement and inspection; other matters important for spatial planning, regulation and use of construction land and building construction.

Great step forward in the integration of environmental concerns into spatial and urban planning development was made by the adoption of the Law on Strategic Environmental Impact Assessment ("Official Gazette of RS", no 135/04). This Law provided for legal framework for environmental impact assessment of spatial and urban development plans. The Law on SEIA is harmonized with the Directive 2001/42/EC.

Causes of problems:

- Lack of strategic-branch-development documents
- Non-compliance with the existing planning documents

- Lack of appropriate information base (establishment of a database on space and environmental performance)
- Insufficiently developed and applied methods for sustainable spatial and urban development planning
- Lack of methodology for monitoring and implementation of plans (development of indicators system within the monitoring);
- Lack of economic instruments for the implementation of planning documents
- Insufficiently developed instruments for comprehensive consideration of economic, environmental and social issues
- Energy efficiency criteria are not sufficiently addressed in design-planning documentation.

Environmental impacts:

Uneven urbanization and deterioration of living conditions in urban areas
Pressure on protected natural areas, biodiversity and geodiversity due to illegal construction and inadequate use of space
Depopulation of rural areas and excessive demographic growth in largest cities
Unsatisfactory and uneven transport system in cities
Unsatisfactory transport linkages between settlements, especially in rural areas
Unregulated industrial and economic zones
Illegal construction, especially in access and brink city zones
Uncontrolled and environmentally unfriendly development of tourism in protected areas and other valuable nature areas
Fragmentation of natural ecosystems and disturbance of valuable landscapes
Excessive demographic growth in largest cities
Degraded environment, both visually and aesthetically
Pressure on protected natural areas, biodiversity and geodiversity due to illegal construction and inadequate use of space

6.7.2 Tourism

Similarly to other commercial activities, tourism affects the environmental quality as a consumer of natural and other resources: soil, water, fuel, electricity and food, but also as a substantial waste generator and emitter. Negative environmental impacts of tourism are expressed through pressures on natural resources, living world and habitats, as well as through waste generation and pollution.

According to the existing statistics, tourism participates in GDP with 2.5%. Approximately 2,266,166 tourists were registered in Serbia in 2008, while touristic circulation between January and October 2009 was approximately 1,802,586 tourists.

Key touristic products in Serbia include: city vacations, circular travels, business tourism, health tourism, mountains and lakes, nautics, events, rural tourism and special interests. The most visited cities are Belgrade and Novi Sad, while most visited touristic destinations are Kopaonik, Zlatibor, Tara, Vrnjacka Banja, Sokobanja, Zlatar, Stara Planina, Golija, Divcibare, etc.

Tourism has its great interest in maintaining the quality of environment, as its successful development relies on clean and healthy environment. Positive tourism effects with respect to the environment are reflected through the fact that this is an activity which tends to use natural resources in adequate way, as well as to improve landscape and maintain environmental, economic and socio-cultural values of local community.

Adequately planned touristic development is the most important prerequisite for environmental protection. The Tourism Strategy of Serbia was adopted on 5 October 2006 ("Official Gazette of RS", no. 91/06).This documents stresses the sustainable development concept, where natural resources contain potentials for the achievement of economic and other goals in tourism, not the opposite way round, it presents contribution to the achievement of good results in tourism. In order to implement the aforementioned Strategy, 15 master (business) plans have been developed for the following destinations: Master Plan Palic, Master Plan Stig Kucajske, Mountain of Beljanica, Master Plan Gornje Podunavlje, Master Plan Donje Podunavlje, Master Plan Tara, Master Plan Stara Planina, Master plan Sokobanja, Master Plan Vlasina, Master Plan of cultural-historic route – Roman Emperor's Route Felix Romuliana, Master Plan Golija, Master Plan Zlatibor – Zlatar, Master Plan Besna Kobila, Master Plan Sremski Karlovci with Fruska Gora, Master Plan Kopaonik and Master Plan Novo Milosevo.

Investment programmes for touristic and municipal infrastructure raise attractiveness of touristic destinations of our country, which also enables employment in these parts of Serbia.

Most of touristic potentials of the Republic of Serbia (except for city vacations) are located in underdeveloped areas. The National policy for even regional development of Serbia stresses the priority of tourism development based on the need to develop regions marked as less developed, but with adequate potentials for tourism development, which contains natural, cultural and historic values and preserved environment.

New Law on Tourism ("Official Gazette of RS", no. 36/09) was adopted in May 2009, and it regulates and prescribes conditions and ways of tourism planning and development. The Law stipulates proclamation of and sustainable use of touristic area. The area which due to its characteristics, values and priority touristic purpose requires special regimes of organization, regulation, use and protection, or construction of facilities of national interest is planned in such areas, will be proclaimed a touristic area by the Government following the proposal made by the Ministry. A part of touristic area which at the same time presents the protected area will be subject to protection regimes and interior organization in compliance with regulations which pertain to conservation and use of those areas.

The current negative impacts of tourism activities on the quality of environment are caused by weak enforcement of planning regulations, lack of infrastructure for wastewater treatment, uncontrolled disposal of waste, and ineffective management of protected areas.

Specific problem is also seen in tourism inside and around protected areas, which is at very low level in Serbia. In order to improve sustainable tourism, it is necessary to apply experience from developed countries (environmental education and

information provision, management of visitors' movement inside and around protected areas, hotel business which has minimal environmental impact, etc.).

Causes of problems:

- Insufficient compliance with spatial planning and urban planning documents
- Illegal construction in protected areas
- Unsustainable use of natural resources
- Inadequate management of protected areas
- Inadequate municipal and transport infrastructure
- Insufficient cross-sectoral cooperation

Environmental impacts:

- Pressure on environment, natural resources and biodiversity by inappropriate location/illegal construction of tourism facilities
- Discharge of untreated wastewaters
- Illegal dumping of waste
- Emissions to air from transport and heating installations
- Noise emissions from traffic and other facilities (catering facilities, events)
- Uncontrolled and environmentally unacceptable tourism development in protected areas and other valuable natural areas
- Disturbance and destruction of habitats and wildlife by visitors

7. ENVIRONMENTAL POLICY OBJECTIVES

7.1 Strategic Framework for the Establishment of Policy Objectives

Environmental policy objectives of the Programme 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 Programme 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) related to the environment in Serbia (see Figure 7.1).

Figure 7.1. Strengths, weaknesses, opportunities and threats related to the environment in Serbia

Strengths:	Weaknesses
- Commitment of environmental institutions to environmental protection	- Lack of basic strategic documents (as defined by the Law on Environmental Protection)

- High level of biodiversity and geodiversity - Adequate volume of water resources - Considerable potential of natural resources - Low intensity and introduction of to many chemicals in agriculture through fertilizers and pesticides - High quality of environment in non-industrialized areas - Considerable hydro-energy potential - Considerable potential of renewable and alternative sources of energy	- Unsustainable use of natural resources - Excessive exploitation of aquifers, forests and other natural resources - Discrepancy between the prices of energy and fuels - Low energy efficiency in energy generation, distribution and consumption - Inadequate time/space distribution of water - Loss of fragile natural habitats - Significant soil erosion processes - Excessive water pollution - Pollution of water, soil and air by poor waste management practices - Excessive air pollution in industrial zones and in energy and mining regions - Excessive air pollution resulting from traffic - Significant gaps in environmental infrastructure (wastewater treatment, solid waste disposal and treatment, and air pollution abatement) - Inadequate monitoring and reporting systems - Insufficient law enforcement, especially at local level - Insufficient institutional capacity, especially at local level - Lack of incentives for pollution reduction - Lack of efficient environmental financing system
Opportunities: - Adoption of strategic, programme and planning documents as defined by umbrella laws on environmental protection and spatial planning - Clearly defined environmental policy objectives - Introduction of EU norms and	Threats: - Overlapping of institutional competences - Insufficient horizontal coordination - Discontinuity of state authorities work in this area - Poor implementation of laws, programs and plans

standards providing for improved quality of the environment - Strong political commitment to implement legal reforms in environmental protection - Access to EU funds during the pre-accession process and commitment of other donors - Modernization and privatization of industry - Implementation of strategic documents in energy sector, particularly in the part which pertains to energy efficiency and renewable energy sources - Introduction of the EU norms and regulations providing for better energy efficiency - Awareness raising on energy efficiency - Introduction of energy management system - Enhanced economic competitiveness in the international market - Introduction of the concept of cleaner technologies - Improving energy and raw materials efficiency - Introduction of new technologies - Participation of stakeholders in environmental decision-making - Increasing public environmental awareness - Intensive international cooperation - Ban on nuclear power plants	- Poverty, indebtedness and slow economic growth - Slow pace of institutional strengthening - Low level of environmental awareness - Inability of citizens to pay the full cost of public utility services - Environmental funds not used for the specified earmarked purpose - Restrictive budget policy - Re-starting industrial production with obsolete technologies - Rising level of motor vehicle transport based on low quality fuel quality of which is not harmonized with the existing national regulations - Low level of awareness about rational use of energy and energy efficiency - Insufficient integration of energy efficiency principles in traffic planning and organization

7.2 Approach to Ranking of Priority Policy Objectives

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

A Selecting prioritization criteria

B Setting weighting system
C Setting scoring system
D Setting priorities by stakeholders

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

Table 7.1. Prioritization criteria and weighting system applied in the NEPP process

Number	Selecting prioritization criteria	Weights
1.	Expected environmental benefits	3.78
2.	Expected health benefits	3.28
3.	Meeting the EU approximation requirements and international agreements	2.56
4.	Savings of natural resources and energy	2.50
5.	Creation of permanent jobs	1.61
6.	Total expenditures required to achieve goals	1.50
7.	Expected biodiversity and habitat benefits	1.44
8.	Creation of a basis for application of other policy objectives	1.06
9.	Expected benefits for protected areas	1.06
10.	Size of beneficiary population	1.00

The scoring system for the prioritization 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 analyzed through the prioritization criteria, scoring and weighting system. 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 3.7). The results from each criterion (e.g. score 2 multiplied by weight 3.7 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

prioritization 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 Environmental Policy Objectives

General policy objectives of the Programme 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. *Adoption of strategic and planning documents* in the area of environmental protection and sustainable use of natural resources as defined by the Law on Environmental Protection and other special laws.
2. *Full integration of environmental policy* with economic and other sectoral policies. Participate in preparation and implementation of sectoral strategies in those areas which pertain to environmental protection. Sectoral policies and strategies should incorporate environmental considerations. Environmental and energy efficiency principles should also be integrated into spatial and urban planning.
3. *Institutional capacity building* for development and enforcement of sectoral and environmental policy should be strengthened generally and emergency response systems should be developed.
4. *Upgrading environmental monitoring and enforcement system,* which 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 GHG inventory, and environmental information system.
5. *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.
6. *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 Environment Protection Fund. They should include debt for environment swaps, full cost recovery in environmental services, investment programs in privatized companies etc. 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.

7. *Improve formal and informal environmental and energy efficiency 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 Environmental Policy Objectives

7.4.1 Short-term policy objectives for the period between 2010 and 2014

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 2010 – 2014 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 for the period between 2010 and 2019

The ongoing priorities include policy objectives that should start in 2010 but their implementation requires long time and can only be accomplished within the whole time frame of the Programme. The ongoing policy objectives for this period focus on extension and modernization 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 Mid-term policy objectives for the period between 2015 and 2019

The medium term priority objectives are envisaged for implementation after 2015. The objectives include investment projects of lower priority that are less important from the view point of pollution reduction (e.g. 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

Short-term objectives 2010-2014

- To adopt strategic framework on protection and sustainable use of water
- To eliminate overlapping in competences in the area of water management and protection and better inter-institutional coordination in the area
- To harmonies the national legislation on integrated water management with the EU Water Framework Directive 2000/60/EC
- To introduce effluent standards according to the Urban Wastewater Treatment Directive 91/271/EEC by the end of 2011
- To harmonize national legislation with other water-related directives (EU Floods Directive 2007/60/EC, EU Bathing Water Directive 2006/7/EC), Ground Water Directive 80/68/EEC (expires in 2013 and Directive 2006/118/EEC)
- To adopt Strategy on Surface and Ground Waters Monitoring in the Republic of Serbia and related Action Plan
- To transpose and implement the Nitrates Directive 91/676/EEC
- To transpose the Directive which defines quality of water intended for human use 98/83/EC into the national legislation
- To transpose the Directive which defines bathing water quality 76/160/EEC
- To define protection zones for all aquifers and accumulations used for water supply
- To adapt standards for drinking water to the requirements of Drinking Water Directive 98/83/EC by 2012
- To adopt strategy for geological research of ground waters
- To develop Balance of ground water reserves for the whole territory of the Republic of Serbia based on the Elaborate of ground water reserves in order to ensure sustainable use of ground waters
- To develop and upgrade the Geological Information Systems of Serbia – ground water subsystem including reserve balance, monitoring and protection thereof
- To provide full implementation of water information system of the Republic of Serbia
- To draft the missing components of water quality information system
- To develop a register of water polluters within the Environmental Protection Agency

Ongoing objectives 2010-2019

- 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 collection and treatment of municipal wastewaters in settlements exceeding 100,000e inhabitants
- To provide treatment of municipal wastewaters in settlements without organized water supply, and which significantly affect direct recipient and water quality in sensitive zones
- To increase coverage with public sewer systems to 65%
- To ensure that drinking water in settlements meet quality standards of the Drinking Water Directive 98/83/EC, and to extend the centralized water supply to selected rural areas with the most unsatisfactory water quality
- To define protection zones for all aquifers and accumulations used for water supply
- To rationalize water consumption among individual users
- To establish monitoring system for ground waters in the Republic of Serbia
- To establish reference laboratory for water testing
- To develop Balance of ground water reserves for the whole territory of the Republic of Serbia based on the Elaborate of ground water reserves in order to ensure sustainable use of ground waters

Mid-term objectives 2015-2019

- 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 objectives 2010-2014

- To harmonize national legislation in the area of waste management with the EU legislation
- To develop regional and local waste management plan
- To increase population covered by waste collection system to 75%
- To establish a national capacity for hazardous waste treatment
- To improve management system for special waste streams (waste tires, waste oils, old vehicles, spent batteries)
- To increase re-use and recycling of packaging waste (glass, paper/cardboard, metal, plastic and wood) to 25% of its volume
- To apply detailed geological, geo-engineering and hydro-geological research on micro location of municipal and hazardous waste
- To develop waste management information system
- To develop management programme for waste of animal origin

Ongoing objectives 2010-2019

- To introduce separate collection and treatment of municipal and industrial hazardous waste
- To establish sanitary landfill in each region according to technical and operational requirements of the Landfill Directive 99/31/EC and relevant national regulations
- To provide appropriate incineration capacity for organic industrial and medical waste
- To encourage the use of waste as alternative fuel for cement industry, steel mills and thermal power plants in accordance with waste hierarchy principle
- To improve efficiency of already established management systems for special waste streams ensuring continual approximation to the EU legislative requirements
- To rehabilitate existing dumpsites and remediate them, as they are highest environmental risk
- To strengthen professional and institutional capacities for hazardous waste management
- To establish a system for construction waste management and asbestos-containing waste
- To increase volume of composted green waste

Mid-term objectives 2015-2019

- To dispose of PCB waste, waste originating from abandoned pesticides and pesticides packaging waste according to solutions defined by operational plans
- To introduce recycling for certain types of industrial waste (ionic resin, mineral wool, ash, etc.)

7.5.3 Chemicals and risk management

Short-term objectives 2010-2014

- To establish and improve chemicals and biocide products management in the Republic of Serbia based on the developed regulations, procedures and standards harmonized with the EU *Acquis communautaire*
- To develop professional and administrative capacities in Chemicals Agency, to achieve high level of professional knowledge, good communication with clients and cooperation with other competent authorities
- To establish an Integrated Chemicals Register which will enable formation and continual update of chemicals database, databases of biocide and plant protection products on Serbian market
- To establish adequate information provision and education for consumers about dangerous properties of chemicals and biocide products and about measures for reduction of risk
- To provide fully harmonized national legislation in the area of protection against industrial and transport accidents with the EU legislation
- To ratify important international conventions which pertain to accidents
- To develop capacities for implementation of national regulations in the area of protection against accident to achieve high level of knowledge and good communication with commercial sector and other competent authorities
- To establish and develop information system for protection against accident within the Emergency Division

Ongoing objectives 2010-2019

- To develop professional knowledge and build capacities in inspection and other competent authorities, industry and scientific-research sector in the area of chemical and risk management, as well as to raise public awareness about risks and measures for chemical and accident risk reduction
- To achieve that chemicals are used in safer way and to achieve lower human health and environmental risk through replacement of high risk chemicals and biocide products with safer alternatives
- To establish systematic monitoring of trade and use of chemicals and biocide products, as well as their metabolites and chemicals streams in the environment and living organisms
- To establish a Joint Authority for Integrated Chemicals Management and to draft an Integrated Chemicals Management Programme and related action plans
- To provide adequately equipped and accredited laboratories in compliance with SRPS ISO/IEC 17025:2006 standard, certified in compliance with GLP to perform researches needed for risk assessment (classification) and risk assessment related to chemicals and biocide products
- To reduce risks for human health and environment related to dangerous chemicals
- To establish and develop risk management and accident response systems at all levels

7.5.4 Air quality and climate change

Short-term objectives 2010-2014

- To adopt Air Protection Strategy and related Action Plan
- To harmonize national legislation referring to air quality requirements and monitoring and emission into air with the EU legislation
- To define zones and agglomerations, to prepare air quality plans in zones and agglomerations with third category air in accordance with the Law on Air Protection
- To improve monitoring programme and air quality evaluation programme
- To draft a register of air polluters and emission balance, as well as GHG and uPOPs inventories
- To develop a plan for HCFC phasing-out
- To develop relevant national strategic and planning documentation in the area of climate change, as well as climate change issues integrated into other sectoral policies
- To draft GHG Inventory
- To develop the Initial National Communication and to build capacities for development of further reports towards *UNFCCC*
- To transpose and prepare for implementation the EU Emission Trade Directive, i.e. a set of EU regulations in the area of climate and energy
- To develop professional and administrative capacities for efficient implementation of the national policy to combat climate change, international regulations, and to implement regulations in this area harmonized with the EU regulations, including industrial capacities and other relevant bodies

Ongoing objectives 2010-2019

- To improve quality of ambient air in line with air quality standards by reducing emissions from energy, industry, transport and other sectors
- To establish continual emission monitoring at emitters in accordance with relevant regulations
- To establish ambient air quality monitoring in compliance with the EU requirements
- To raise public awareness about climate change and to train industry to participate in Kyoto Protocol mechanisms
- To update GHG Inventory
- To integrate climate change issues into other sectoral policies
- To strengthen institutional framework and administrative capacities to address air protection, climate change and protection of ozone layer
- To adopt and implement international agreements pertaining to air protection, climate change and protection of ozone layer
- To reduce gradually consumption of ODS (HCFC) in accordance with the

adopted reduction plan

Mid-term objectives 2015-2019

- To implement action plans for air quality improvements where the ambient air quality does not meet the prescribed limit values prescribed by the Law on Air Protection

7.5.5 Protection of nature, biodiversity and forests

Short-term objectives 2010-2014

- To adopt the National Strategy on Sustainable Utilization of Natural resources
- To expand the coverage of protected areas
- To adopt perennial plan for nature protection financing and sustainable use of biodiversity and Protected Area Management Plans, all in compliance with the Law on Nature Protection
- To harmonize national legislation in the area of protection of nature, biodiversity and forests with the EU legislation and international conventions
- To harmonize protected area management plans in compliance with the Law on Nature Protection
- To build capacities among protected areas managers
- To develop a Report on Nature Status in the Republic of Serbia
- To adopt Strategy of Nature Protection and Natural Resources Protection
- To adopt the Nature Protection Programme
- To develop the National Strategy for Biodiversity and Geodiversity Conservation
- To develop afforestation plans for barren areas
- To draft biodiversity inventory, especially inventory of endangered ecosystems and habitats of rare and endemic species
- To establish monitoring of biodiversity components
- To implement effective measures to control introduction of GMO
- To improve protection and sustainable use of wild flora and fauna and fungi
- To establish protection and conservation of migratory species
- To establish more intensive monitoring in nature

Ongoing objectives 2010-2019

- To halt the loss of biodiversity by 2010 in accordance with the Kiev declaration
- 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 ecosystems
- To improve protection of Important Bird Areas
- To develop ecological network in accordance with international standards
- To establish management system for ecological network (Emerald network, NATURA 2000, corridors, transboundary areas within the EU Green Belt in Serbia, transboundary Biosphere Reserves, etc.)
- To establish management of individual habitats, species and corridors of migratory species of international importance in Serbia
- To establish monitoring system for impact electric lines and wind generators to birds in accordance with the Recommendation no. 110 of the Council of Europe within the Bern Convention
- To establish monitoring system of climate change impact to biodiversity and in protected areas in accordance with the Decision 9-XVI CBD and Recommendation of the Council of Europe no. 135
- To establish synergy of sectoral policies and strategies in the area of conservation-development of habitats, species, corridors and sustainable use of biodiversity, to establish mechanisms of equal distribution in compliance with ABS Regime – CBD
- To establish mechanisms of application of traditional knowledge in the area of sustainable use of biodiversity and protection of indigenous residents' rights and knowledge in this area
- To improve protection of autochthonic species and to halt introduction of invasive species
- To protect, conserve and sustainable use wild flora and fauna and fungi. To protect and conserve migratory species and to establish more intensive monitoring in nature

7.5.6 Fishery

Short-term objectives 2010-2014

- To adopt documents as stipulated by the Law on Protection and Sustainable Use of Fish Fund
- To revise the established fisheries, taking into account professional opinion from the Institute for Nature Protection

Ongoing objectives 2010-2019

- To improve the system of sustainable fisheries management and to reduce negative impacts to biodiversity and protected areas
- To develop modern monitoring system for harmful and dangerous substances in fishery
- To raise public awareness about importance of fish as natural wealth and resource of general interest
- To harmonize fishery management system in the Republic of Serbia with the neighboring countries with which our country shares river course borderline
- To develop monitoring and procedure systems in case of fish epidemic and death

Mid-term objectives 2015-2019

- To improve quality of fishing waters in accordance with the Directive 2006/44/EC
- To establish NATURA 2000 areas based on present fish species, in compliance with the Guidelines 92/43/EEC on protection of natural habitats of wild flora and fauna
- To establish systematic monitoring of fish fund management
- To suppress poaching to reach percentage below 10% of total fishing volume
- To establish efficient operation of fisheries' users
- To establish efficient control over fish trade, especially for endangered and protected species
- To establish efficient control over all those involved in this business

7.6 Other Environmental Policy Objectives

7.6.1 Soil protection

Short-term objectives 2010-2014

- To harmonize national legislation in the area of soil protection with the EU legislation
- To draft a cadastre of landslides and unstable slopes in Serbia for most of its territory and to map terrain sensitivity in terms of stability
- To establish a programme of systematic monitoring of soil quality and to establish a database of soil status in urban areas
- To get involved into the European Commission programme related to the development of multifunctional information system on soil
- To adopt quality standards for non-agricultural and industrial land
- To develop a list of locations with status of particularly endangered environment and to establish priorities for rehabilitation and remediation on 20% of the Republic of Serbia's territory
- To develop a long-term strategy and related action plans and programmes for drought, degradation and desertification management

Ongoing objectives 2010-2019

- To reduce area of land affected by erosion by 40% through implementation of anti-erosion activities and introduction of effective measures for erosion control
- To update the cadastre of landslides and unstable slopes in Serbia
- To remediate contaminated locations from the priority list
- To develop a system for monitoring, protection and improvement of soil quality, to be done by polluters
- To develop modern standardized operational procedures and guidelines to meet the requirements related to soil protection
- To reduce poverty through contribution in combating desertification and consequences of drought
- To improve sub-regional, regional and international cooperation among those parties affected by drought in the area of environmental protection and conservation of soil and water resources
- To establish database of transboundary soil pollution, to assess risk of pollutant migrations; to develop a 3D pollution model for Serbia
- To educate and inform public through the activities at national and international levels about fighting against land degradation and desertification

7.6.2 Noise

Short-term objectives 2010-2014

- To adopt bylaws on protection against environmental noise
- To improve monitoring system for environmental noise
- To determine acoustic zones in settlements and outside them within the National Environmental Information System for data about noise with the register of significant sources of noise
- To draw up the 1st round of strategic noise maps
- To adopt action plans for the areas covered by strategic noise maps in accordance with Directive 2002/49/EC based on the strategic noise maps

Ongoing objectives 2010-2019

- To implement monitoring of environmental noise
- To apply measures for noise reduction in most affected location in which noise level exceeds limit values
- To draw up strategic noise maps and action plans based on those maps

Mid-term objectives 2015-2019

- To draw up strategic noise maps for agglomerations of more than 100,000 inhabitants, main roads with the annual traffic volume of more than 3 million vehicles, railroads with 30,000 trains annually and less
- To adopt action plans for areas covered by strategic noise maps in accordance with the Directive 2002/49/EC based on strategic noise maps

7.6.3 Ionizing and non-ionizing radiation

Short-term objectives 2010-2014

- To harmonize national regulations with the EU legislation and improve national capacities to implement regulations in the area of protection against ionizing and non-ionizing radiation
- To build capacities of the Agency for Protection against Ionizing Radiation and Nuclear Safety of Serbia
- To adopt a Programme of radiation safety and security and Programme of radioactive waste management
- To modernize and extend the network of radioactivity monitoring by 2012

Ongoing objectives 2010-2019

- To establish monitoring of non-ionizing radiation

- To provide capacities for permanent disposal of radioactive waste

7.7 Priority Environmental Policy Objectives in Economy

7.7.1 Industry

Ongoing objectives 2010-2019

- To reduce industrial emissions of SO2, NOx, VOC, PAH, particulate matters and other pollutants from the existing IPPC industrial facilities which do not meet the EU Emission Standards in compliance with the Programme of measures for harmonization of the existing establishment or activity with the prescribed conditions
- To expand treatment of industrial wastewater
- To introduce cleaner production and environmental management system (EMAS) in numerous industrial facilities
- To apply energy management system
- To implement integrated permitting system for industrial establishments in compliance with the Law on IPPC
- To manage waste in compliance with regulations
- To remediate contaminated soil in industrial complexes
- To increase energy efficiency and save raw materials in industry

7.7.2 Mining

Short-term objectives 2010-2014

- To finalize the initiated activities of remediation and recultivation of closed mines
- To implement technical measures for prevention of air, water and soil pollution near the mining facilities
- To establish and improve environmental monitoring near all active mining facilities

Ongoing objectives 2010-2019

- To provide treatment of wastewater from exploitation and processing of minerals
- To provide treatment of mining waters from active and abandoned mining facilities
- To remediate and recultivate areas degrade by mining activities
- To apply technical measures for prevention of air pollution near open cast mines

- To reduce risk of water and soil pollution as a consequence of mining activities
- To solve problem of overburden disposal and to solve problem of temporary drill-in fluid ponds generated in oil drilling activities
- To solve problem of overburden recovery and its disposal to adequately prepared areas, with the established monitoring

7.7.3 Energy

Short-term objectives 2010-2014

- To adopt law on rational use of energy and related bylaws
- To establish an Energy Efficiency Fund
- To establish fiscal, customs and other incentives for those who apply measures of energy efficiency
- To establish an energy management system
- To establish energy revision system in energy consumption sectors
- To reduce negative impacts occurring due to oil spills in forceful drilling or possible accident in pipeline through installation of fiber optic cable for continual monitoring for potential leakages

Ongoing objectives 2010-2019

- To reduce emissions of SO2, NOx and particulate matter from large combustion plants in compliance with the regulations
- To implement the integrated permitting system for energy establishments in compliance with the Law on IPPC
- To reduce environmental impacts of oil refineries through implementation of the adopted action plans
- To provide treatment of wastewater from energy sector
- To reduce environmental impacts of fly ash disposal by changing transport and disposal technology
- To harmonize regulations which pertain to renewable energy sources with the EU regulations
- To increase energy efficiency in all energy generation and consumptions sectors. To provide efficient application of waste management regulations. To recultivate the existing ash disposal sites
- To increase use of renewable energy sources and gas
- To connect individual households to district heating systems or gas heating systems
- To increase energy efficiency and reduce losses in heating plants and in distribution network
- To explore possibilities for ash recovery, extraction of harmful and useful components and to provide their disposal to adequately prepared and appropriate surfaces, with the establishment of a monitoring system

- To utilize fly ash from thermal power plants
- To adjust energy policy to the EU requirements in the area of climate and energy, i.e. to the taken international commitments
- To apply the Law on Rational Energy Consumption
- To establish a rational energy management system
- To establish an energy revision system in energy consumption sectors
- To raise awareness and to develop education about increased energy efficiency and utilization of renewable energy sources

7.7.4 Agriculture, forestry and hunting

Short-term objectives 2010-2014

- To increase environmental awareness amongst agricultural producers by developing and disseminating the Code of Good Agricultural Practice
- To adopt strategic and planning documents addressing forestry and hunting
- To establish a set of indicators to monitor environmental impact of agriculture
- To increase the level of harmonization of national legislation in the area of forestry, agriculture and hunting with the relevant EU legislation
- To establish a recording system about types and quantities of utilized fertilizers and plant protection products
- To establish a recording system about the areas under organic agricultural activities
- To draft nutrient balance
- To identify areas under risk of soil and ground water pollution originating from fertilizers and plants protection products
- To improve monitoring of soil standing
- To control change in agricultural land use
- To implement soil and water monitoring in order to determine presence and distribution of pollutants, as well as their impact to ecosystem components
- To erect wind protection bands in order to prevent eolic erosion on agricultural land
- To evaluate reserves of organic substances in soil and to develop indicators for soil contents monitoring
- To draw up maps for highly valued agricultural areas from biodiversity aspect in order to protect them
- To restore and maintain traditional agricultural areas

Ongoing objectives 2010-2019

- To assess non-point soil and water pollution from agricultural areas
- To reduce discharge of nutrients and other dangerous substances from point and non-point sources and identify areas sensitive to nitrate water pollution
- To introduce a system of controlled use of fertilizers and plant protection products in agricultural land in order to reduce environmental impacts

- To improve environmental management in livestock and food processing plants
- To develop organic agriculture
- To suppress and prevent spread of allergen and weed plants
- To improve the sustainable management system, especially in privately-owned forests
- To develop modern monitoring system for harmful and dangerous substances in soil and hunting, as well as for allergen and weed plants (allergen pollen)
- To implement measures for establishment of sustainable level of organic substances in soil
- To improve management system in the area of hunting and fishery and to reduce their negative impact to biodiversity and protected areas
- To explore possibilities for use of natural geologic raw materials for reduction of soil acidity
- To protect highly valued agricultural ecosystems
- To limit change in agricultural land use in cases of land of high fertility

Mid-term objectives 2015-2019

- To organize agricultural activities in the areas identified as sensitive to nitrate pollution in compliance with the Directive 91/676/EEC and in protected areas
- To control agricultural production in protected areas
- To introduce emission limit values for heavy metals in agricultural land and sewerage sludge used for agricultural activities in accordance with the Directive 86/278/EEC

7.7.5 Transport

Ongoing objectives 2010-2019

- To phase out leaded petrol
- To improve fuel quality according to relevant standards
- To ensure that all cars produced in Serbia or imported comply from 2012 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 reduce fuel vapor emissions from petrol stations, mobile containers and tankers following Directive 94/63/EC
- To construct bypass roads in cities most affected by environmental impacts of through traffic
- To reduce pollution from vessels in navigable waters

- To prepare transport planning and organization system in the manner that encourages rational energy consumption in this sector

Mid-term objectives 2015-2019

- To develop protection against noise in highways
- To control air pollution in big crossways in cities
- To introduce new materials in road construction

8. **MEASURES FOR IMPLEMENTATION OF ENVIRONMENTAL PROTECTION PROGRAMME**

8.1 Schedule of Measures Implementation

Implementation of policy objectives of the National Environmental Protection Programme 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 education and environmental infrastructure needs. The policy reforms presented include a wide range of instruments and reflect the implementation needs of the Programme 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 (2010 – 2014) should involve practical, financially feasible reforms, which can be implemented straight away. It refers primarily to legislative and regulatory reforms, aiming at harmonization 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 earmarked 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 remediation 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 national legislation.

The medium-term phase (2015 – 2019) will be dependent upon prior implementation of the preceding phase. It should focus on a wider application of incentive based instruments, accelerated harmonization 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 Reform of Regulatory Instruments

8.2.1 Current status

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

The Law on Environmental Protection regulates integrated approach to environmental protection which provides for human rights on life and development in healthy environment and balanced relation between economic development and environment in the Republic of Serbia. It specially regulates the following:

- Criteria and conditions for sustainable use and protection of natural resources and values
- Environmental protection (air, water, land, soil, forests, protected areas, 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
- Permitting and approval systems
- Handling with dangerous substances and protection against chemical accident
- Environmental monitoring (monitoring and information system)
- Public awareness and participation in decision-making
- Economic instruments for environmental protection
- Liability for pollution
- Administrative supervision
- Penalty policy

The Law on Air Protection regulates air quality management and stipulates measures, manner of organization and enforcement, improvement of air quality as natural value of general interest which is under special protection in Serbia. The Law is harmonized with most relevant EU regulations which regulate air protection in most comprehensive way, especially with the Directive 2008/50/EC. The Law prescribes the establishment, maintenance and development of a unified air quality management

system in Serbia; conservation and improvement of air quality through definition and implementation of protective measures aimed at prevention or reduction of harmful effects to human health and environment; avoidance, prevention and reduction of pollution which affects ozone layer depletion and prevention and reduction of GHG emissions; monitoring, collection and assessment of appropriate data about air quality based on measurements and standadized methods; availability of air quality data; fulfillemnt of obligations in accordance with retified international agreements; international cooperation in the area of protection and improvement of air quality and availability of those data.

The Law on Water Management ("Official Gazette of RS", no. 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, consents and permits), water management activities, limitation of owner or beneficiary's rights, water co-operatives, financing water management activities, as well as administrative inspection, i.e. the supervision over the enforcement.

According to the Law on Environmental Protection, sustainable use and protection of natural values is provided for through the National Strategy of Sustainable Utilization of Natural Resources and Goods. According to the NIP document and amendments of the Law on Environmental Protection, the adoption of the Strategy is planned for 2010.

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 (SEA); environmental impact assessment (EIA); integrated pollution prevention and control (IPPC); a coordinated system of permits and approvals; maintaining cadastres 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 o 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 limit values. Construction and operation of facilities and activities is possible if the ambient and emission limit values, and the emission abatement technologies are met.

Regulations related to air emission limit values are harmonized with the EU requirements. As for deadlines within which such emission limit values are to be met, it was taken into account how much time was available for member states to meet the mentioned deadlines. Air emission limit values are prescribed for particulate matters, soot, SO_2, NO_2, benzene, CO, ground-level ozone, heavy metals (Pb, As, Cd, Ni and Hg) and polycyclic aromatic hydrocarbons, but also for other pollutants.

There are emission limit values prescribed for surface waters. Ambient standards for soil and irrigation water include a number of heavy metals. There are also prescribed standards for environmental noise, while limit values for bathing water and fish are not introduced. Most of the ambient limit values is not harmonized with the relevant EU directives.

Emission standards are set for air pollution (though these are not harmonized 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). Adoption of a new Regulation on emission limit values for air pollutants, which will be harmonized with the LCP Directive 2001/80/EC and Directive 2001/81/EC for the national annual emissions and technical regulation TA Luft is expected before the end of 2009. the VOC Directive 99/13/EC will be transposed into the national legislation by the end of 2011. Emission standards have not been introduced for effluent discharges.

System of environmental bans or restrictions is put in force for certain 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 of ozone-depleting substances; import and export of certain ODS determined by international agreement, i.e. products and equipment containing such substances from or into the countries which are not parties to the mentioned agreement;
- Import and/or export and trade in ODS and fluorinated GHGs;
- Import and/or export and trade in new products and equipment containing the controlled substances which deplete ozone layer, except for hydrochlorofluorocarbon (HCFC);
- Release of ODS and fluorinated GHGs;
- Filling of products and equipment containing fluorinated GHGs with ODS;
- Rinsing with ODS;
- Import and/or export, trade in and use of disposable containers for ODS and fluorinated GHGs;
- Retail trade in ODS and fluorinated GHGs;
- Import and/or export and trade in second-hand products and equipment containing ODS;
- Import and export 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 not harmonized 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 labeling of products, processes and services with reduced environmental impact.

Centre for cleaner production was established in 2007 at Faculty of Technology and Metallurgy in order to support economic organizations in preventing environmental pollution. The Centre is implementing the project in Serbia called "Cleaner Production", as a part of the programme introduced by the UN Industrial Development Organization (UNIDO). The Strategy of Introduction of Cleaner Production in Serbia was adopted by the Government on 19 February 2009.

Remediation measures imply the adoption of remediation plans at the level of national government, autonomous province and local government units, 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, medical herbs, timber, hunting etc). 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 in compliance with the EU Directive 2001/43/EC. It applies to the plans and programmes at national, provincial and municipal levels. Public participation is envisaged at the phase of public presentation of plans or programmes, i.e. before the submission of the application for consent on SEA report. The Law is implemented directly without the adoption of separate regulation.

The EIA procedure is implemented in Serbia according to the Law on EIA. The list of establishments and activities is different from the List of Projects 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 in compliance with the EU Directive (2008/01/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. A number of regulations needed for the implementation of this law was adopted between 2005 and 2008. in November 2008 the Government adopted the Regulation on schedule of IPPC application submission.

Measures for protection against dangerous substances include bans and restrictions regarding the production and trade of ozone depleting substances, or products containing such substances and the export, import and transit of waste. Provisions of the Seveso II Directive (82/96/EC) have partially been transposed into

the existing Law on Environmental Protection and Bylaw on methodology for assessment of chemical accident and environmental pollution risks, preparation and remediation measures. Adoption of three bylaws is expected for 2010, which will fully provide for transposition of provisions referred to in the Seveso II Directive.

Adoption of the Law on Chemicals, Law on Biocide Products and Law on Plant Protection Products created legal basis for regulation of the area of chemicals management. However, adequate chemicals management will be provided when appropriate institutional framework is created, and when related bylaws enter into force which will ensure regulation of obligations, conditions, criteria and procedures in this area.

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. Amendments of the Law on Privatization prescribed that the state, not new owner, is responsible for environmental pollution in the period before privatization. The proceeds from privatization 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 local self-government units, which calls for further capacity building of relevant supervisory authorities.

8.2.2 Short-term reforms of regulatory instruments (2010-2014)

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

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

- Environmental quality standard and emission standards;
- Environnemental Management System;
- Environnemental labelling;
- Import and export of ozone-depleting substances or products containing them, if their trade or use is prohibited (based on the Law on Air Protection);
- Import, export and transit of waste;
- Handling dangerous substances and protection against chemical accident;
- Environmental monitoring and information system and an integral cadastre of polluters;
- Economic instruments (user charges and pollution charges).

It is necessary to revise emission standards and introduce the missing ones (e.g. for wastewaters).

The ambient standards (environmental quality standards) should be aligned with the respective EU directives during the short-term period because of their direct impact to human health. Certain national standards should be kept in the areas which are not covered by the EU legislation.

Emission limit values have passed through substantial reforms. In this short-term period, they should become the basis for industrial pollution control and enforcement.

Introduction of emission limit values for effluent waters according to the Directive for municipal wastewater treatment 91/271/EC is a high priority reform. Air emission limit values have been revised according to the LCP Directive 2001/80/EC, VOC Directive 2001/81/EC and Directive for waste incineration 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 the end of 2012. The regulation for the content of certain dangerous 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 companies with the established EMS systems should be set up. It is necessary to adopt regulations for establishment and implementation of the EMAS system in compliance with the EU requirements.

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. Certain types of existing and new installations will be subject to integrated permitting. For new installations, both the existing and new ones, the law becomes applicable as of the time of its entrance into force. For the existing installations subject to IPPC the Government adopted the Regulation on schedule of IPPC application submission ("Official Gazette of RS", no. 108/08). According to this Regulation, the existing establishments and activities are obligated to obtain IPPC permit by 2015.

The emission based permitting system should be introduced for installations that are not subject to IPPC.

It is necessary to adopt bylaws which will closely regulated PCB and PCB waste management.

In the area of handling with dangerous substances and protection against chemical accident, it is necessary to ensure full transposition of the Seveso II Directive through the adoption of the Law on Amendments of the Law on Environmental Protection and Bylaw on the contents and methodology of the development of Accident Prevention Policy, Safety Report and Emergency Plan, and to develop guidelines for reaction in case of an accident.

It is necessary to develop the National contingency plan in case of chemical accident, municipal contingency plans in case of chemical accident and Emergency plan for major accidents with transboundary effects by 2012.

In the area of chemicals management, it is necessary to prescribe conditions for placement on the market, import and export, use and other handling with chemicals, as well as conditions for placement on the market and use of active substances biocide product and biocide product, as well as plant protection product. This area will be adequately regulated when all bylaws to the Law on Chemicals, Law on Biocide

Products and Law on Plant Protection Products are adopted and harmonized with the relevant EU regulations (Regulation EC 1907/2006, *REACH*, Directive 67/548/EEC; Directive 99/45/EC; Directive 2004/42/EC; Regulation EC 304/2003 and Regulation EC 648/2004, Directive 98/8/EC, Directive 91/414/EC)

Bearing in mind that all the REACH procedures are centralized, this EU Regulation cannot be transposed into our legislation except for in the part that pertains to bans and restrictions. However, Law on Chemicals provides for prerequisites for the future full transposition of REACH, as well as the basis for the adoption of bylaws for the implementation of Globally Harmonized System (GHS) of classification and labeling. Law on Chemicals also took into account the existing EU regulations on classification, packaging and labeling (Directive 67/548/EEC; Directive 99/45/EC), but also new EU Regulation 1272/2008 on GHS and transitional period which will be prescribed for re-classification and labeling of chemicals according to GHS.

8.2.3 Medium term reforms of regulatory instruments (2015-2019)

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 polluters. In parallel, additional regulatory instruments should be introduced following the EU *environmental acquis*.

The ambient water quality limit values should be supplemented following the EU 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 the end of 2012 following a gradual phasing out of leaded petrol. From 2012 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 fertilizers, and cultivation of land along sensitive water bodies).

Voluntary agreements can be gradually phased in in parallel with the development of regulatory system and privatization process.

Taking into account that all the procedures of the EU Regulation 1907/2006 on Registration, Evaluation, Authorization of Chemicals – REACH are centralized ones, this EU Regulation cannot be transposed into our legislation, except for the part pertaining to bans and restrictions. Once Serbia becomes the EU member state, regulation for REACH implementation will have to be introduced.

8.3 Monitoring and Information System

8.3.1 Current status

Self-monitoring is a type of monitoring performed by the operator either alone or through an authorized organization. The Government establishes types of activities and other phenomena subject to self-monitoring, operational methodology, indicators, record keeping, submission deadlines and maintenance of data, based on special laws.

Data obtained through environmental monitoring are submitted in a form of report to competent state authorities, most commonly to Environmental Protection Agency.

The monitoring system in Serbia is mainly focused to ambient environment quality and it does not cover all priority areas. Polluters self-monitoring is quite limited, primarily due to unharmonized legislation.

Air quality monitoring. In our country, air quality monitoring had been based on manual methods until recently, and the obtained results could not provide for real picture, they especially could not ensure timely intervention at the operators' related to reduction of emissions exceeding ELV (emission limit values).

The State Air Quality Monitoring System was established in Serbia in 2009, and it will be maintained by the Agency. It will also include 28 AQMS from the EU donation and 7 existing ones throughout Serbia, as well as one mobile automatic station. Analytical and calibration laboratory will also be established in order to enable completion of the state monitoring system. All the data collected in AQMS are real-time data, while stored data and related reports will be submitted at the user's request. The National Air Analysis Laboratory in Belgrade will be the reference one.

Autonomous Province of Vojvodina also has a network of 7 AQMS, and there are local networks for automatic monitoring in Pancevo (organized by local self-government) and in Belgrade (organized by the City Institute for Public Health).

Air emission monitoring is implemented in the Environmental Protection Agency as a part of the integrated polluters cadastre; the Agency also maintains the register of air polluters. According to PRTR Protocol, this register is limited to monitoring of emissions of pollutants from IPPC establishments. Data about this type of establishments were analyzed and reported in 2008 and 2009 within the reporting towards the LCP Directive.

According to the Law on Air Protection, the Environmental Protection Agency is in charge of allergy pollen monitoring, whereby pollen is defined as polluter emitted from nature primarily due to its negative and harmful effects to human health. The state monitoring network for pollen, organized by the Agency, consists of 10 measurement stations. Pollen from 24 plant species is being identified through this network.

Soil monitoring is not organized in the whole territory of Serbia as systematic and permanent activity.

Legislation pertaining to monitoring of soil status and emission limit values for soil pollutants is not well-developed in Serbia.

Soil status in urban areas is monitored in several cities of Serbia and it includes soils in drinking water spring zones, city parks and children's playgrounds, along busy roads, in industrial zones and within agricultural areas in urban environment.

Monitoring of agricultural land fertility is performed through systematic control organized by the Ministry of Agriculture, Forestry and Water Management. In 2008, it included 49,417 soil samples in the whole country.

The water quality monitoring in Serbia lies in the competence of the Republic Hydro-Meteorological Institute, and is implemented according to the Programme of systematic water quality control adopted by the Government for the period of one year. The principal network of measuring stations, established during the 1960's, was enlarged over the time both in terms of the number of stations and in terms of the frequency of sampling and analysis. 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. Daily control of water quality is carried out in 12 water quality stations on 8-10 parameters, while 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 and sediment quality is performed in all important reservoirs in the Republic of Serbia.

Obsolete legislative regulations (the existing regulation 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 not implemented in Serbia to the full extent. The number of parameters measured is too limited and usually not linked to hydrological measurements. Polluters are obliged to measure the quantity of wastewater, and monitor the operation of wastewater treatment installations, but this obligation is insufficiently implemented. Compliance monitoring of wastewater is hampered by the lack of effluent standards.

On the basis of the Regulation on methodology for development of the integrated polluters cadastre, the Environmental Protection Agency maintains the register of wastewater discharges as a part of the register of environmental polluters. It is however limited to wastewater discharges from IPPC establishments.

Biodiversity monitoring is inadequate. Except for cumulative protected areas, other data about biological diversity, protection effects monitoring and distribution of populations both in protected and other areas, data are not available or are incomplete.

There is not state monitoring of protected species at national level, except for reporting on trade. A new List of Strictly Protected and Protected Species is being drafted.

Expert monitoring of fish species in fishing areas has been in place since 2004, but information system about fishing waters management still does not exist. There is no expert monitoring for hunting game. Forest monitoring is at relatively good level with numerous national indicators, but it is necessary to develop adequate components of other indicators.

Waste monitoring was initiated in 2005 within the activities implemented by the Environmental Protection Agency related to the establishment of the information sub-system on waste management, based on the Regulation on methodology for development of the integrated polluters cadastre.

During 2005 and 2006 data were collected from 164 PUC landfills and more than 800 wild and old dumpsites. In order to provide detailed records about wild landfills, the Sector for Supervision made a list in February 2009 which included more 4,500 waste disposal sites in Serbia.

Monitoring of industrial waste generation is implemented within the Integrated Polluters Cadastre. This register includes IPPC establishments. In 2009, the Agency started to collect data about medical and pharmaceutical waste.

The Law on Waste Management delegated a range of authorizations to the Environmental Protection Agency related to collection of data about waste management in general, but primarily industrial waste, packaging and packaging waste, special waste streams, etc.

There is no systematic monitoring of *trade and use of chemicals* in Serbia and measures for risk reduction are not implemented, nor is adequately determined whether certain measures for risk reduction should be implemented or not. There is not information system about chemicals which would be used for chemicals management system or for the inspection. In addition, there are no conditions for certification of laboratories in Serbia which would confirm that they operate in compliance with GLP principle, which creates additional problem.

Monitoring of ionizing radiation is carried out by the Institute for Occupational 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 ("Official Gazette of FRY" no. 45/97).

Monitoring of noise is not established at the national level in Serbia. The existing monitoring is implemented only in Belgrade and Novi Sad, as well as some individual measurements within certain projects. The Law on Noise was adopted in May 2009 and it will enable establishment of noise monitoring from point, line and other sources and drawing up of maps of noise which will be done by the Environmental Protection Agency. The Agency will also develop the protection action plans.

The Environmental Protection Agency is obligated to establish the Integrated Polluters Cadastre in compliance with the Law on Ministries and Law on Environmental Protection. Adoption of the Regulation on methodology for development of the integrated polluters cadastre in September 2007 provided for the establishment of this register, harmonized with the PRTR Protocol of the Aarhus Convention and E-PRTR Directive.

Information system of the Integrated Polluters Cadastre was completed in 2009. in addition to the National Polluters Register, local registers of pollution sources are also being developed which will be established by the adoption of the Regulation.

A range of activities are implemented within the Environmental Protection Agency related to the establishment of an integrated environmental information system. This primarily refers to the adoption of relevant bylaws, as well as to

implementation of a number of projects aimed at the establishment of a network of institutions in charge of environmental monitoring.

In 2008, the Environmental Protection Agency prepared a project within IPA 2008 for further development of EIONET network in Serbia, as well as for the establishment of a reporting environmental system at the national level, and international cooperation and inclusion into the European system of data flow.

8.3.2 Proposed reforms of 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 integrated information and reporting framework (table 8.1).

Table 8.1. A list of proposed reforms of monitoring and information systems

Relevant areas	Proposed monitoring and information systems reforms
Water quality	- Further development of surface and groundwater monitoring accordingly to the Framework Water Directive - Further accreditation of laboratories and setting up reference laboratories - Establishing automatic stations for continued monitoring of certain water quality parameters - Development of modern biological monitoring. - Developing cadastre of water polluters - Improvement of quality of data related to emissions to water - Establishment of integrated information system - Increasing the number of monitoring sites, frequency and list of monitoring parameters of drinking water quality - Improved monitoring of nitrates in surface and ground waters in accordance with specific requirements of Nitrate Directive in Serbia
Waste management	- Improving self-reporting of waste generators - Improved reporting quality of waste generators - Monitoring waste volume, composition and physico-chemical characteristics - Establishing waste database - Increasing the number of labs for waste characterization - Development of a separate register for PCB waste and devices containing PCB
Chemicals management	- Setting up an integrated chemicals register - Establishing integrated information system for

	chemicals management - Establishing systematic monitoring of trading in and use of chemicals, and their fate and pathways in the environment (degradation ways, metabolites, etc.) in order to implement measures for risk reduction - Establishment of appropriate legal framework and fulfillment of other conditions which would enable access to OECD – since GLP compliance certificate will be issued only by a designated authority that passes an OECD evaluator's checks - Standardization and accreditation of labs for environmental components examinations - Granting GLP certificates to laboratories that operate in accordance with good laboratory practice principles
Air quality, climate change and allergy pollen	- Improving program of ambient air monitoring and air quality assessment - Establishment and operational start-up of a State System for Automatic Air Quality Monitoring, AQMS, including one mobile AQMS, calibration laboratory and analytical laboratory - Upgrade of the State System of AQMS, adding new measurement points for particulate matters in urban areas in accordance with the Environmental Protection Action Plan (CEHAP Project) - Improvement of monitoring programme for ambient air and air quality assessment - Modernizing 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 - Developing register of uPOPs sources - Defining zones and agglomerations based on air quality assessment, depending on the lower and upper assessment levels - Maintenance of the established State network for detection of allergy pollen in Serbia - Extension of the existing network for detection of allergy pollen - Modeling effects of stationary and large point sources - Enforcing self-monitoring - Modeling transport and disposition of pollutants emitted into the air according to data provided for by the IPC - Implementing self-monitoring - Establishing GHGs emission inventory and balancing and information system

Nature and biodiversity	- Improving monitoring of biodiversity components, endangered species, ecosystems and protected areas - Establishing monitoring of sustainable use of natural resources (hunting, fishery, forestry) - Establishing bio-monitoring of certain water eco-systems - Establishing NMS portal of CBD - Establishing national information system and databases in protected areas - Identification and mapping of habitats
Soil	- Establishing systematic monitoring of soil with precisely determined sampling locations and standardized methods for collection and analysis of samples - Determining specific parameters and monitoring factors of land degradation, soil erosion, reduction of organic substance, contamination, salinization, compression, loss in biodiversity, change in land use, floods and landslides - Defining criteria for determination of zones under risk of degradation - Identifying locations with confirmed presence of dangerous substances in quantities that may cause risk to human health or environment – contaminated locations - Developing database of contaminated locations - Introducing monitoring of sludge quality
Forests	- Improved monitoring of forests health status in accordance with the International Cooperation Programme for Forests (ICPF).
Noise	- Improving environmental noise monitoring - Drawing up strategic noise maps - Developing action plans - Informing the public about environmental noise status
Ionizing and non-ionizing radiation	- Improving radioactivity monitoring including indoor radon - 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, waste, noise, radiation) - Improving emission compliance monitoring - Monitoring of contaminated soil - Setting up cadastre of polluters
Mining	- Enforcing self-monitoring (air, water, waste) - Improving emission compliance monitoring - Monitoring of contaminated soil - Setting up cadastre of polluters
Energy	- Enforcing self-monitoring (air, water, waste) - Improving emission compliance monitoring - Monitoring of contaminated soil - Setting up cadastre of polluters
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 - Agro-biodiversity monitoring
Transport	- Establishing and improving monitoring of air quality in the most affected traffic routes - Setting up obligatory measurements of exhaust emissions
Information system	- Development of the missing components for the Environmental Information System in order to ensure continual environmental data collection and processing - Development and upgrade of GIS - Establishment of a permanent network of institutions in charge of monitoring and reporting

8.3.3 Short-term reforms of monitoring and information system (2010 – 2014)

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. Reference laboratories should be established and uniform sampling and analytical procedures should be applied. It is necessary to create all the conditions for harmonization of laboratories with GLP
- Establishment and permanent updating of database of chemicals on the market and their intrinsic properties, i.e. establishment of the Integrated Chemcials Register

- Monitoring activities should be carried out by polluters as self-monitoring, coupled with record keeping, notification and reporting obligations to competent authorities on obligatory bases
- Monitoring based on the Programme adopted by the Government (National monitoring – the State Network for Monitoring the Quality of Air, Water, etc.) should be adequately financed by the state budget
- 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
- Establishment of a monitoring network for wastewater emissions
- Development of a GHG emissions inventory
- It is necessary to provide for complete development of a central and integrated database of all environmental components and polluters cadastre in Serbia. This database is a basis for the development of the Environmental Information System which will ensure public access to environmental information. The system created in such way should be outlined so to become a part of EIONET network, i.e. future European Information Systems (SEIS) in the area of environmental protection
- Establishment of monitoring and data processing related to generation of waste, waste composition and physical-chemical properties
- Development of information network for notification and management in case of chemical accident and development of a database of dangerous substances and of Seveso II establishments
- System of national accounts, still not adopted by Serbia to full extent, should be modified in such way to reflect environmental costs and costs of exploitation of natural resources. Capacities should be developed for calculation of green GDP
- Establishment of systematic monitoring of soil with precisely defined sampling locations and standardized methods for data collection and analysis
- Determination of specific parameters and monitoring factors of land degradation, erosion, reduction of organic substance, contamination, salinization, compression, loss in biological diversity, change in land use, floods and landslides
- Defining criteria for determination of zones under threat of land degradation
- Identification of locations with confirmed presence of dangerous substances in quantities that may cause considerable risk to human health and environment – contaminated locations
- Development of a database of contaminated locations
- Establishment of the national reference laboratory for soil
- Extension of the existing network for monitoring of allergy pollen by 3 points annually
- Capacity building in data analysis and reporting about the type and quantities of allergy pollen
- Capacity building among staff in charge of monitoring and detection of allergy pollen

- Data exchange between the state monitoring network and European base for aerobiology
- Establishment of monitoring system for hunting and non-hunting game and fishery

It is necessary to prescribe the following in the area of monitoring and information system:

- The criteria for determining the number and distribution of measuring points, the network of measuring points, the scope and frequency of measurements, sampling, classification of events that are monitored, methods and indicators of environmental pollution including their monitoring, schedule and reporting requirements
- The content and scope of maintaining information systems, methodology, structure, common bases, categories and data collection levels, and the content of information regularly reported to the public
- Methodology for monitoring of hunting and non-hunting game
- Information system about fishery
- Sustainability criteria related to use of natural resources

8.3.4 Medium-term reforms of monitoring and information systems (2015-2019)

The following reforms are envisaged for medium-term period:

- 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 concentration in soil
- Broadening of monitoring and processing of data on waste generation, waste composition and physical-chemical characteristics
- Broadening of monitoring network for ground water protection and data processing
- Broadening of monitoring network for landslides and unstable slopes
- Broadening of monitoring network for allergy pollen
- Updating and extension of database of allergy pollen
- Upgrading of the State System of AQMS with additional measurement points for particulate matters in urban areas in accordance with the Environmental Protection Action Plan and Children's Health (CEHAP Project)
- Monitoring the POPs emissions
- Develop and implement programmes for systematic monitoring of chemicals, including biomonitoring in order to check the existing and introduce new measures for risk reduction

- Development of information system for chemicals management and permanent updating of database of chemicals on the market and about their intrinsic properties in order to provide for timely information provision to all the relevant institutions
- Regular monitoring of nitrates and nitrites in the nitrate sensitive zones
- Extend the monitoring of nature components and forest health
- Draw up of strategic noise maps for smaller settlements, traffic routes, railways and airports
- Update 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
- Full inclusion of the Environmental Information Systems of Serbia into the Shared European Information System
- Full automatization of monitoring processm collection and exchange of data about environmental components and reporting at national and international levels
- Improvement and extension of the soil monitoring system
- Definition of zones under risk of land degradation
- Establishment of biodiversity cadastre as per species, communities, habitats, genetic diversity
- Establishment of permanent monitoring of biodiversity through composite indicators CBD, CHM.

8.4 Reform of 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.

The purpose of economic instruments is to provide for adequate definition of prices for environmental-natural resources in order to ensure their efficient use and appropriate allocation. In market economy conditions, environmental protection is achieved through positive preventive actions implemented by polluters, especially in terms of pollution prevention, as well as through corporate responsibility (of local and regional communities).

From the economic point of view, economic instruments should:

- Maximize rational use of natural resources in time and space;
- 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. To this end, economic incentives should be implemented as an effective tool persuading the polluters and consumers of goods and services that investing in environmental protection is beneficial, and that there are financial benefits generated in that process.

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

8.4.1 Current status

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, environmental pollution charges in the areas of special state interests, and environmental charges charged by the local self-government units. Two regulations were adopted in accordance with the polluter pays principle: Bylaw on criteria for calculation of the level of pollution charges for various types of pollution emissions, obligated entities, rules for collection of pollution charges ("Official Gazette of RS", no. 113/05 and 6/07), as well as Bylaw on measures and criteria for reduction or waiver of pollution charges ("Official Gazette of RS", no. 113/05).

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. Charges for emissions from individual sources is calculated according to type, quantity or characteristics of emissions of the following pollutants: sulphur oxides expressed as sulphur dioxide (SO_2); nitrogen oxides expressed as nitrogen dioxide (NO_2) and particulate matters. Charges for generated or disposed waste are calculated according to type, quantity and characteristics of waste generated or disposed within a year, which is determined according to real production capacity and is expressed in mass units, in tons. Charges of motor vehicles is calculated according to vehicle type, engine and fuel type, operating volume and age of the vehicle. The entities obligated are all legal and private entities that cause environmental pollution.

The Law on Waste Management regulates the establishment of an integrated waste management system, from its generation, through its collection, transport, storage, treatment, up to its final disposal. Waste management costs are calculated according to quantity and characteristics of waste in compliance with the "polluter pays" principle. Waste generator or owner bear costs for collection, transport, storage, treatment and disposal in compliance with law; producer or importer of products which after their use become special waste streams bear costs for collection, transport, storage, treatment and disposal, and Government determines which products become special waste streams after their use, obligated entities, calculation criteria, amount and manner of calculation and collection of charges. Bylaw on products which become special waste streams after their use, on template of daily records about quantities and type of produced and imported products and annual report, obligated entities, calculation criteria, amount and manner of calculation and charges collection ("Official Gazette of RS", no 88/09) for tires and asbestos.

The Government adopted the Bylaw on amount and conditions for granting of incentive funds ("Official Gazette of RS", no. 88/09) for re-use and recovery of waste tires as raw material and for energy generation, which are paid to the operator of a facility which re-uses, recycles or treat waste tires.

The instrument of deposit refund is not sufficiently used in Serbia, and it is applied only to certain type of packaging (glass bottles, plastic crates, etc.).

The Law on Packaging and Packaging Waste regulates environmental protection conditions which must be fulfilled by certain packaging before its placement on the market, packaging and packaging waste management, as well as relevant economic instruments: charges for placement of packaging on the market (calculated on the basis of type, quantity, composition and packaging purpose, and the material it is made of), while the Government may establish a deposit refund system for disposable packaging if this is necessary in order to achieve national goals. The Law prescribes the obligation for producers or importers of certain chemicals to establish the deposit amount to be paid by consumers for individual packaging containing the subject chemical, but this deposit cannot be less than 10% or higher that 30% than the chemical price, except for certain packaging for which the Minister prescribes the deposit amount.

As for water sector, there is legal basis for introduction of water pollution charges, which are not related to wastewater standards. The presently valid market instruments include mainly user charges (for use of water, waste, natural resources) and fines for violation of legal provisions which are generally below the incentive level.

Water protection charges are paid by entities that release wastewaters into surface and ground waters or into man-made canals. The charges are based on the discharged quantity and quality of the recipient. The highest charges are paid for most polluting activities, i.e. for discharge of untreated wastewaters into the recipient of best quality. The prescribed amounts have been increased by 50% for Class I, and 25% for Class II. Polluters may be exempted from charging if they have primary of secondary treatment plants. The revenues are paid to a special account maintained by the Ministry of Agriculture, Forestry and Water Management, and they are earmarked.

Exemption from import duties is applied to the equipment which directly serves to environmental protection provided that such equipment is not manufactured within the country.

Charges for users services are currently most commonly used economic instruments. All commercial companies, as well as public utility companies for water supply and collection, transport and treatment of wastewaters pay charges for water consumption and use according to the established, i.e. allowed quantity in compliance with the Bylaw on water charges, water protection charges and charges of the material extracted from watercourses. The entities and households that receive water from public water supply network pay the price determined according to users categories or according to the consumed water quantity. The entities and households also pay for collection, transport and treatment of wastewaters. Both of these prices are paid to public utility companies. User charges are paid by households and enterprises for collection and disposal of municipal and industrial waste. The amount is not based on the quantity, but on the size and type of residential building. It is envisaged that charges cover operational service costs (with maintenance), not the costs for infrastructural modernization (treatment, distribution or collection), i.e. new investments.

Charges and fees for natural resources management are prescribed for extraction and use of water and minerals, use of land and forests, as well s for hunting and fishery. Charges of 3% are paid to public company in charge of forest management

and conservation of nature in protected areas to the value of cut tree – market value of cut tree determined on the loading point, for use of woodland when rented – amount of the effected rent, for use of forests and woodland for pasture – amount of charges for pasture. Charges for cut tree, use of woodland for rent and use of forests and woodland for pasture are paid by users, while owners pay only charges for cut tree. Market value of the cut tree in terms of this Law is price per measurement unit at which Public Company "Srbijasume" sells wood from the forest under its management at the loading point.

Law on Environmental Protection also envisages charges for use and trade in wild flora and fauna for commercial purposes. This charge is intended for protection and improvement of environment (including biodiversity and protected area management), and Bylaw on control of use and trade in wild flora and fauna has been adopted ("Official Gazette of RS", no. 31/05, 45/05, 22/07 and 38/08).

The Law on Mining ("Official Gazette of RS", no. 44/95 and 34/06) prescribed that enterprise which exploits mineral raw materials has to pay charges for use of those raw materials. The charge is payable for all components of mineral raw materials being bought or sold, and it is not payable for samples of raw materials used for technical-technological researches. The revenues collected from these charges are the revenues of Serbia in the percentage of 50% (when exploitation of mineral raw materials is done at the territory of autonomous province, the revenues are paid to the Republic in the amount of 40%, while 10% are paid to the autonomous province), while 50% of revenues belong to the municipality of exploitation.

The Law on Protection and Sustainable Use of Fish Fund introduced charges for use of fishing area in the amount of 15% of permitting costs in commercial fishing and 10% for recreational fishing (annual, daily and several-day permits). The funds are earmarked, and they are revenues paid into the state budget. Charges for use of fishing area in the autonomous province are revenues of the provincial budget.

Fines have been prescribed for violation of legal provisions in case of discharges of wastewaters containing pollutants concentrations of which exceed limit values, and in case of activities which lead to deterioration of status bringing it below prescribed ambient standards. Fines are also introduced for companies or individuals for illegal waste dumping. The collected fines are paid to either state or municipal budget.

8.4.2 Proposed measures

In order to ensure successful implementation of the Programme, it is necessary to reform economic instruments significantly (Table 8.2.), in particular:

- 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 (who should pay and their likely responses)
- Capacity building in administration implementing the economic instruments

The following should receive special attention:

- Earmarked use of revenues

- Possible impacts to economy in general and reduction of environmental pollution

Table 8.2. A list of proposed incentives which support implementation of goals

Goals of the Programme	Economic instruments reform
Water	
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 in sensitive areas[2] - To upgrade or renew operation of the existing municipal wastewater treatment plants - To extend sewerage system to cover 65% of population by 2019 - To rationalize water consumption among individual users	- Raise effluent charges to stimulate construction of WWTP - Raise charges for collection and treatment of municipal wastewater (utility services charged through PUCs) - Raise fines for discharge of untreated water and earmark the revenue - Increase the level of water prices
Waste management	
- To extend municipal waste collection to cover 80% of population by 2015	- 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 and relevant national legislation	- Landfill charges - Charges for methane
- To increase re-use and recycling of packaging waste (glass, paper, cardboard, metal and plastic) to 25% of their volume	- Deposit refund for packaging re-use and recycling based on producer/importer responsibility
- Reduced landfilling of industrial waste	- Ban on landfilling of usable industrial waste. Introduction and proper application of penalties for landfilling of this type of waste

[2] Priority is given to agglomerations with more than 100,000 eq inhabitants, except for agglomerations that discharge wastewaters directly into large watercourses (the Danube, the Sava), where WWTP will be finished after 2016 and cities in sensitive zones (proximity to water supply sources)

	- Charges for landfilling of industrial waste which cannot be re-used
Energy, industry and transport	
- To reduce emissions of SO_2, NO_x, and PM and GHGs from large combustion plants to the levels required by the national legislation - To reduce industrial emissions of SO_2, NO_x PM, VOC, PAH and other pollutants in industrial facilities which do not meet the EU standards	- Charges for emission of SO_2, NO_x, and PM into the air for non-IPPC establishments, since such charge has been prescribed for IPPC establishments
- Harmonization of national legislations with the EU Directive 2001/80/EC[3] of LCP (bearing in mind that final deadline for its implementation is 31 December 2017 according to obligations taken by Serbia by ratifying the Agreement on the Establishment of Energy Association of SEE Countries)	
- Phasing out of leaded fuel	- Differentiated charges for leaded/unleaded petrol
- Ensure that all vehicles manufactured in Serbia and imported from 2012 and on are harmonized with ELV for motor vehicles according to Directives 98/69/EC and 2001/100/EC	- Change of old vehicles for new with a premium
- Increased use of renewable energy sources and gas	- Selection and introduction of incentives in heating energy plants using renewable energy sources, achievement of real economic price for electricity and heating, introduction of incentives for use of biofuels in transport, etc. Application of Kyoto Protocol instruments
- Increase energy and raw material efficiency in industry and reduce waste generation - Increase energy efficiency in all industrial sectors of energy generation and consumption	- Energy Efficiency Fund (in accordance with the Energy Development Strategy of Serbia) and other incentives for increase of energy efficiency - Change charges for water and waste in order to achieve full cost recovery

[3] Deadline for full compliance with the EU Directive 2001/80/EC will be agreed upon during the EU accession negotiations. Transitional period is expected as it was the case with other new member states

	- Charges for disposal of fly ash and mining waste (tailing, overburden) - Subsidies for companies that invest in cleaner production
- Use 20% of fly ash from thermal power plants by 2014	- Subsidies for use of fly ash, slag, etc. in construction and construction material industry
Biodiversity, agriculture and forestry	
- Conservation, improvement and extension of forest ecosystems - Conservation, improvement and sustainable use of wild plant and animal species and fungi - Protection and conservation of strictly protected and protected wild species	- Charges for wood harvesting for timber and fuel wood - Subsidies for afforestation - Permitting and quota systems for exploitation of wild animal and plant species and fungi - Charges in the amount of 10% of market value established per kg or per piece - Compensation for damages caused by illegal actions in strictly protected and protected wild species - Compensation for damages made by strictly protected and protected wild species
- To restrict agricultural activities along watercourses that are sensitive to pollution by nitrates in accordance with Directive 91/676/EEC and in protected areas	- Subsidies to farmers for land use restrictions and income forgone (especially in protected areas and water spring zones)
- To achieve 20% reduction of land endangered by soil erosion through counter-erosion actions and introduction of effective erosion control measures	- Subsidies for afforestation

Local units in whose territory municipal and industrial waste landfills are located are entitled to get a part of revenues collected through waste disposal charges.

8.4.3 Short-term economic instruments measures (2010-2014)

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. A part of user fees

and pollution charges should be earmarked and channeled to the Environmental Protection Fund, provincial budget fund and local self-government unit's fund.

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 2012. The tax rate would range from Euro 0.03 to 0.05/litre surcharge on leaded petrol by 2012. Revenues could be spent as earmarked 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^3 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. Gradual 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 e*nvironmental 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 SO2, NOx, particulate matters, lead and heavy metals should be levied on industrial and energy non-IPPC operators, since such charge has been already prescribed for IPPC establishments by the relevant Bylaw. The basis of the charge would be for each unit of pollutant over and above those permitted in the national air quality standards. A prerequisite 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 cleaner 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). Neighborhood 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 minimization 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.

The Government has adopted the Regulation on products which become special waste streams upon their use, template for daily records on quantities and types of produced and imported products and for annual report, manners and deadlines for submission of annual report, obligated entities, amount and calculation and collection manner for tires and asbestos, which will be expanded to other waste streams.

Tax incentives for clean technology and pollution abatement are 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.

On 26 February 2009 the Government adopted the Regulation on conditions and manner of implementation of subsidized purchase of cars manufactured in Serbia through *old for new* swap.

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 for products collected from nature takes the form of a quantitative administrative charge for a permit to collect (e.g. mushrooms, snails, frogs, medicinal plants, berries, fuel wood etc). The charges should be channeled in proper manner. A part of these user charges will be earmarked for protection of nature and biodiversity and to provide compensation for farmers for limited land use in protected areas and zones particularly sensitive to nitrates and pollution from non-point sources in agriculture.

System of competitive small subsidies for associations involved in environmental education and awareness raising activities should be introduced. The subsidies should be managed by the Ministry and by the Environmental Protection Fund.

8.4.4 Medium-term economic instrument measures (2015 – 2019)

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 re-use 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 earmarked 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 labeling 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 dealers 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 modern (cleaner) vehicles by the end of 2012.

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 Current status

The environmental financing system in Serbia is decentralized and relies on earmarked funds, own revenues and 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 decentralized 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, incompletely harmonized legal system with the EU regulations, 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 appeared to be well 0.3 percent of the GDP in 2001, and the same percentage was in 2008. This is lagging behind other transitional countries where such expenditure amounted to around 2 percent of GDP.

The environmental revenues at the state level come from the tax on the collection of wild plants and species collected for commercial purposes, environmental pollution charges in the amount of 60%, environmental pollution charges in the areas of special national interest in the amount of 80%, water protection charges and funds approved by the Law on Budget of Serbia. The Law on Environmental Protection provides for establishment of the Environmental Protection Fund, sets out the sources of financing for the Fund, which became operational in 2005 in order to provide for financial means for environmental protection and development. The Law on Environmental Protection Fund regulates position, competence, organization, revenues, purpose and manner of utilization of the Funds revenues, as well as all other Fund related issues. The founder of the Fund is the Republic of Serbia.

Obligation of the establishment of a budget fund of the autonomous province, as well as local self-government unit's fund has been introduced.

In compliance with the Law, the Fund's revenues include: a part of user charges, part of environmental charges, charges for use of fishing areas, revenues collected on the basis of international bilateral and multilateral cooperation in projects, programmes and other environmental related activities and activities related to renewable energy sources, revenues collected from the Fund's free assets management, grants, donations, gifts and assistances, loan interests, charges for provision of professional services, as well as other sources compliant with law. Fund's revenues amounted to 888.7m RSD in 2006, 972.2m RSD in 2007 and 1,045.9m RSD in 2008. About 90% of current revenues are being allocated for projects implemented in the area of solid waste management.

In 2009, the Fund started to grant soft loans to private sector.

Fines for non-compliance of environmental rules are included into the general state budget and they are not earmarked funds intended for environmental expenditures.

The environmental financing at the local level originates from environmental charges in the amount of 40% for environmental pollution, 20% for pollution of areas of special state interest and revenues obtained on the basis of relevant documents of local self-government (environmental protection and development charges). Environmental financing at 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 and environmental action plans (where available). 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 earmarked funds, high interest rates on commercial loans and administrative restrictions on borrowing. Environmental funds exist in several local self-governments (Aleksandrovac, Apatin, Bor, Despotovac, Cuprija, Jagodina, Kikinda, Krusevac, Kula, Paracin, Pozarevac, Cacak, Uzice, Valjevo, Nis, Obrenovac and others), while a number of municipalities with low conceded revenues do not have environmental funds established yet. However, amendments of the Law on Environmental Protection imposed the obligation for the autonomous province and local self-government units to establish budget funds by the end of 2009 in order to provide for efficient and earmarked utilization of funds.

Environmental financing by the public utility companies (PUC) cannot meet 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 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 % (Belgrade or Cacak) to as low as 50 % in other locations. The increase of charges is approved by 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 minimize costs. The PUCs are still state owned and operated by municipalities. Privatization 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 World Bank, the European Bank for Reconstruction and Development and bilateral donors.

8.5.2 Proposed measures

The investment objectives of the Programme require substantial reform of the environmental financing system in order to generate sufficient funds for their implementation. The policy objectives of the Programme 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 modernization costs, and stimulation of competition in environmental services through privatization and concessions. Different reforms of environmental financing system will be required to address policy objectives considered as responsibility of the central government, local self-government and industry respectively.

Earmarked 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. Decentralization of the public financial system will increase environmental expenditures at local level. Restructuring and privatization 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 privatization process. Amendments of the Law on Privatization stipulate that responsibility for past pollution until the privatization day lies upon the state, not the new owner. Environmental improvement issues are an integral part of the privatization agreements. Privatization 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 environmental financing system (2010-2014)

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 earmarked funds, establishing transparent system of environmental investment, decentralization 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.

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 until it is completely phased out.

All environmental revenues should be used as earmarked funds for investment in the protection and improvement of the environment.

Funds collected under economic instruments for environmental purposes shall be channeled to the Environmental Protection Fund. The Fund should appropriate these funds as earmarked funds for investments aiming to achieve improvement of the environment.

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 several countries (Poland and Bulgaria). The Environmental Protection Fund, in cooperation with relevant ministries, should actively cooperate with the international and national financial institutions (World Bank, EBRD, etc.) to increase its financial capacity, especially for projects introducing full cost recovery for public utility environmental services.

Municipal environmental funding capacity should be strengthened by fiscal and financial decentralization, and wide application of the multiyear financial planning. The decentralization 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 multi-annual 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. Privatization will significantly increase environmental financing capacity of industry. Finally, system of soft loans for industry and the private sector should be expanded and increased by the Environmental Protection Fund.

8.5.4 Medium-term measures of environmental financing system (2015 – 2019)

The medium-term reforms will require further strengthening of the environmental revenue collection, expanding the revenue base, fiscal decentralization, privatization and further increase of tariff s 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 (1), short-term (3-5 years) service contracts (2) and long-term (15-25 years) concessionary contracts (3) 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.

Multi-annual plan for environmental policy financing with the investment plan for this area will be also adopted.

8.6 Institutional Reforms

8.6.1 Current status

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). Adoption of the second set of environmental laws in May 2009,

decentralization of competences was continued through competence shifts to provincial and local levels.

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

- Frequent institutional changes; inadequate law enforcement and supervision of law enforcement by inspection services, especially at local level;
- Lack of personnel, financial and other capacities as a basis for provision of efficient and operational environmental activities;
- 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 Ministry does not enable effective coordination (horizontal and vertical) of environmental policy, especially in the area of water protection which disables implementation of integrated environmental protection policy. In practice, there are overlapping between the Republic Water Directorate and the Ministry in terms of water quality and pollution control.

Inconsistent implementation of competences may be overcome by a functional system of cross-sectoral cooperation which would facilitate integration of environmental issues into sectoral policies, taking into account institutional overlapping as well.

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 lacks reference laboratories, while there are more and more accredited ones.

Integrated environmental information system and cadastre of polluters are being established 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 Ministry in charge of local self-government is financing the development of databases for polluters cadastre which is a good example of inter-ministerial cooperation. The main institutions providing the Ministry 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 “Dr Milan Jovanovic Batut” and individual institutes for public health in Serbia; Ministry of Agriculture, Forestry and Water Management and other relevant institutions. The Environmental Protection Agency takes a coordinating role in setting up integrated environmental information

system and it produces annual environmental performance reports and reports on the implementation of environmental policy.

The current situation in the Republic of Serbia regarding the organization 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 Emergency Plans;
- Inadequate training of staff of the competent authorities for management of accident response,
- Insufficient cooperation and harmonization between institutions and companies at all levels regarding the action plans in the event of chemical accidents;
- Insufficient number of mobile eco-toxicological units and intervention units;
- Lack of protocol on remdiation procedures in contaminated locations.

Adoption of the amended Law on Environmental Protection enabled implementation of SEVESO II Directive (major accidents control); cooperation with the Ministry of the Interior in accident response area is at very good level and adoption of the Government Statement provided for the establishment of the Sector for Emergencies; Action Plan stipulating shifting of several staff members from the Ministry has been adopted, and it has been decided to take over all the employees from the Centre for Notification of the Army of Serbia.

Serbia has very sizeable requirements for financing environmental infrastructure. It is necessary to strengthen the existing regulatory mechanisms for provision of more financial sources for the Fund. At local level, environmental funds are established only in a few local self-government units and they function with very limited funds. There is very limited structural, procedural and transparent approach to disbursement of the Fund's resources. The amended Law on Environmental Protection prescribed the obligation of establishment of environmental budget funds at local levels in accordance with the law which regulates budget system.

The budget funds are used to finance action and remediation plans in accordance with the National Environmental Protection Programme, i.e. to finance programmes and plans of the autonomous province and local self-government units.

The budget funds are used on the basis of the established programme for use of budget funds adopted by competent authority of the autonomous province, i.e. of the local self-government unit.

National financial markets and the banking system are not yet prepared for 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 self-government (Law on Environmental Protection, Law on Environmental impact Assessment, Law on Integrated Pollution Prevention and Control, Law on Protection against Noise, Law on Chemicals, Law on Waste Management, Law on Protection against Ionizing Radiation, Law on Nature Protection).

At the local level there is need for capacity building to address statutory competences (strategic impact assessment, EIA, permitting in the area of monitoring,

inspection, financing local environmental infrastructure). There are about 400 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. The municipalities suffer also from under-funding and lack of financial decentralization to cover their statutory tasks.

8.6.2 Short-term measures for institutional framework (2010-2014)

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

However, a number of these reforms, especially those related to capacity building, horizontal integration and decentralization of decision-making, will stretch beyond 2014. The starting point of the institutional reforms is the new Law on Environmental Protection (2004) that introduced significant reforms of environmental policy in Serbia and allows more effective environmental management. New set of laws (2009) denoted continuation of institutional reforms in environmental policy in Serbia. 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 cross-sectoral issues should be coordinated by the Environmental Protection Council. Apart from this Council, cross-sectoral commissions should also be established to address certain operational issues. 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, privatization 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 three key factors, i.e. three pillars of sustainable development: economy and technology, socially balanced society and environmental protection with rational use of natural resources. This would require setting up operating procedures for its functioning.

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. A competent institution will address integrated water management, in accordance with the EU experience. 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.

Key institutional priority in short-term horizon is strengthening capacities of the Ministry, including the Environmental Protection Agency, Chemicals Agency, Agency for Protection against Ionizing Radiation and Nuclear Safety and the Fund. The new organizational structures should streamline the effectiveness of the Ministry 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 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 standardized format. The staff of the monitoring institutions should be trained accordingly. The network of monitoring stations should be optimized, modernized and it should rely on automatic stations.

In order to ensure administrative capacities for quality, efficient and safe chemicals and biocide products management, the Government has established the Chemicals Agency, as an independent, development, professional and regulatory organization which performs its statutory tasks in compliance with the Law on Chemicals. The Agency will cooperate with the European Chemicals Agency and other international authorities and organizations in order to fulfill international obligations and implement conventions, as well as to exchange information. The Agency will provide legal and private entities with information and general professional guidelines in application of legal provisions which regulate chemicals. They will also provide with the same assistance those entities that plan to place certain chemicals of products on the EU market. In addition, the Agency will provide professional assistance and will train environmental and trade inspectors and municipal inspectors in terms of proper application of legal provisions regulating the area of chemicals. The Agency will adopt the Programme of public information about the chemicals affecting human health and environment, as well as about risk reduction measures.

Another pressing issue is accreditation of laboratories conducting environmental analysis. Uniform analytical procedures and quality control procedures should be introduced, reference and etaloning laboratories should be set up, and the labs should become accredited with Serbian Standard SRPS ISO/IEC 17025:2006. Intensive training of staff will be required. Accreditation should be mandatory for all laboratories supplying data to government institutions.

An efficient system for emergency response has been established in accordance with the Government Statement. It is necessary to build awareness and knowledge of

all those involved in the implementation of obligations emanating from Seveso II Directive, and continue the initiated process of the development of Guidelines in this, as well as in all other environmental areas.

Centre for Cleaner Technology was established in 2007 within the Faculty of Technology and Metallurgy in order to provide support to industry in pollution prevention. The Strategy of Introduction of Cleaner Production in Serbia (adopted by the Government on 19 February 2009) is an elaboration of strategic documents, especially the Sustainable Development Strategy and draft National Environmental Protection Programme of Serbia. The Strategy elaborates the national sustainable development concept by encouraging cleaner production.

Environmental Inspectorate should be substantially strengthened, especially at provincial and municipal levels (in towns and municipalities with insufficient number of inspectors), to improve environmental enforcement and cope with the forthcoming tasks emanating from the adopted environmental laws. Emphasis should be put on raising capacity for compliance and assessment of self-monitoring by polluters.

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 earmarked 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 and 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 measures for institutional framework (2015-2019)

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 institutionalized in the medium-term. Integrated regional waste management should be implemented in the whole territory of the Republic in accordance with the National Waste Management Strategy. River Basin Management Institutions should be set up in all relevant river basins.

The institutional reforms will require ongoing capacity building and human resources development efforts. The activities of the Ministry 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 Environmental Performance and Implementation of environmental policy 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 standardization of activities. Privatization of laboratories could be considered at this stage as increasing demand for private sector monitoring is expected. Inspectorate functioning at all levels should be based on the Council of Europe and European Parliament Recommendation for minimum criteria for environmental inspection, which implies operational planning and reporting as it is in the EU countries.

Increased revenues of the Environmental Protection Fund and other earmarked funds are expected in the medium term in line with improving effectiveness of the monitoring and enforcement systems. The establishment of municipal environmental protection funds should be continued 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 Current status

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 population was connected to sewerage system in 2002, while in 2008 that percentage was 35.03%. It is estimated that 13% of all municipal wastewater is treated. The percentage of households connected to sewage network with appropriate municipal wastewater treatment was 5.3% in 2002 and 4.8% in 2008. Only 28 cities in Serbia have wastewater treatment plants, whereat in 2006 only 5 of them were in function. The largest cities of the country, Belgrade, Novi Sad and Nis do not have a municipal WWTP. Some of the existing WWTP 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 industrial establishments. 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 in 2002 and in 2008 that percentage was 78.31%. Although the coverage of piped water supply is very high, many systems are not always properly functioning, resulting in large physical water losses and low, inadequate service levels. Average losses in pipelines of Serbia amount to 28.4%.

The percentage of the population covered by municipal waste collection system was 55% in 2006 and 60% in 2008. 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.).

Within the Ministry action called "Let's Clean Serbia" started in 2009, public attention was drawn to the waste management issue. In cooperation with local self-government, large number of wild dumpsites were removed, 12 garbage trucks were procured, as well as 880 mesh containers for plastic waste, 1,400 metal containers and 1,000 plastic post bins as a form of assistance for local self-government in establishing municipal waste management systems. The aim of the action in 2010 is to improve quality of waste management in accordance with the regulations adopted in 2009. the following will be emphasized: recycling, waste separation (primary and secondary one), new employment and conservation of natural resources. Increased coverage of settlements with waste collection system will be insisted on, stressing this obligation and responsibility for local self-governments.

There is hardly any separate collection, sorting and recycling of municipal waste in Serbia. There is one facility for waste separation functioning in Novi Sad. There are few industrial waste recycling facilities in Serbia: a waste oil recuperation plant (Belgrade), which currently operates at low capacity; old batteries recycling in the Lead Smelter in Zajaca (capacity of 10,000 t/year) and in battery production facility in Sombor (capacity of 2,000 t/year). There is a Recycling Centre in Pancevo authorized to store and process electronic and computer waste. AD Umka – Cardboard Factory uses waste paper as its basic raw material. It uses old paper within its production capacities to make it into cardboard by applying respective technological process. A special sector has been established within the factory to collect, sort and transport old paper. The paper is usually bought from physical entities and this process is organized in 5 purchase centers.

Over the past several years, sanitary landfills have been constructed in Serbia in several municipalities: Vranje, Kikinda, Lapovo and Pancevo, and several ones are being constructed: in Pirot, Uzice and Nova Varos. There are 180 officially registered sites in Serbia for disposal of municipal waste – dumpsites. In rural areas waste is disposed of in illegal dumpsites or is burnt, which leads to environmental degradation. The existing dumpsites generally do not meet requirements prescribed by the national legislation. Numerous sites are located along river courses and in zones highly sensitive to ground water pollution. The dumpsites with highest environmental and human health risks are those located less than 100m from the settlements (12 such dumpsites) or less than 50m far from the river, stream, lake or reservoir (25 such dumpsites, of which 14 are located on the river banks). A lot of illegal dumpsites were cleaned during the action "Let's Clean Serbia" in 2009 (more than 2,000 ones).

There are large quantities of fly ash (approximately 5.5 million tons of ash per year) resulting from operation of coal-fired 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 "Vinca".

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. Usually, there are no appropriate pollution abatement installations. There is a constructed gas pipeline, which according to the Programme for implementation of the Energy Development Strategy of Serbia for the period 2007-2012 is in the following status: transport system: 2,140km; distribution system: (4-16 bar) 650km; distribution system: (up to 4 bar) 3,000km.

Electric power and heat generation in Serbia is based on thermo-electric and hydro-electric power plants (the total installed capacity of thermal power plants using lignite is 3,936 MW, the capacity of hydro power plants is 2,831 MW and the installed capacity of combined heat-and-power plants based on heavy oil and natural gas is 353 MW), excluding the thermal power plants in Kosovo and Metohia (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 electrostatic precipitators, power 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, car and paper industries and energy generation leading to excessive consumption of energy and raw materials, poor optimization of processes and general maintenance.

Many large cities in Serbia do not have by-pass or ring roads. The exceptions include Novi Sad, Nis, Subotica, Pancevo and Pozarevac, which divert most through traffic away from the city centers. 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 overall number of vehicles owned by the City Transportation Company "Beograd" as of 31 December 2008 was 1,189. Out of that number, there were 846 buses, 7 years of average age. The estimated needs are about 1,400 vehicles.

8.7.2 Short-term investment needs of environmental infrastructure (2010 – 2014)

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 Programme policy objectives in
the short-term 2010 – 2014

Programme objectives	Required infrastructural improvements
Water	
- To extend sewerage systems to cover 65% of population by 2019 - To provide wastewater treatment in agglomerations with organized sewerage system that have significant impact on the receiving waters especially on sensitive areas[4] - To upgrade or renew operation of the existing municipal wastewater treatment plants	- Construction of 1,000 km of municipal sewage collectors – phase 1 - Construction of 700 km of municipal storm water collectors – phase 1 - Construction of 200 km of general sewage collectors – phase 1 - Upgrading of the existing infrastructure – especially the pumping stations
	- 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
Waste management	
- To extend municipal waste collection to cover 75% of	- Modernizing the existing infrastructure (vehicles, containers) for collection

[4] Priority is given to agglomerations with more than 100,000 eq inhabitants, except for agglomerations that discharge wastewaters directly into large watercourses (the Danube, the Sava), where WWTP will be finished after 2016 and cities in sensitive zones (proximity to water supply sources)

population by 2014	and transport of waste - Building of transfer stations to serve the regional landfills
- To establish national capacity for treatment of hazardous waste	- 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 establish regional centers for waste management according to technical and operational requirements of the Landfill Directive 99/31/EC and relevant national legislation	- Construction of regional landfills[5] and controlled closing down, remediation and recultivation of the existing dumpsites posing the greatest environmental and health risk - Construction of transfer stations and collection centers
- To increase recovery and recycling of packaging waste (glass, paper, cardboard, metal, plastic) to 25% of their volume	- Construction of regional facilities for packaging waste sorting and recycling
- To introduce composting of green waste	- Construction of a facility for composting of green and other waste collected from public areas in major cities
- To introduce treatment of construction debris and asbestos-containing waste	- Construction of regional centers for sorting and recycling of construction debris

[5] According to the National Waste Management Strategy

- To provide capacities for incineration of organic industrial and medical waste - To establish capacities for special waste streams treatment, specifically: • To establish a system for waste tires management • To establish a system for old batteries management • To establish a system for waste oils management • To establish a system for electic and electronic waste management	- Procurement of the equipment for collection and storage and vehicles for transport of separated organic industrial and medical waste - Construction of incineration plant for organic industrial and medical waste and construction of a landfill for post-treatment disposal - Procurement of the equipment for waste treatment by the means of autoclaves and micro-waves in remote places without reliable transport infrastructure - To form separate centers for collection and storage of the mentioned waste types - To improve industrial recycling capacities - To construct regional centers for old cars treatment
Energy	
- To reduce emissions of SO_2, NO_x and PM and gases from large combustion plants to the levels required by the national regulations	- Upgrading or replacement of existing boilers, increase combustion efficiency of furnaces - Upgrading/replacement of burners (low NOx) - Upgrading/replacement of existing PM control equipment - Introduction of cleaner and more efficient production technologies - Development of local capacity for utilization of biomass for heat and electricity production - Construction and revitalization (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 increase energy efficiency of the energy sector and reduce waste generation - To increase energy efficiency in all energy generation and consumption sectors - To introduce the energy management system and apply various measures of energy efficiency increase	
- To increase the use of renewable energy sources and gas	
- To reduce environmental impacts from oil industry	- To construct desulphurization plants - To construct closed water cooling systems and wastewater systems - Remediation of polluted soil in NIS a.d. Novi Sad

- 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 users to the municipal heating system or gas heating systems instead of using electricity based heating systems	- Upgrading of the existing district heating plants (upgrading combustion efficiency of furnaces; reducing losses in distribution network; improving and automatizing control systems; new pollution abatement installations, etc.)
- 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 by 150,000 customers (first phase) - Extension of the gas distribution network by 400,000 customers (first phase)
Industry	
- To reduce emissions of SO_2, NOx, PM, VOC, PAH, GHGs 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 ensure 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
- To replace dangerous chemicals used in industrial processes with safer, alternative chemicals	- Adaptation or replacement of production processes so as to enable replacement of dangerous chemicals with safer alternatives in accordance with the prescribed bans and restrictions for certain chemicals use
Mining	

- 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 water pollution caused by mining activities	- Reconstruction of pipes and collectors - Stabilization of tailing dams - Construction of drainage tunnels
Biodiversity	
- To improve measures for protection of migratory species	- Improvement of the existing infrastructure and planning of future infrastructure aimed at reduction of negative impacts to daily-nocturnal and seasonal migrations of wild species
Agriculture	
- To improve environmental management in livestock farms and food processing facilities	- Construction of manure and wastewater storage and treatment facilities in the largest farms
Transport	
- 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 - Purchase of new buses, trams and trolleybuses - Construction of gas fuel stations
- To improve conditions and competitiveness of public transport in larger cities and hence reduce emissions from mobile sources in city centers	
- To reduce petrol vapors at petrol stations, moving tanks and tankers in accordance with the Directive 94/63/EC.	- Improvement or replacement of moving tanks for transport of oil and petrol
- To reduce pollution from vessels in navigable waters - To reduce gas emissions and noise from air traffic	- Construction of the necessary infrastructure in border ports in Belgrade, Novi Sad and Smederevo (collection and storage of waste, cleaning up, prevention) - Modernization of air transport

8.7.3 Medium-term investment needs of environmental infrastructure (2015 – 2019)

Substantial extension and modernization of environmental infrastructure will take place in the medium term (2015 – 2019) 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 NPEP policy objectives in the medium-term2015 - 2019

Programme objectives	Required infrastructural improvements
Water	
- To extend sewerage systems to cover 65% of population by 2019	- Construction of 1,000 km of municipal sewage collectors – phase 2 - Construction of 700 km of municipal storm water 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 organized water supply system that have significant impact on the receiving waters and especially on sensitive areas[6] - To upgrade or renew operation of the existing municipal wastewater treatment plants	- Building of primary and secondary wastewater 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 WWTP	

[6] Priority is given to agglomerations with more than 100,000 eq inhabitants, except for agglomerations that discharge wastewaters directly into large watercourses (the Danube, the Sava), where WWTP will be finished after 2016 and cities in sensitive zones (proximity to water supply sources)

- 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
Waste management	
- To dispose PCB waste, waste from abandoned pesticides and waste pesticide containers according to solutions contained in operational plans	- Construction of regional storages for temporary storage until final disposal
- To introduce recycling of certain types of industrial waste (ionic resin, mineral wool, ash, etc.)	- Construction of regional facilities for sorting and recycling of industrial waste
Energy	
- To reduce emissions of SO_2, NO_x and PM and GHGs from large combustion plants to the levels required by the national regulations	- Continued upgrading of existing boilers (combustion efficiency of furnaces) in the remaining facilities - Upgrading/replacement of burners (low NO_x) in the remaining facilities - Introduction of continual measurements of air emissions - Upgrading/replacement of existing PM control equipment in the remaining facilities - Installation of de-NO_x equipment in the remaining facilities - Continued introduction of cleaner and more efficient production technologies - Development of local capacity for utilization of biomass for heat and electricity production - Construction and revitalization (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 increase energy and raw material efficiency of the energy sector and reduce waste generation - To apply the system of rational energy management	
- To increase use of renewable energy sources and natural gas	

- 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 - 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)
- Increase energy efficiency and reduce heat losses in heating plants and distribution network	
- 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
Industry	
- To reduce emissions of SO_2, NOx, PM, VOC, PAH, GHGs and other pollutants from the existing industrial facilities, which do not meet the EU emission standards	- Further modernization of production technologies and installation of air pollution abatement facilities - Further introduction of environmentally friendly technologies - Renovation of all existing WWTP for industry (second phase) - Further construction of new WWTP in industrial plants that have the greatest impact on receiving waters
- Increase energy and raw materials efficiency in industry and reduce waste generation	

- To ensure treatment of industrial wastewater by upgrading the existing wastewater treatment facilities and installation of treatment plants in industries discharging hazardous sewage - To replace dangerous chemicals used in industrial processes with safer, alternative chemicals - To develop a brownfield management programme	- Further adaptation or replacement of production processes so as to enable replacement of dangerous chemicals with safer alternatives in accordance with the prescribed bans and restrictions for certain chemicals use, in accordance with authorization procedures as prescribed by REACH - Remediation of soil at the operators' locations
Mining	
- 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 reduce risks of water pollution which results from mining activities	- Further reconstruction of tailing ponds, dams, collectors, etc.
Biodiversity	
- To improve measures for protection of migratory species	- Improvement of the existing infrastructure and planning of future infrastructure aimed at reduction of negative impacts to daily-nocturnal and seasonal migrations of wild species
Agriculture	
- To improve environmental management in livestock farms and processing facilities	- Further construction of manure and wastewater storage and treatment facilities in the largest farms
Transport	
- To construct bypass roads in cities most affected by environmental impacts of through traffic	- Construction of ring roads in the remaining larger agglomerations - Local road network and traffic improvements in the remaining larger agglomerations

- To improve conditions and competitiveness of public transport in larger cities and hence reduce emissions from mobile sources in city centers	- Further modernization of public transport stocks - Construction of gas fuel stations
- To reduce pollution from vessels in navigable waters - To reduce gas emissions and noise from air traffic	- Construction of the necessary infrastructure in other ports and harbors (collection and storage of waste, cleaning up, prevention) - Modernization of air transport

8.8 Education and Awareness Raising

8.8.1 Current status

The research and daily observations show that the general environmental awareness and environmental culture in Serbia are at insufficient levels. 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 poor enforcement of environmental standards, inadequate education related to this area in curricula of elementary, secondary and vocational schools, lack and inadequate availability of teaching materials, insufficient availability of informal education in this area, lack of information system and low living standard.

The activities related to environmental education and awareness raising and development of environmental culture are coordinated by the Ministry in cooperation with the Ministry of Education and other relevant institutions. There is a need for strategic approach in implementation of environmental education in accordance with the sustainable development principles, which would facilitate the initiated development and reform processes that should cover all educational institutions in Serbia.

Environmental education in reformed school and society should be based on internationally established standards: the UN Conference on Environment and Development – Rio in 1992, UNESCO Conference on Education and Public Awareness raising – Thessalonica 1997 and the "Millennium Declaration", adopted at the UN Conference on Sustainable Development in Johannesburg in 2002, "Education for All – the Road towards the Developed Society" – Dakar 2002, "Statement Made by the Environmental Minister about the Education for Sustainable Development" – Kiev, 2003, "Education Strategy for the UNECE Sustainable Development" – Villnus 2005, "The UN Decade of Education for Sustainable Development" 2005-2015. It is particularly important to mention that environmental education is recognized at the UN level as key part of education for sustainable development. Therefore, the strategic framework was defined in the "Joint statement made by environmental and

education ministers of the UNECE region about education for sustainable development", which expressed the need and readiness for more efforts to be made for its implementation (adopted at the 6th Ministerial Conference "Environment for Europe" held in Belgrade in October 2007).

At the strategic horizon, environmental education for sustainable development is recognized as inseparable part of the national policy, in addition to the Law on Educational and Upbringing Bases and Law on Environmental Protection, also in the Sustainable Development Strategy, National Programme for EU Integration of Serbia, Youth Strategy, Strategy for Education of Adults.

Formal environmental education in Serbia has not been developed to a satisfactory level to meet international standards, although over the past decade, especially in recent years, certain teaching programmes related to environment have been intensively introduced in all educational levels. There is no "ecology" or "environmental protection" as a separate subject in primary schools.

The curricula in the classes from 1st to 8th that have been reformed adopted certain approaches to environmental education and sustainable development. The so-called "environmental" programmes are integrated in curricula of several, primarily scientific, subjects. Contents and aims of environmental education and sustainable development are built-in the obligatory subject called "The world around us" (1st and 2nd grade), as well as "Nature and society" (3rd and 4th grade), as well as in civil (1st to 6th grade) and health education (1st and 2nd grade). In addition, these programmes are also part of the subject "Biology" (5th to 8th grade). Sustainable development elements are mentioned in 4th grade within the subject called "Nature and society".

From the 5th grade on, environmental education is present in the subject "Technology and informatics", as well as in "Civil education". Certain programmes about ecology and environmental protection are also present in Geography, Chemistry, Physics, Technical education, Art and Physical education.

From the school year 2003/04, new subject has been a part of education from 1st to 6th grade – "Guardians of nature".

Pointing out to the need to improve and enrich subjects related to environment and sustainable development, the Ministry sent the initiative to the Ministry of Education for cooperation in the area of environmental education reform.

Two relevant ministries reached a principal agreement on further cooperation in the mentioned matters, which should primarily lead to expansion of environmentally related subjects, their enrichment and innovations according to international environmental standards and standards related to sustainable development concept. A very important result of this initiative is the agreement to organize environmental and ecological programmes for the seventh, not for the eighth grade as it was the case within the subject of "Biology", starting from school year 2009/10. Recommendations were given for the subject "Biology" for the eighth grade, which addresses ecology and biological discipline, in terms of its expansion and enrichment with environmental elements in sustainable development context, in accordance with international standards and guidelines.

New textbooks are harmonized with teaching programmes, and training of teaching staff in the area of environmental protection has been in place since 2001. Special education programmes have been implemented since 2004 in primary and

secondary schools in the form of optional subjects or so (e.g. *I do not have a reserve planet,* the projects for Western Balkan primary schools).

There is a subject in secondary vocational school "Ecology and environmental protection", part of the 1st grade curriculum. In addition, secondary vocational schools are introducing new subjects and educational profiles particularly addressing environmental protection. For example, in addition to educational profile of eco-sanitary technician, a part of medical school, a new profile has been introduced – environmental technician in the area of chemistry, non-metals and graphic design. Environmental elements are integrated in Biology, Chemistry, Ecology and Environmental Protection, Disinfection and deratization etc. In cooperation with UNICEF, a pilot project is being implemented in Belgrade and Kragujevac secondary schools – *Education for health through life skills.*

Grammar schools have several subjects within their curricula that address environmental issues: *Biology, Chemistry, Geography and Physics,* throughout four years of education, as well as within *Philosophy, Sociology, Constitution and Civil Rights (civil education).* Within this group of general education subjects there is a subject *Biology with ecology.* Interdisciplinary environmental elements are studies through programmes: *Production technologies, Environmental protection and Side products and waste management.* The students, supported by the ministry in charge of education, apply with their projects in national and international competitions addressing protection of the planet against pollution.

Some vocational secondary schools formed experimental departments which study according to new or innovated programmes. Ecology and environmental protection are considerably studied in those schools. For example, the profile "Banking officer" contains the subject "Ecology" which includes aims pertaining to biodiversity and economic significance of conservation thereof, development of competences for simple researches of ecological processes and phenomena, understanding, formulation and analysis of solutions related to environmental challenges. Manuals for the implementation of school curricula contain recommendations for use of internet, organization of educational workshops, case studies, environmental data collection, etc.

One of the standpoints advocated by experts and related to possible reforms of educational system is a concept according to which environmental education and upbringing in the context of sustainable development should be a part of general education; hence, it is necessary that this education makes a part of all subjects and all schooling aspects.

A more advanced environmental education is present at 24 faculties of four universities established by the Republic of Serbia (Belgrade, Nis, Novi Sad and Kragujevac). These faculties have set up departments or study groups for teaching environmental issues in both graduate, post-graduate and doctorate studies. In addition, many private faculties have environmental programmes and subjects, such as Faculty of Applied Ecology of Singidunum University in Belgrade and Faculty of Environmental Protection of Educons University from Sremska Kamenica. Faculty of Pedagogy and Teaching has one-year course intended for training of teaching staff, called "Nature and society" which is composed of combined sciences: biology, chemistry and physics.

As for teaching staff development, it is necessary to stress that faculties of pedagogy do not cover sufficiently the areas of environmental protection and sustainable development. Teaching staff is obligated to attend specialized courses in various areas. Training of teaching staff is done through various programmes accredited by the Ministry of Education (started in 2003). A part of these programmes belongs to environmental protection and sustainable development.

Training of teaching staff and students about new techniques, methods and contents of different scientific disciplines is also performed in the Research Centre Petnica (RCP), an independent organization addressing the development of scientific culture, scientific literacy, education and culture. The RCP programmes include a wide range of area san disciplines within natural, social and technical sciences, including ecology, environment, and sustainable development.

The ministry in charge of education is implementing a range of activities pertaining to equipping of schools using the state budget funds and National Investment Plan funds, as well as national and international donations. As a part of the project *Development of education in Serbia* (loan granted by the World Bank 2002-2007), the Ministry in charge of education has implemented four parts of the project, of which *School grant* is a very important part. One of the aims of school projects financed from the funds intended for a part of the School Grant project is environmental protection and school as friendly environment for students (projects: *Eco Corner*, ES "Sveti Sava" Citluk; *Healthy Child*, ES "Stevan Dukic" Belgrade; *On the Nature's Palm,* ES "Sveti Sava" Subotica; *Eco School Green Oasis*, ES "Milentije Popovic" Belgrade; *From School to the World of nature",* ES "Vuk Karadzic", Backa Palanka; *Eco and Zoo Workshop*, ES "Svetozar Miletic", Zemun; *Green Corner*, ES "Heroj Radmila Siskovic" Smederevska Palanka, etc.).

Still, it may be stated that there are not sufficient number of textbooks and other teaching aids which specifically pertain to environmental protection and sustainable development, intended for teachers in they everyday work.

Within the project "Capacity Building in the Area of Environmental Protection – ESBP 2003", the Ministry has prepared manuals pertaining to environmental protection and sustainable development for teachers. The material should be graphically designed and prepared for printing.

At the beginning of 2009, a process of adaptation of multimedia education material for elementary schoolteachers was completed. The material is called "Green Package" and was prepared by the Regional Environmental Centre for Central and South-East Europe. The support to this project in Serbia was provided by two relevant ministries (education and environmental protection). The material is intended for teachers and elementary school students as additional teaching aid in the area of environmental protection and sustainable development. The project envisages the initial training of teachers for implementation of teaching practice according to this education materials.

The Ministry supports and actively participates in the implementation of the projects "Education for Sustainable Development in Western Balkan Countries". The project is funded by the Government of Finland, and is coordinated by the Regional Environmental Centre for Central and South-East Europe. The project is aimed at supporting the sustainability of schools (sustainable schools concept) and local

communities, both in terms of teaching quality and studying process, and in terms of school policy development, planning and organization in selected municipalities in the Drina region. A specially important aim of the project is improvement of inter-relations between schools and local communities through better cooperation, networking and building of strategic partnership in the area of environmental protection and improvement in the context of sustainable development. The implementation of this project involves 25 elementary schools, of which 10 are located in Serbia, 5 in Montenegro and 10 in Bosnia and Herzegovina. In addition, trainings in the area of sustainable development would be provided for teaching staff from selected schools. Also, educational materials are planned.

Informal education and other forms of awareness raising are insufficiently coordinated, unsystematized and unavailable to all population categories. The following factors affect slow development of this form of education: lack of strategic approach, insufficient access to information, limited interest from the media and still insufficient possibilities for public participation in environmental decision-making.

As a part of the action "Let's Clean Serbia", the Ministry and Centre for Free Choice and Democracy (CESID) implemented a research at the beginning of 2009, exploring wide public opinion about environmental issues. The obtained results have shown that ecological and environmental challenges are not significant in the perception of greatest problems in Serbia – only 3% of interviewees stated that this is the biggest problem. In principal, the citizens' interest for environmental issues is considerably high (38%), but this does not coincide with understanding of or with specific participation in this area. Along with the pollution reduction and increase in ECO industry capacity, one of the priorities of the action "Let's Clean Serbia" is public awareness raising about the importance of environmental protection. Bearing that in mind, the Ministry is implementing an intensive educational campaign aimed at pointing out the ecological challenges.

The Ministry has provided financial support to large number of educational programs prepared by NGOs. In 2009, the Ministry co-financed a total of 31 NGO projects within the campaign "Let's Clean Serbia" in total amount of 10,000,000 RSD. The projects are educational in nature and are focused to the development of ecological awareness and dissemination of knowledge about environmental protection. The Fund also opened the invitation in 2009 for co-financing of educational projects in the area of environmental protection proposed by NGOs in total amount of 8,000,000.00 RSD.

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', drafting of manuals for elementary and secondary school teachers.

In 2009, the Ministry provided support for publication and distribution of magazine "Environment and Sustainable Development" *NIP Decja kuca*, intended for school children and youth. Through its contents, concept, illustrations and text, this publication is a quality material which can be of great importance in studying, but also in promoting ecology and environmental protection. The scope of this publication promotes sustainable development concept, especially its component focused to environmental protection and natural resources.

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 ("Djacko doba", "Ekolarac", "Djak prvak", "Zrnce", "Zivotna sredina i odrzivi razvoj" etc.). The number and quality of articles in daily newspapers and periodicals however is generally far from satisfactory. Although there are special radio and TV programs (state TV station RTS1, Radio Beograd 2, etc.), insufficient attention is paid to these issues. Positive example is provided by information and education centers in protected areas as a useful approach to promote the issues of environmental protection (their establishment is ongoing).

Starting from the Joint statement made by environmental and educational ministers adopted at 6th Ministerial Conference "Environment for Europe", held in Belgrade on 10-12 October 2007, the Ministry has prepared in cooperation with the Ministry of Education and other relevant institutions and organizations, an internal strategic document called: First framework action plan for environmental education in function of sustainable development. This action plan provides for the basis for further reforms in environmental education in accordance with sustainable development concept. In addition, the document provides guidelines for supporting various programme activities and projects proposed by stakeholders in the process of environmental education and sustainable development in Serbia.

8.8.2 Short-Term Measures in Education and Raising of Environmental Public Awareness (2009 – 2013)

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

- Development and implementation of strategic frameworks in the area of environmental education in function of sustainable development
- Integration of environmental education into regular schools and other forms of formal education. This implies implementation of environmental education in function of sustainable development into school system, as well as in all other forms of formal education
- Support to educational and upbringing institutions in order to promote environmental protection and inclusion of sustainability into their everyday functioning (energy efficiency, saving water, etc.)
- Development and application of educational standards and awareness raising in the area of environmental protection and sustainable development harmonized with international standards
- Establishment of a network of centers for improvement of environmental education in function of sustainable development
- Support to development of teaching staff competences for inclusion of environmental education into teaching and optional activities, development and accessibility of teaching aids and working materials
- Improved professional environmental education (education of decision makers and employees)
- Support to university education development (in accordance with Prague Declaration adopted in 2003), especially in the area of interdisciplinary

educational programmes focused to understanding of scientific bases about ecology and environment in context of sustainable development
- Awareness raising about climate change, emission reduction measures and adaptation to changed climate conditions
- Better public access to environmental decision-making and environmental information
- Systematic improvement of informal environmental education through educational activities by professional institutions, organized awareness raising campaigns and environmental culture campaigns with adequate media coverage
- Development of internet presentation with database about environmental education in function of sustainable development.

8.8.3 Medium-Term Measures in Education and Raising of Environmental Awareness (2014 – 2018)

The reforms of environmental education and awareness raising in the medium term should focus on:
- Greater level of integration of environmental related subjects it the curricula of the education process, training of teachers, development of teaching methods and development of teaching aids
- Further improvement of general population education and awareness raising in accordance with international trends;
- Expansion and improvement of professional environmental education in function of sustainable development in order to prepare experts for integrated environmental management in accordance with sustainable development principles
- Intensified awareness raising actions and development of ecological culture of general population, especially in the area of waste management, water, nature protection and biodiversity, particularly protected areas management. It is therefore, very important to implement further development of information centers in protected areas
- Further education and awareness raising about climate change and other global environmental challenges.

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.

Key political priority of Serbia is acceleration of stabilization and accession process. It is very important to fulfill obligations within this process in order to be able to use pre-accession funds – IPA funds. Further support is expected from the EU in European integration process.

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 has ratified 73 international agreements in the area of environmental protection. 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 2 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 Bank for Reconstruction and Development, UNECE, the World Trade Organization, the International Monetary Fund etc. The Ministry hosted 6th Ministerial Conference "Environment for Europe", held in Belgrade in October 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 and implementation thereof. 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 neighboring countries that are pursuing the EU approximation process with the aim to harmonies 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 neighboring 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.

Serbia is very active in UNEP through international multilateral environmental agreements, and it also participates in the work of important convention secretariats. It also uses UNEP programmes for assessment and early warning systems, implementation of environmental policy, technological, industrial and economic development, as well as for regional cooperation. Serbia uses considerable funds from the Global Environmental Facility (GEF), especially in the area of climate change and protection of biodiversity, and UNEP is one of key UN agencies which participates in coordination and streamlining of those funds. Serbia chaired the Global Ministerial Forum of the United Nations Environmental Programme (UNEP), held in Nairobi, Kenya in February 2009.

9. **FINANCING OF THE NATIONAL ENVIRONMENTAL PROTECTION PROGRAMME**

9.1 Sources of Funding

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

The assessment of the NEPP expenditure over the next ten years consists of total expenditures required to implement the Action Plan (2010-2014) based on costing of individual actions, and estimation of expenditure required to implement the NPEP medium-term policy objectives and reforms (2015-2019). 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 NEPP expenditure relies mainly on the following sources of funding:

- Revenues from charges and taxes on trade in wild flora and fauna, registration into the EMAS, environmental pollution charges and pollution charges in the areas of special state interest;
- Earmarked funds from the state budget and municipal budgets gained on the basis of charges in accordance with special laws;
- International bilateral and multilateral cooperation in programmes, projects and other environmental activities and activities related to renewable energy sources;
- Revenues from free funds management;
- Contributions, donations, gifts and assistance;

- Loan interests;
- Other sources in compliance with law.

Fund's revenues are to be used in accordance with the Programme, in particular for the following: protection, conservation and improvement of air, water, soil and forests' quality, as well as for mitigation of climate change impacts and protection of ozone layer; rehabilitation of waste disposal sites, reduction of waste generation, waste recycling and re-use; introduction of cleaner technologies in industry and early adaptation to environmental needs; technologies and products which reduce environmental pressures and pollution; biodiversity and geodiversity protection and conservation; sustainable use of protected areas; sustainable rural development; utilization of renewable energy sources; cleaner transport; sustainable economic development, i.e. sustainable economic development; development of an environmental information system, monitoring and evaluation of environmental status, as well as introduction of environmental management system; education, research and development studies, programmes, projects and other activities, including pilot activities; co-financing of preventive and intervention measures in environmental emergencies, accident response, including recultivation and rehabilitation of the area polluted due to the accident, when polluter is not known or in cases in which polluter's responsibility is excluded; recultivation and rehabilitation of historic pollution (tailing ponds, industrial waste disposal sites, etc.); co-financing of programmes, projects and other activities in the area of geological research; financing of programmes related to environmental education and environmental awareness raising, as well as education and awareness raising about sustainable development.

9.2 Expenditures

The total NEPP expenditure 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 Programme. 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 NEPP 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 NEPP 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 NEPP expenditure includes a large number of projects, which have been planned and implemented irrespectively of the NEPP.

At the end of 2009, the Fund promulgated the Decision to allocate funds for co-financing of projects pertaining to rehabilitation of solid municipal waste sites, as well as to construction of transfer stations. The allocation amounted to a total of

150,000,000.00 RSD and it was planned for 10 municipalities. The Ministry of Science and Technological Development of the Republic of Serbia are currently financing 144 scientific-research projects in the area of environmental protection. Total financial support to environmental and climate change projects in all scientific areas amounted to 9.7m Euros in 2008, which equals to 9.7% of overall budget allocation for science and technological development. Renewal and Modernization Programme (Annex 2 to the Contract on Sale of NIS) implies reconstruction and modernization of the NIS technological complex, with an aim to ensure production of engine fuel compliant to Euro-5 Standards. It has been planned to invest 50m Euros into environmental projects in 2009, while additional 10m Euros are planned for environmental projects in 2010. In addition, special National Energy Efficiency Programme has been financed for a number of years now.

Environmental sector employs about 12,000 people in almost 400 enterprises which received about 120m Euros of direct foreign investments in 2007. Thus, overall figures should not be observed as exclusively related to the Programme implementation.

It has been estimated that total investments will increase from approximately 48m Euros annually in 2010 to 725m Euros in 2019 (Table 9.1). The schedule of investments shows gradual investment increase during the short-term implementation period covered by the Action Plan (2010-2014). Short-term implementation phase is focused to development of the effective environmental legal, financial, monitoring and reporting systems, which also includes many activities which are not of capital-intensive nature. Expenditures of investment nature in this period are mainly related to hot spots and existing projects in pipeline. Significant investment increase in the area of environmental protection has been planned for mid-term implementation period (2014-2019).

Table 9.1 Total annual NEPP implementation expenditures (incl. indirect costs) as per sub-sectors between 2010 and 2019 (in million Euros)

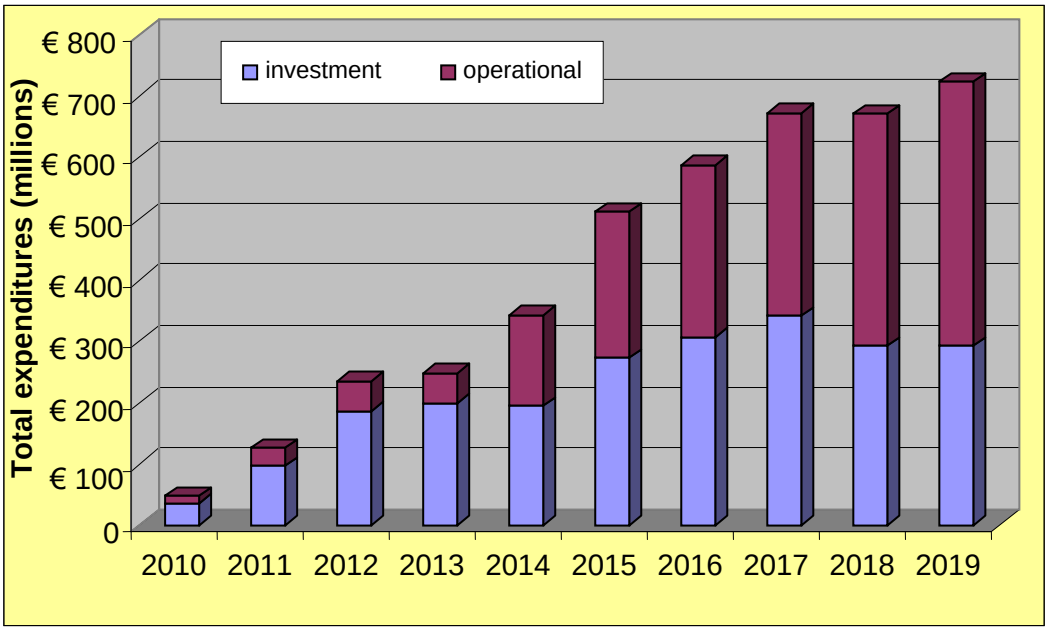
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Waste	10	36	52	70	138	128	133	139	144	150	1000
Energy	4	2	54	47	51	141	192	243	227	244	1205
Mining	2	2	0,3	10	12	3	2	2	2	2	37,3
Industry	2	18	30	20	15	18	21	25	28	31	208
Chemicals	0,5	4	6	6	8	5	5	5	5	5	49,5
Transport	0,1	1	15	12	12	68	79	94	107	127	515,1
Agriculture	1	12	14	15	15	11	12	13	15	16	124
Soil	0,1	2	2	2	2	3	3	3	3	3	23,1
Air	0,6	5	7	3	3	3	3	3	3	3	33,6
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	18,6
Radiation	0,4	1	1	1	3	18	18	18	1	1	62,4

Total	48	125,5	235,3	247,9	343,9	510	588	672	670	725	4165,6

The Programme 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 655m Euros in the period 2010-2019. Majority of the indirect expenditure relates to traffic and transport improvements (approximately 300m Euros from the mentioned investments), approximately 250m Euros will be spent on the extension of district heating, and 100m 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, landfills, recycling projects, monitoring system etc.), the operational costs will be rising gradually to exceed 50% of the total annual expenditure of the Programme in 2019 (Figure 9.2).

Figure 9.2. Estimated NEPP investment needs (investment and operational costs) for the period 2010-2019



Estimation of the total NEPP expenditure expressed as percentage of GDP depends on the economic development scenarios in Serbia. It has been estimated that the NEPP expenditure (excluding indirect environmental expenditure) will increase gradually (Figure 9.3). 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. It is expected that Serbian environmental expenditure will reach a similar range in the med-term. Consequently, provided that effective financing,

enforcement and monitoring mechanisms are introduced in Serbia, financing of the Programme should not cause major obstacles.

Table 9.3. Estimated share of the Programme implementation costs (indirect costs excluded) in GDP

	2010	2014	2019
Share of environmental investments in GDP	0.3%	1.2%	2.4%

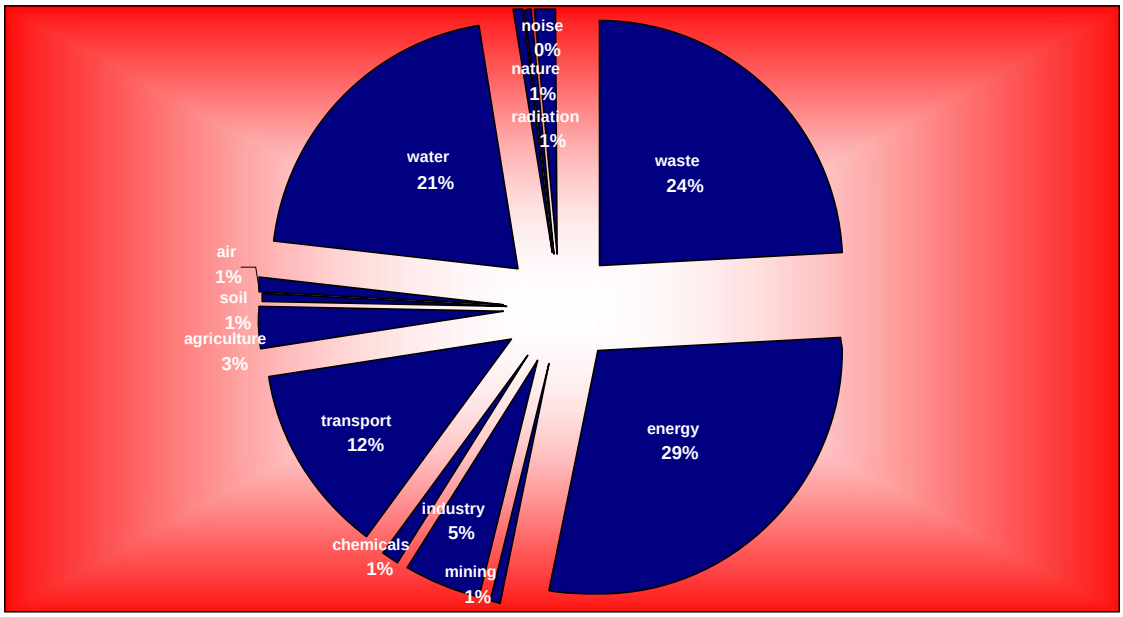
The NEPP expenditure should be considered also from a different perspective. Assessment of the costs of environmental damage in Serbia shows that environmental degradation incurs annual costs on the national economy in the range of 4.4% (conservative scenario) to 13.1% (maximum scenario) of GDP from 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 Programme 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.

Breakdown of the total estimated NEPP 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, institutional related costs and climate change). If the air expenditure in these sectors is added, the combined total air-related expenditure is estimated at about 40% of the total NPEP 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 20m Euros annually). The annual operational expenditure on operation of sanitary landfills is expected to reach 20m Euros in 2019. It is estimated that recultivation of the existing dumpsites will require at least 2.5m Euros annually after 2010. Operational expenditure on waste collection is expected to increase to 70m Euros annually during the period 2015-2019. Setting up the recycling and composting system is envisaged in the medium-term horizon (2015-2019). The respective average investment is estimated at 13.5m Euros per year, the operational cost at 15m Euros by 2019.

The total investment in the hazardous waste incinerator for medical and organic industrial waste is estimated at 40m Euros, while the investment into the physical-chemical treatment and transport of hazardous waste is foreseen at the level of 17m Euros. The operational cost of hazardous waste management system is estimated to rise gradually to reach about 14 m Euros in 2019.

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



It is estimated that the total investment expenditure of the energy sector necessary to reach compliance with the LCP Directive will exceed 800 million Euros during the forthcoming decade. Of this, at least 50m Euros has to be invested by the refineries. Operational costs are estimated to reach 100m Euros in 2019, of which about 90% for the power sector and 10% for refineries.

In order to reach target rate of 50% regarding the industrial wastewater treatment by 2019, 10m Euros will need to be invested annually after 2014. Operational costs of industrial wastewater treatment are estimated at 17.5m Euros in 2019. The average annual expenditure on introduction of the Environmental Management System to the largest industrial plants is estimated at 1.5m Euros (50,000 Euros annually per enterprise). It is also assumed that after 2014 each year 2m Euros 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 4m Euros per year, and private sector investment of 4.5m Euros/annum. Operational costs (after 2014) will be 1m Euros for the public sector and 4m Euros for industry and private sector.

The introduction of unleaded petrol is estimated to incur additional costs for consumers and industry at the level of 5m Euros annually (assuming 5% annual increase of consumption). The low sulphur diesel fuel is estimated to require additional expenditure of 15-18m 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 2019, the additional cost for new vehicles that meet the EU emission limit values is estimated at 36m

Euros in 2014 rising steadily to 87m Euros in 2019. Rigorous vehicle inspection (including monitoring of emissions) is estimated to require additional expenditure of 10m Euros in 2014 rising to 15m Euros in 2019.

Extension and improvement of urban wastewater treatment will require an increase of the treatment capacity by some 1.6m people. Total investment is estimated at 400m Euros (on average at least 35m Euros annually after 2014). Operational costs are estimated at 25m Euros in 2019. It is estimated that about 1m inhabitants will be additionally connected to the sewerage system by 2019. Assuming an average cost of 334 Euros per inhabitant, this leads to a total investment of 342m Euros, or 55m Euros annually after 2014. Additional operational costs are estimated at the level of 17m Euros in 2019. It is estimated that 10m Euros annually will be invested into improvement of drinking water quality, and 2m Euros 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 2014 the expenditure on reduction of noise emissions from traffic and industry will grow from 1m Euros in 2014 to 5m Euros in 2019. The estimated investment costs of radioactive waste storage facility will be 50m Euros to be invested after 2014. The annual operating expenditure of the storage facility is estimated at 1.25m Euros.

9.3 Financing the NEPP

The time-frame of the NEPP is too long to develop a detailed financing plan. Financing plan will be prepared for the Action Plan (2010-2014), which develops the short-term policy objectives and reforms into specific packages of measures, with clear indication of funding sources and funding categories. Unlike that, this Programme should present funding sources and funding mechanisms. The main financial burden of the Programme implementation will be shared by the polluters (industry, population), the state budget, municipal budgets, earmarked environmental funds, and foreign donors.

The following sources of funding and financing mechanisms need to be put in place to successfully implement this Programme:

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;

- Earmarked funds – Environment Protection Fund and other earmarked 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;
- Privatization of industrial facilities – clean up of past pollution and modernization of industrial technology to meet the emission limit values and reduce water and energy consumption should be safeguarded in the privatization contract.

2. State funds and funds provided by local self-government units:

- State budget funds allocated to the Ministry, part of the funds allocated to the Ministry of Agriculture, Water and Forestry and other relevant ministries;
- Municipal budgets catalyzing 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. International assistance:

- EU assistance funding through 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, Government of Norway, the Netherlands, Czech Republic and others.

It is estimated that more than 50% of expenditure linked directly to the Programme should be financed by polluters themselves (consumers and industries). Part of the expenditure will be financed from the polluters' own resources. 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 privatization 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, a large part of the expenditure on municipal environmental infrastructure should be increasingly covered by user fees (the same as the "user pays principle" stipulates that the users of these services should ultimately pay for such services).

Also, 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 Programme implementation and the uncertainties typical for transitional economy prevent presentation of a detailed financing plan for the Programme. 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 Programme. 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 2014, 20% of the additional expenditure on municipal wastewater and waste management will be covered by user charges. For the medium term (2015-2019) it is assumed that the cost coverage ratio will increase to 80%. It is estimated that the revenues of environmental charges directed to the Environment 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. Total Fund's revenues amounted to 888,700,000.00 RSD in 2006, 972,245,491.65 RSD in 2007, while in 2008 they amounted to 1,045,934,763.15 RSD

and were higher than expected ones by 48,934,763.15 RSD. Thus, about 55m Euros can be generated annually by 2019.

Law on Budget of the Republic of Serbia for 2009 ("Official Gazette of RS", no. 120/08), Fund's revenues were stipulated at 1,583,830,000.00 RSD based on the accrual in 2008 (the Fund's medium term programme enables changes in estimated revenues).

It is difficult to predict the volume of capital inflow from privatization, 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 privatization and operating surpluses of enterprises.

Based on international experience of Central and Eastern European countries, it was estimated that the value of foreign aid in short-term Programme implementation will be 10% of the total investments. The EU aid is expected to grow gradually in line with the progress of the EU approximation process.

Out of the IPA funds (first component – national capacity building), the Ministry was allocated funds for three projects of 4m Euros total value for 2007, while 5m Euros were allocated for three projects in 2008.

The report on the state aid allocated to the Republic of Serbia in 2008 does not contain data about horizontal state aid for environmental protection in 2006, 2007 and 2008.

10. IMPLEMENTATION PROGRESS MONITORING

Implementation of the Programme requires much more effort than the preparation of the document and management of the policy process. Implementation of the Programme will require many implementation arrangements. The experience of other European countries indicates that the lack of such arrangements renders national strategies impossible to implement.

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

- Development of the National Environmental Action Plan;
- Institutionalization of the Programme;
- Financing;
- Progress monitoring and reporting;
- Evaluation, revision and updates.

National Environmental Action Plan is the key implementation mechanism of the Programme. The Action Plan develops policy objectives and policy reforms of the Programme 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 Action Plan 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 Action Plan was developed in parallel with the Programme and its adoption by the government will follow the adoption of the Programme. In addition to the Action Plan, 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 institutionalization of the Programme is its adoption by the Government 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 Programme implementation;
- Establishment of the NEPP and Action Plan coordination office in the Ministry;
- Continuous proactive operation of the Forum (representatives of ministries, industry and NGOs. At least one Forum meeting per annum should be convened discussing implementation progress and identifying bottlenecks);
- Proactive involvement of other Ministries, industry and NGOs in practical implementation of the Programme;
- Communication of implementation results to the stakeholders and to the public.

Financing of the Programme is the most challenging implementation task. Environmental funding will have to increase substantially over the coming years to make the Programme 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 Programme should be rising significantly every year and the implementation progress can be measured against the committed and invested funding. The Programme is also expected to facilitate donors' involvement in the environmental sector.

Implementation of the Programme 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 Programme implementation progress include:

- Are the policy objectives implemented according to time schedule?
- Value of financing sources allocated to the Programme;
- Meeting targets of specific objectives stipulated in the Programme;
- 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. The Ministry will submit biannually the Progress evaluation reports to the National Assembly.

Experience with the Programme 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 Programme should be carried out with participation of the Forum and the working groups under the leadership of the Ministry.

ANNEX 1

LIST OF LEGAL ACTS IN THE FIELD OF ENVIRONMENTAL PROTECTION

I General acts

- *The Constitution*

1. The Constitution of the Republic of Serbia (Official Gazette of the Republic of Serbia, No. 98/06)

- *Laws*

1. The Law on Environmental Protection (Official Gazette of the Republic of Serbia, Nos. 135/04, 36/09, 36/09 and 72/09)
2. The Law on Environmental Protection Fund (Official Gazette of the Republic of Serbia, No. 72/09)

- *Regulations*

1. Regulation on types of pollution, criteria for the calculation of the environmental pollution charge and charge payers, amount and manners of calculation and payment of the charge (Official Gazette of the Republic of Serbia, No. 113/05 and 6/07)
2. Regulation on parameters and criteria for the return of, exemption from and reduction of payment of the environmental pollution charge (Official Gazette of the Republic of Serbia, No. 113/05)
3. Regulation on the determination of activities, the performance of which influences the environment (Official Gazette of the Republic of Serbia, No. 109/09)
4. Regulation on criteria for determination of the environmental protection charge, improvement of the environment and the highest amount of the charge" (Official Gazette of the Republic of Serbia, No. 111/09)
5. Regulation on the content and manner of environmental IT system management, methodology, structure, common grounds, categories and levels of data collection, as well as on the content of information used for regular and obligatory informing of the public (Official Gazette of the Republic of Serbia, No. 112/09)

- *Bylaws*

1. Bylaw on the type of equipment and content and appearance of the environmental protection inspector's mark (Official Gazette of the Republic of Serbia, Nos. 35/05, 23/06, 7/07, 64/07 and 94/08)

2. Bylaw on the form of the official identification of the environmental protection inspector (Official Gazette of the Republic of Serbia, No. 35/05)

II Nature protection

- *Laws*

1. The Law on Nature Protection (Official Gazette of the Republic of Serbia, No. 36/09)
2. The Law on National Parks (Official Gazette of the Republic of Serbia, Nos. 39/93, 44/93, 53/93, 67/93, 48/94, 101/05 and 36/09

- *Regulations*

1. Regulation on the placement under control of the use and trade of wild flora and fauna (Official Gazette of the Republic of Serbia, Nos. 31/05, 45/05, 22/07, 38/08)

- *Bylaws*

1. Bylaw on the categorization of protected natural goods (Official Gazette of the Republic of Serbia, No. 30/92)
2. Bylaw on the methods of marking of protected natural goods (Official Gazette of the Republic of Serbia, Nos. 30/92, 24/94, 17/96)
3. Bylaw on the registry of protected natural goods (Official Gazette of the Republic of Serbia, No. 30/92)
4. Bylaw on the appearance of the nature protection logo, and on the procedures and conditions for its use (Official Gazette of the Republic of Serbia, No. 84/09)
5. Bylaw on the form of the protected area ranger's official identification (Official Gazette of the Republic of Serbia, No. 84/09)
6. Bylaw on the requirements that must be met by a protected area manager (Official Gazette of the Republic of Serbia, No. 85/09)
7. Bylaw on the transboundary trade of protected species (Official Gazette of the Republic of Serbia, No. 99/09)
8. Bylaw on the proclamation of strictly protected and protected wild animal, plant and fungi species" (Official Gazette of the Republic of Serbia, No. 5/10)

III Fishery

- *Laws*

1. The Law on the protection and sustainable use of the fish fund (Official Gazette of the Republic of Serbia, No. 36/09)

- *Bylaws*

1. Bylaw on the manner of marking of fishing area boundaries (Official Gazette of the Republic of Serbia, No. 79/09)
2. Bylaw on the content of the annual commercial fishing permit (Official Gazette of the Republic of Serbia, No. 82/09)
3. Bylaw on the content of the recreational fishing permit (Official Gazette of the Republic of Serbia, No. 82/09)
4. Bylaw on the costs for issuing the annual recreational fishing permit (Official Gazette of the Republic of Serbia, No. 71/09)
5. Bylaw on the manner of determination and costs for the compensation of damages inflicted to the fish fund (Official Gazette of the Republic of Serbia, No. 84/09)
6. Bylaw on the manner, tools and means used for commercial fishing, as well as on the manner, tools, equipment and means used for recreational fishing (Official Gazette of the Republic of Serbia, No. 104/09)
7. Bylaw on the record keeping on the fish catch, as well as on the appearance and content of the unified records on the catch kept by recreational fishermen (Official Gazette of the Republic of Serbia, No. 104/09)
8. Bylaw on the form of the fishing area ranger's official identification (Official Gazette of the Republic of Serbia, No. 49/95)

- *Decrees*

1. Decree on the determination of fishing areas (Official Gazette of the Republic of Serbia, No. 115/07)
2. Decree on the proclamation of natural hatcheries in fishing areas (Official Gazette of the Republic of Serbia, Nos. 76/94 and 79/02)

- *Orders*

3. Order on the measures for the preservation and protection of the fish fund (Official Gazette of the Republic of Serbia, No. 104/09)

IV Environmental Impact Assessment

- *Laws*

1. The Law on Environmental Impact Assessment (Official Gazette of the Republic of Serbia, No. 135/04)
4. The Law on Strategic Environmental Impact Assessment (Official Gazette of the Republic of Serbia, No. 135/04)

- *Regulations*

1. Regulation on the determination of the list of projects for which an environmental impact assessment is obligatory and the list of projects for which an environmental impact assessment may be required (Official Gazette of the Republic of Serbia, No. 114/08)

- *Bylaws*

1. Bylaw on the content of the request for decision making on the need for the environmental impact assessment and the content of the request for the determination of the scope and content of the environmental impact assessment study (Official Gazette of the Republic of Serbia, No. 69/05)
1. Bylaw on the content of the environmental impact assessment study (Official Gazette of the Republic of Serbia, No. 69/05)
2. Bylaw on the content, appearance and the manner of keeping of the official book on managed procedures and decisions made regarding the environmental impact assessment (Official Gazette of the Republic of Serbia, No. 69/05)
3. Bylaw on the work of the technical commission for the evaluation of the environmental impact assessment study (Official Gazette of the Republic of Serbia, No. 69/05)
4. Bylaw on the public access, presentation and public discussion on the environmental impact assessment study (Official Gazette of the Republic of Serbia, No. 69/05)

V Integrated Pollution Prevention and Control

- *Laws*

1. Law on Integrated Environmental Pollution Prevention and Control (Official Gazette of the Republic of Serbia, No. 135/04)

- *Regulations*

1. Regulation on types of activities and facilities for which integrated permit is issued (Official Gazette of the Republic of Serbia, No. 84/05)
2. Regulation on the content of program of measures for adjusting of the existing plant or activities with the prescribed conditions (Official Gazette of the Republic of Serbia, No. 84/05)
1. Regulation on the criteria for the determination of the best available techniques for the application of environmental quality standards, as well as

on the determination of emission limit values in the integrated permit (Official Gazette of the Republic of Serbia, No. 84/05)

2. Regulation on the determination of the Program of dynamics for submitting requests for issuing of the integrated permit (Official Gazette of the Republic of Serbia, No. 108/08)

- *Bylaws*

1. Bylaw on the content and the manner of keeping of the register of issued integrated permits (Official Gazette of the Republic of Serbia, No. 69/05)
2. Bylaw on the content, appearance and manner of filling in the request for issuing of the integrated permit (Official Gazette of the Republic of Serbia, No. 30/06)
3. Regulation on the content and format of the integrated permit (Official Gazette of the Republic of Serbia, No. 30/06)

VI Chemicals

- *Laws*

1. Law on Chemicals Management (Official Gazette of the Republic of Serbia No. 36/09)
2. The Law on Prohibition of Development, Production, Storage and Use of Chemical Weapons and their Destruction (Official Gazette of the Republic of Serbia, No. 36/09)

VII Biocides

- *Laws*

1. The Law on Biocidal Products (Official Gazette of the Republic of Serbia No. 36/09)

VIII Waste management

- *Laws*

1. The Law on Waste Management (Official Gazette of the Republic of Serbia No. 36/09)

- *Regulations*

1. Regulation on the determination of specific kinds of hazardous waste, which may be imported as secondary raw material (Official Gazette of the Republic of Serbia No. 60/09)

2. Regulation on lists of waste for transboundary movement, content and format of documents related to the transboundary movement of waste, together with instructions for their filling in (Official Gazette of the Republic of Serbia No. 60/09)
3. Regulation on products that become special waste streams after their use; the daily record keeping form on the quantity and type of produced and imported products and annual report; manner and deadlines for submitting of the annual report, payers of charges, criteria for the calculation, amount and manner of calculation and payment of the charge (Official Gazette of the Republic of Serbia No. 89/09)

- *Bylaws*

1. Bylaw on the criteria for determining the location and disposition of waste materials deposit sites (Official Gazette of the Republic of Serbia No. 54/92)
2. Bylaw on the content of the documentation attached to the request for issuing of the waste import, export and transportation permit (Official Gazette of the Republic of Serbia No. 60/09)
3. Bylaw on the Document on movement of hazardous waste and instruction for its filling in (Official Gazette of the Republic of Serbia No. 72/09)
4. Bylaw on the Document on movement of waste and instruction for its filling in (Official Gazette of the Republic of Serbia No. 72/09)
5. Bylaw on the Request for issuing of the waste storage, treatment and disposal permit (Official Gazette of the Republic of Serbia No. 72/09)
6. Bylaw on the content and format of the waste storage, treatment and disposal permit (Official Gazette of the Republic of Serbia No. 96/09)
7. Bylaw on the manner and procedure for waste rubber management (Official Gazette of the Republic of Serbia No. 104/09)

IX Packaging and packaging waste

- *Laws*

1. The Law on packaging and packaging waste (Official Gazette of the Republic of Serbia No. 36/09)

- *Regulations*

1. Regulation on determining the packaging waste reduction plan for the period from 2010 to 2014 (Official Gazette of the Republic of Serbia No. 88/09)

- *Bylaws*

1. Bylaw on conditions and the manner of sorting, packaging and storing of secondary substances (Official Gazette of the Republic of Serbia Nos. 55/01 and 72/09)
2. Bylaw on the annual quantity of packaging waste by types for which it is obligatory to provide the space for taking over, collecting, sorting and temporary storage (Official Gazette of the Republic of Serbia No. 70/09)
3. Bylaw on the criteria for determining what products can be classified as packaging, with examples for the application of the criteria and a list of national standards related to the basic requirements that packaging must meet (Official Gazette of the Republic of Serbia No. 70/09)
4. Bylaw on the type of packaging with a long service life (Official Gazette of the Republic of Serbia No. 70/09)
5. Bylaw on the type and annual quantity of packaging used for packed goods placed on the market, for which the manufacturer, importer packer/bottler and deliverer are not required to provide packaging waste management (Official Gazette of the Republic of Serbia No. 70/09)
6. Bylaw on the manner of numbering, abbreviations and symbols, which are used as a basis for the identification system and system of marking of packaging materials (Official Gazette of the Republic of Serbia No. 70/09)
7. Bylaw on the limit values of the total level of lead, cadmium, mercury and six-valent chrome in packaging and its components, exceptions to the application and timeframe for the application of limit values (Official Gazette of the Republic of Serbia No. 70/09)
8. Bylaw on the content and manner of keeping of the Registry of issued packaging waste management permits (Official Gazette of the Republic of Serbia No. 76/09)

X Hazardous substances

- *Laws*

1. The Law on Explosive Substances, Inflammable Liquids and Gases ("Official Gazette of the SRS", Nos. 44/77, 45/85, 18/89 and Official Gazette of the Republic of Serbia Nos. 53/93, 67/93, 48/94 and 101/05)
2. The Law on Transport of Hazardous Substances („Official Gazette of the SFRY", Nos. 27/90, 45/90, „Official Gazette of the SRS", Nos. 24/94, 28/96, 21/99, 44/99, 68/02, „Official Gazette of the Republic of Serbia", No. 36/09)
3. The Law on Trade with Explosive Substances („Official Gazette of the SFRY", Nos. 30/85, 6/89, 53/91, „Official Gazette of the SRS", Nos. 24/94, 28/96, 68/02, „Official Gazette of the Republic of Serbia", No. 101/05)

- *Regulations*

1. Regulation on road and railroad transport of hazardous substances (Official Gazette of the Republic of Serbia No. 53/02)

- *Bylaws*

1. Bylaw on the manner of handling waste with hazardous properties (Official Gazette of the Republic of Serbia No. 12/95)
2. Bylaw on the construction of LPG facilities and the storage and decanting of LPG (Official Gazette of the SFRY, Nos. 24/71 and 26/71)
3. Bylaw on the construction of facilities for inflammable liquids and the storage and decanting of inflammable liquids (Official Gazette of the SFRY, Nos. 20/71 and 23/71)
4. Bylaw o the construction of fuel supply stations for motor vehicles and the storage and decanting of fuel (Official gazette of the SFRY, Nos. 27/71 and 29/71)
5. Bylaw on the storage and keeping of light distillate oil (Official gazette of the SFRY, No. 45/67)
6. Bylaw on allowed concentrations of hazardous and harmful substances in soil and water for irrigation and on methods for their testing (Official Gazette of the Republic of Serbia No. 23/94)

XI Air protection

- *Laws*

1. The Law on Air Protection (Official Gazette of the Republic of Serbia No. 36/09)

- *Regulations*

1. Regulation on the establishment of the air quality control program in 2004 and 2005 (Official Gazette of the Republic of Serbia No. 48/04)
2. Regulation on the establishment of the air quality control program in 2006 and 2007 (Official Gazette of the Republic of Serbia No. 23/06)

- *Bylaws*

1. Bylaw on detailed requirements that must be met by professional organizations that perform emissions and imission measurement (Official Gazette of the Republic of Serbia No. 5/02)
2. Bylaw on emission limit values, manner and timeframe for measurement and data recording (Official Gazette of the Republic of Serbia Nos. 30/97 and 35/97)
3. Bylaw on limit values, imission measuring methods, criteria for the establishment of measuring sites and data recording (Official Gazette of the Republic of Serbia Nos. 54/92, 30/99 and 19/06)

XII Protection from noise

- *Laws*

1. The Law on Environmental Noise Protection (Official Gazette of the Republic of Serbia No. 36/09)

- *Bylaws*

1. Bylaw on the allowed level of noise in the environment (Official Gazette of the Republic of Serbia No. 54/92)

XIII Protection from accidents

- *Laws*

2. The Law on emergency management (Official Gazette of the Republic of Serbia No. 111/09)
1. The Law on Fire Protection (Official Gazette of the Republic of Serbia No. 111/09)

- *Regulations*

1. Regulation on bases, parameters and conditions for the classification of organizations and state bodies into appropriate fire risk categories (Official Gazette of the SRS Nos. 58/89 and 4/90)

- *Bylaws*

1. Bylaw on the methodology for chemical accident risk assessment and environmental pollution risk assessment, preparatory measures and measures of remediation of consequences (Official Gazette of the Republic of Serbia No. 60/94)
2. Bylaw on protection measures from natural and other big disasters that must be contained in the technical documentation for the construction of investment buildings (Official Gazette of the SRS No. 34/78)

- *Guidelines*

1. Guideline for foundation of working units for the protection from natural and other big disasters during peace (Official Gazette of the SRS No. 34/78)

XIV Protection from ionizing radiation and nuclear safety

- *Laws*

1. The Law on Protection from Ionizing Radiation and Nuclear Safety (Official Gazette of the Republic of Serbia No. 36/09)
2. The Law on Prohibition to Build Nuclear Power Plants in the SRY (Official Gazette of the Republic of Serbia No. 12/95)

- *Bylaws*

1. Bylaw on the manner of application of ionizing radiation sources in medicine (Official Gazette of the SRS Nos. 32/98 and 33/98)
2. Regulation on conditions which must be fulfilled by legal entities for performing of systematic examination of the radio-nuclide content in the environment (Official Gazette of the SRY Nos. 32/98, 67/02 and 70/02)
3. Bylaw on conditions for trade and use of radioactive materials, X-ray devices and other devices producing ionizing radiation (Official Gazette of the SRY Nos. 32/98 and 32/98)
4. Bylaw on limit values for exposure to ionizing radiation (Official Gazette of the SRY No. 32/98)
5. Bylaw on conditions which must be fulfilled by legal entities for performing of decontamination (Official Gazette of the SRY No. 9/99)
6. Bylaw on the maximum levels of radioactive contamination of the environment and the manner of performing of decontamination (Official Gazette of the SRY No. 9/99)
7. Bylaw on the manner and conditions for collecting, safekeeping, recording, storing, processing and disposing of radioactive waste material (Official Gazette of the SRY No. 9/99)

- *Decisions*

1. Decision on the foundation of the Public Company for the administration of nuclear facilities in the Republic of Serbia (Official Gazette of the Republic of Serbia, No. 50/09)
2. Decision on the foundation of the Serbian Agency for protection from ionizing radiation and nuclear safety (Official Gazette of the Republic of Serbia, No. 76/09)
3. Decision on qualifications and health requirements for persons working with sources of ionizing radiation (Official Gazette of the SRY, No. 45/97)
4. Decision on records and sources of ionizing radiation and on the irradiation of population, patients and personnel exposed to ionizing radiation at work (Official Gazette of the SRY, No. 45/97)
5. Decision on the systematic examination of radionuclide content in the environment (Official Gazette of the SRY, No. 45/97)

6. Decision on conditions which must be fulfilled by legal entities for measuring the degree of exposure to ionizing radiation of personnel working with sources of radiation, patients and population (Official Gazette of the SRY, No. 45/97)
7. Decision on requirements for the location, building, trial work, putting into operation, use and permanent closing of nuclear facilities (Official Gazette of the SRY, No. 42/97)
8. Decision on drafting and content of the report on nuclear safety and other documentation necessary for the determination of fulfillment of nuclear safety measures (Official Gazette of the SRY, No. 42/97)
9. Decision on conditions for trade and use of nuclear materials and manner of keeping records on nuclear materials according to the material balance zones (Official Gazette of the SRY, No. 42/97)
10. Decision on the manner and conditions of systematic examination of radionuclide presence in the environment and in the vicinity of nuclear facilities (Official Gazette of the SRY, No. 42/97)
11. Decision on criteria for assessing safety of a nuclear facility (Official Gazette of the SRY, No. 2/98)
12. Decision on conditions that must be fulfilled by persons who perform work and duties related to production process management in a nuclear facility and work and duties related to monitoring of such processes (Official Gazette of the SRY, No. 2/98)

XV Protection from non-ionizing radiations

- *Laws*

1. The Law on Protection from Non-ionizing Radiations (Official Gazette of the Republic of Serbia, No. 39/09)

- *Bylaws*

1. Bylaw on sources of non-ionizing radiations of special interest, types of sources, manner and period of their examination (Official Gazette of the Republic of Serbia, No. 104/09)
2. Bylaw on maximum allowed exposure to non-ionizing radiations (Official Gazette of the Republic of Serbia, No. 104/09)
3. Bylaw on the content of records on sources of non-ionizing radiations of special interest (Official Gazette of the Republic of Serbia, No. 104/09)
4. Bylaw on the content and format of the report on systematic examination of the level of non-ionizing radiations in the environment (Official Gazette of the Republic of Serbia, No. 104/09)
5. Bylaw on conditions which must be fulfilled by legal entities performing systematic examination of the level of non-ionizing radiations, as well as on the manner and methods of the systematic examination in the environment (Official Gazette of the Republic of Serbia, No. 104/09)

6. Bylaw on conditions that must be fulfilled by legal entities performing examination of the level of radiation of sources of non-ionizing radiation of special interest in the environment (Official Gazette of the Republic of Serbia, No. 104/09)

XVI Water protection

- *Laws*

1. The Law on Waters (Official Gazette of the Republic of Serbia, Nos. 46/91, 53/93, 67/93, 48/94, 54/96 and 101/05)
2. The Law on Water Regimes (Official Gazette of the SRY, No. 59/98, Official gazette of the Republic of Serbia, No. 101/05)

- *Regulations*

1. Regulation on the categorization of watercourses (Official Gazette of the SRS, No. 5/68)
2. Regulation on the classification of waters (Official Gazette of the SRS, No. 5/68)
3. Regulation on the classification of waters in inter-republic watercourses, transboundary waters and the coastal Yugoslav sea waters (Official Gazette of the SFRY, No. 6/78)
4. Regulation on the determination of water-management basis of the Republic of Serbia (Official Gazette of the Republic of Serbia, No. 11/02)
5. Annual Regulations on the determination of the construction, reconstruction and maintenance program of water management facilities
6. Annual Regulations on the water use charge, water protection charge and charge for the material excavated from water bodies

- *Bylaws*

1. Bylaw on the methods and the minimum number of wastewater quality tests (Official Gazette of the SRS, Nos. 47/83 and 13/84)
2. Bylaw on hazardous substances in waters (Official Gazette of the SRS, No. 31/82)
3. Bylaw on requirements that must be fulfilled by companies and other legal entities performing certain types of surface and ground water quality tests, as well as wastewater quality tests (Official Gazette of the Republic of Serbia, Nos. 41/94 and 47/94)
4. Bylaw on hygienic quality of drinking water (Official Gazette of the SRY, Nos. 42/98 and 44/99)

5. Bylaw on the manner of determination and maintenance of the sanitary zone of water supply sources (Official Gazette of the Republic of Serbia, No. 92/08)
6. Bylaw on hazardous substances that are prohibited from being discharged in waters (Official Gazette of the SFRY, Nos. 3/66 and 7/66)

XVII Protection of agricultural land

- *Laws*

1. The Law on Agricultural Land (Official Gazette of the Republic of Serbia, Nos. 62/06, 65/08, 41/09)
2. The Law on agriculture and rural development (Official Gazette of the Republic of Serbia, No. 41/09)
3. The Law on Plant Health (Official Gazette of the Republic of Serbia, No. 41/09)
4. The Law on Plant Protection (Official gazette of the SRY, Nos. 24/98, 26/98, 101/05 and 41/09)
5. The Law on Plant Protection Products (Official Gazette of the Republic of Serbia, No. 41/09)
6. The Law on Organic Production and Organic Products (Official Gazette of the Republic of Serbia, No. 62/06)

- *Bylaws*

1. Bylaw on maximum quantities of harmful substances and ingredients in fodder (Official gazette of the SFRY, Nos. 2/90 and 27/90)
2. Regulation on the method of extermination of plants for which measures of extermination are ordered (Official Gazette of the SRY, No. 67/01)
3. Regulation on types of packaging for pesticides and fertilizers and the destruction of pesticides and fertilizers (Official Gazette of the SRY, Nos. 35/99 and 63/01)
4. Bylaw on requirements for facilities used for storage of products for plant nutrition and premises for sale and storage of plant nutrition products (Official Gazette of the Republic of Serbia, No. 78/09)
5. Bylaw on trade, import and sampling of pesticides (Official Gazette of the SRY, No. 59/01 and Official Gazette of the RS, No. 104/05)
6. Bylaw on methods of organic plant production and collection of wild plant and animal species from natural habitats by method of organic production (Official Gazette of the RS, No. 47/09)
7. Bylaw on methods of organic livestock production (Official Gazette of the SRY, No. 51/02)
8. Bylaw on requirements that must be fulfilled by legal entities issuing a certificate, i.e. re-certification for organic products and the issuing procedure (Official Gazette of the RS, No. 81/06)

9. Bylaw on allowed concentrations of hazardous and harmful substances in soil and water for irrigation and on methods for their testing (Official Gazette of the RS, No. 23/94)

XVII Genetically modified organisms

- *Laws*

1. The Law on Genetically Modified Organisms (Official Gazette of the SRY, No. 41/09)

- *Bylaws*

1. Bylaw on the restricted use of genetically modified organisms (Official Gazette of the SRY, No.62/02)
2. Bylaw on the content and data of register of genetically modified organisms and products from genetically modified organisms (Official Gazette of the SRY, No.66/02)
3. Bylaw on placing on the market of genetically modified organisms and products from genetically modified organisms (Official Gazette of the SRY, No.62/02)
1. Bylaw on introducing into production of genetically modified organisms and products from genetically modified organisms(Official Gazette of the SRY, No.62/02)

XVIII Other related acts

- *Laws*

1. The Law on Energy (Official Gazette of the Republic of Serbia, No.84/04)
2. The Law on Land Use and Construction (Official Gazette of the Republic of Serbia, No.72/09)
1. The Law on General Product Safety (Official Gazette of the Republic of Serbia, No.41/09)
1. The Law on Hunting (Official Gazette of the Republic of Serbia, Nos. 39/93, 60/93 and 101/05)
2. The Law on Hydro meteorological Activities of National Interest (Official Gazette of the SFRY, Nos.18/88 and 63/90)
3. The Law on Forests (Official Gazette of the Republic of Serbia, Nos. 46/91, 83/92, 54/93, 67/93, 48/94, 54/96 and 101/05)
4. The Law on Geological Explorations (Official Gazette of the Republic of Serbia, Nos.44/95 and 101/05)
5. The Law on Mining (Official Gazette of the Republic of Serbia, Nos. 44/95, 85/05, 101/05, 34/06 and 104/09)

6. The Law on Spatial Plan of the Republic of Serbia (Official Gazette of the Republic of Serbia, No.13/96)
7. The Law on Tourism (Official Gazette of the Republic of Serbia, No. 36/09)
8. The Law on Business Companies (Official Gazette of the Republic of Serbia, No.125/04)
9. The Law on Standardization (Official Gazette of the Republic of Serbia, No.36/09)
10. The Law on Communal Police (Official Gazette of the Republic of Serbia, No.51/09)
11. The Law on Health and Safety at Work (Official Gazette of the Republic of Serbia, No.101/05)
12. The Law on Health Protection (Official Gazette of the Republic of Serbia, Nos.107/05 and 72/09)
13. The Law on Protection of the Population from Infectious Diseases (Official Gazette of the Republic of Serbia, No.125/04)
14. The Budget System Law (Official Gazette of the Republic of Serbia, No.54/09)

- *Bylaws*

1. Bylaw on the establishment of networks and working programs for meteorological stations of national interest (Official Gazette of the SFRY, Nos.50/90 and 54/90)

XX Jurisdictions of state authorities related to the environment and the administrative proceedings

- *Laws*

1. The Law on Ministries (Official Gazette of the Republic of Serbia, No.65/08 and 36/09)
2. The Law on the Establishment of Jurisdiction of AP Vojvodina" (Official Gazette of the Republic of Serbia, No.99/09)
3. The Law on Local Self-government (Official Gazette of the Republic of Serbia, No.129/07)
4. The Law on Regional Development (Official Gazette of the Republic of Serbia, No.51/09)
5. The Law on Communal Activities (Official Gazette of the Republic of Serbia, Nos.16/97 and 42/98)
6. The Law on State Administration (Official Gazette of the Republic of Serbia, Nos.79/05 and 101/07)
7. The Law on State Servants (Official Gazette of the Republic of Serbia, Nos. 79/05, 81/05, 83/05, 64/07, 67/07, 116/08 and 104/09)
8. The Law on General Administrative Procedure (Official Gazette of the Republic of Serbia, Nos.33/97 and 31/01)

9. The Law on Administrative Disputes (Official Gazette of the Republic of Serbia, No.111/09)

- *Decisions*

1. Decision on the establishment of the Organization for Protection of Natural Goods (Official Gazette of the Republic of Serbia, No.88/92)

ANNEX 2

LIST OF INTERNATIONAL AGREEMENTS IN THE FIELD OF ENVIRONMENTAL PROTECTION

I. International agreements which directly regulate environmental protection

1. The Law on ratification of the Convention for the Protection of the Mediterranean Sea against Pollution (Official Gazette of the SFRY – International Treaties, No. 12/77)
2. The Law on ratification of the Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Air-crafts (Official Gazette of the SFRY – International Treaties, No. 12/77)
3. The Law on ratification of the Protocol Concerning Co-operation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency (Official Gazette of the SFRY – International Treaties, No. 12/77)
4. The Law on ratification of the International Convention for Prevention of Pollution of the Sea by Oil (Official Gazette of the SFRY – International Treaties, No. 12/77)
5. The Law on ratification of the Geneva Maritime Conventions from 29 April 1958, ratifying the Convention for Epi-continental Zone (Official Gazette of the SFRY – International Treaties, No. 4/65)
6. Regulation on Ratification of the International Convention Relating to Intervention on the High Seas in Case of Oil Pollution Casualties (Official Gazette of the SFRY – International Treaties, No. 2/77)
7. Regulation on ratification of the Convention for Prevention of Pollution of Seas with Waste (Official Gazette of the SFRY – International Treaties, No. 13/77)
8. Regulation on Ratification of Yugoslav – Italian Lawsuit on Co-operation for Protection of Adriatic Sea and Surrounding Cost Areas from Pollution (Official Gazette of the SFRY – International Treaties, No. 2/77)
9. Regulation 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 (Official Gazette of the SFRY – International Treaties, No. 8/58)
10. The Law on ratification of Geneva Maritime Conventions from April 29, 1958, ratifying Convention of High Seas (Official Gazette of the SFRY – International Treaties, No. 4/65)
11. The Law on ratification of International Convention for the Protection of Birds (Official Gazette of the SFRY – International Treaties, No. 6/73)

12. Regulation on ratification of Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Official Gazette of the SFRY – International Treaties, No. 9/77)
13. The Law on ratification of Convention Concerning the Protection of the World Cultural and Natural Heritage (Official Gazette of the SFRY – International Treaties, No. 8/74)
14. The Law on ratification of Convention Concerning the Protection of the Cultural Heritage in Case of Wars (Official Gazette of the FPRY – International Treaties, No. 4/56)
15. The Law on ratification of Convention on Measures for Prohibition and Prevention of Illegal Import, Export and Trade of Cultural Goods (Official Gazette of the SFRY – International Treaties, No. 50/73)
16. The Law on ratification of the Vienna Convention on Civil Responsibility for Nuclear damages (Official Gazette of the SFRY – International Treaties, No. 5/77)
17. Regulation on ratification of the Convention for the Establishment of the European Plant Protection Organization (Official Gazette of the FPRY – International Treaties, No. 12/57)
18. Regulation on ratification of the International Plant Protection Convention (Official Gazette of the FPRY – International Treaties, No. 7/55)
19. Decision on ratification of the Protocol on Interventions on High Seas in case of Pollution by Materials Other than Oil (Official Gazette of the SFRY – International Treaties, No. 12/81)
20. The Law on ratification of the Protocol on Protection of the Mediterranean Sea against Pollution Caused By Land-Based Sources, with Annexes I, II and III (Official Gazette of the SFRY – International Treaties, No. 1/90)
21. The Law on ratification of the Protocol on Specially Protected Areas of the Mediterranean Sea (Official Gazette of the SFRY – International Treaties, No. 9/85)
22. The Law on ratification of the Law of the Sea Convention (Official Gazette of the SFRY – International Treaties, No. 1/86)
23. Regulation on ratification of the International Convention for the Prevention of Pollution from Ships (Official Gazette of the SFRY – International Treaties, No. 2/85)
24. The Law on ratification of the Treaty on the Protection of the Tizsa River and its Tributaries Against Pollution (Official Gazette of the SFRY – International Treaties, No. 1/90)
25. The Law on ratification of the Convention on Long Range Transboundary Air Pollution (Official Gazette of the SFRY – International Treaties, No. 11/86)
26. The Law on ratification of the Protocol to the 1979 Convention on Long-range Transboundary Air Pollution on the Financing of the Cooperative Program for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (Official Gazette of the SFRY – International Treaties, No. 2/87)
27. The Law on ratification of the Vienna Convention for the Protection of the Ozone Layer (Official Gazette of the SFRY – International Treaties, No. 1/90)

28. The Law on ratification of the Montreal Protocol on Substances Depleting the Ozone Layer (Official Gazette of the SFRY – International Treaties, No. 16/90)
29. Amendments to the Montreal Protocol on Substances Depleting Ozone Layer (Official Gazette of Serbia and Montenegro – International Treaties, No. 24/04)
30. The Law on ratification of the Convention on Early Warning in Case of Nuclear Accidents (Official Gazette of the SFRY – International Treaties, No. 15/89)
31. The Law on ratification of the Convention on Physical Protection of Nuclear Material (Official Gazette of the SFRY – International Treaties, No. 9/85)
32. Treaty on ratification of the Convention on Prohibition of Improvement, Production, and Stockpiling of Bacteriological (Biological and Toxic) Weapons and their Destruction (Official Gazette of the SFRY – International Treaties, No. 43/74)
33. The Law on Confirming of the Treaty between the Federal Government of FR Yugoslavia and Government of Russian Federation in the Field of Environmental Improvement and Protection (Official Gazette of the SRY – International Treaties, No. 6/96)
34. The Law on Confirming of the UN Convention of Climate Change (Official Gazette of the SRY – International Treaties, No. 2/97)
35. The Law on Confirming of the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Official Gazette of the SRY – International Treaties, No. 2/99)
36. The Law on Confirming of the Convention on Biological Diversity (Official Gazette of the SRY – International Treaties, No. 11/01)
37. The Law on ratification of the Cartagena Protocol on Biosafety to the Convention on Biological Diversity, with annexes (Official Gazette of Serbia and Montenegro – International Treaties, No. 16/05)
38. The Law on Confirmation of the Convention on International Trade of Endangered Wild Fauna and Flora Species (Official Gazette of the SRY – International Treaties, No. 11/01)
39. Convention on Cooperation for the Protection and Sustainable Use of the Danube River (Official Gazette of the SRY – International Treaties, No. 2/03)
40. The Law on ratification of the Framework Agreement on the Sava River Basin (Official Gazette of Serbia and Montenegro – International Treaties, No. 12/04)
41. The Law on Confirmation of the United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Especially in Africa (Official Gazette of the Republic of Serbia – International Treaties, No. 102/07)
42. The Law on ratification of the Convention on the Conservation of Migratory Wild Animals, Bonn 1979 (Official Gazette of the Republic of Serbia – International Treaties, No. 102/07)
43. The Law on Confirmation of the Convention on the Conservation of European Wildlife and Their Natural Habitats, Bern 1979 (Official Gazette of the Republic of Serbia – International Treaties, No. 102/07)

44. The Law on Confirmation of the Kyoto Protocol to the UN Framework Convention on Climate Change (Official Gazette of the Republic of Serbia – International Treaties, No. 88/07)
45. The Law on Confirmation of the Convention on the Protection and Sustainable Development of the Carpathians (Official Gazette of the Republic of Serbia – International Treaties, No. 102/07)
46. The Law on ratification of the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Official Gazette of the Republic of Serbia – International Treaties, No. 38/09)
47. The Law on Confirmation of the Convention on the Transboundary Effects of Industrial Accidents (Official Gazette of the Republic of Serbia – International Treaties, No. 42/09)
48. The Law on Ratification of the Stockholm Convention on Persistent Organic Pollutants (Official Gazette of the Republic of Serbia – International Treaties, No. 42/09)
49. The Law on Confirmation of the Agreement on Financing (the "Regional Development of Bor" Project) between the Republic of Serbia and the International Development Association (Official Gazette of the Republic of Serbia – International Treaties, No. 83/08)
50. The Law on Confirmation of the Agreement on Financing (additional financing of the energy efficiency project for Serbia) between the Republic of Serbia and the International Development Association (Official Gazette of the Republic of Serbia – International Treaties, No. 83/08)
51. The Law on Confirmation of the Rotterdam Convention on the Prior Informed Consent for Certain Hazardous chemicals and Pesticides in International Trade (Official Gazette of the Republic of Serbia – International Treaties, No. 38/09)
52. The Law on Confirmation of the Convention on Environmental Impact Assessment in a Transboundary Context. Espoo, 1991 (Official Gazette of the Republic of Serbia – International Treaties, No. 102/07)
53. The Law on Confirmation of the Amendment to Annex B of the Kyoto Protocol to the UN Framework Convention on Climate Change (Official Gazette of the Republic of Serbia – International Treaties, No. 38/09)
54. The Law on Confirmation of the Statute of the International Renewable Energy Agency (IRENA) (Official Gazette of the Republic of Serbia – International Treaties, No. 105/09)

II. International Agreements which indirectly regulate environmental protection

1. The Law on ratification of the Geneva Maritime Conventions from April 29, 1958, ratifying the Convention of Territorial Seas and Outside Sea Zone (Official Gazette of the SFRY – International Treaties, No. 4/65)
2. Regulation on ratification of the Treaty on Financial Contribution to the North-Atlantic Department for Protection from Ice (Official Gazette of the FPRY – International Treaties, No. 3/59)

3. Decree on ratification of the Treaty for Establishment of the General Council for Fisheries of the Mediterranean Sea (Official Gazette of the Presidency of the National Assembly – International Treaties, No. 25/51)
4. Decree on ratification of the Convention on Fishing and Preservation of Biological Goods of High Seas (Official Gazette of the SFRY – International Treaties, No. 4/65)
5. Regulation on ratification of the International Convention for Protection of Human Life at Sea (Official Gazette of the SFRY – International Treaties, No. 5/65)
6. Regulation on ratification of the International Convention on Civil Responsibility for Damages caused by Oil Pollution (Official Gazette of the SFRY – International Treaties, No. 7/77)
7. The Law on ratification of the International Convention on establishment of the International Fund for Compensation of damages caused by Oil Pollution (Official Gazette of the SFRY – International Treaties, No. 3/77)
8. The Law on ratification of the Convention on International Rules for Avoiding Collision at Sea (Official Gazette of the SFRY – International Treaties, No. 60/75)
9. The Law on Conventions adopted on the bases of the Versailles Peace Treaty from June 8, 1919, and on the bases of corresponding directives from other conventions on peace adopted at International conferences held in Washington, Genoa and Geneva 1919 – 1926 (Official Gazette of the Kingdom of Yugoslavia – International Treaties, No. 44 XVI/30)
10. Regulation on ratification of the Convention Concerning Protection against Hazards of Poisoning Arising from Benzene (Official Gazette of the SFRY – International Treaties, No. 16/76)
11. The Law on ratification of the Convention on Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents (Official Gazette of the SFRY – International Treaties, No. 3/77)
12. The Law on Prohibition of Experiments with Nuclear Weapons in the Atmosphere, Space and Under the Water (Official Gazette of the SFRY – International Treaties, No. 11/63)
13. The Law on ratification of the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-Bed and the Ocean Floor and in the Subsoil Thereof (Official Gazette of the SFRY – International Treaties, No. 33/73)
14. The Law on ratification of the Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration (Official Gazette of the SFRY – International Treaties, No. 14/82)
15. The Law on ratification of the Convention on Safety at Work, Health Protection and Working Environment (Official Gazette of the SFRY – International Treaties, No. 7/87)
16. The Law on ratification of the Convention on Occupational Health Services (Official Gazette of the SFRY – International Treaties, No. 14/89)

17. The Law on ratification of the Convention Concerning Safety in the Use of Asbestos (Official Gazette of the SFRY – International Treaties, No. 4/89)
18. The Law on ratification of the European Convention on Protection of Archaeological Heritage (Official Gazette of the SFRY – International Treaties, No. 9/90)