



**GOVERNMENT OF THE REPUBLIC OF SLOVENIA**

**STATE OF THE ENVIRONMENT  
REPORT**

Summary

Ljubljana, December 2002

## Summary

### Reporting on the state of the environment

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The State of the Environment Report 2002 has been drawn up on the basis of Article 75 of the Environmental Protection Act (Official Journal of the Republic of Slovenia – *Uradni list RS* – 32/93 and 1/96). The report contains data on the state and changes in the environment, pressures on the environment, the effects on human health, implementation of the National Environmental Action Programme and other action plans, financial flows in the area of environmental protection, performing public services, major international events, priority tasks and measures and other data significant for environmental protection.

The content and structure of the report follows the system of reporting practiced by the European Environment Agency. Every three years this agency drafts a comprehensive report (*Environmental Outlook*<sup>1</sup>), which covers information on and an assessment of the state of the environment, points out pressures on the environment and monitors societal responses. Every year the European Environment Agency produces what it calls *Environmental Signals*<sup>2</sup>, brief reports offering simply the values of key indicators, where the subjects are selected with regard to the relevance of the field for that year. National reports from certain EU member states, as well as from others, have been reviewed and taken into consideration.

The structure of the report also follows the EU acquis and the assuming of obligations in the area of the environment, which is also evident in the linking of individual chapters and topics to an individual EU directive, regulation or decision or to an adopted international agreement (conventions and protocols). Individual chapters provide an analysis of the situation, highlight the problems connected to it, review and assess the targets and define measures for achieving the targets. The special “box with regulations” before individual chapters is also aimed at providing a comprehensive overview of the most important EU regulations and relevant Slovenian legislation by subject matter.

The report contains a special “Environmental indicators” supplement, which enhances the value of this report. The report has also used the European Environment Agency’s methodological fact sheets for indicators, which serve for the drafting of reports on the environment by EU member states and, more recently, by the associate members, and which are therefore internationally comparable.

A special chapter of the report is devoted to Implementation of the National Environmental Action Programme from 1999. An analysis of the implementation of each measure individually has shown that there are no major deviations from the programme, while for some measures it has turned out that they are not harmonised with the EU requirements or are no longer relevant, since the field in question is regulated differently.

In the majority of fields (waste water treatment and river water quality, SO<sub>2</sub> emissions, greenhouse gas emissions, measures in the field of efficient energy use and renewable energy sources, agri–environmental measures, environmental taxes and so forth) the

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<sup>1</sup> The last complete report is *Environment in the EU at the turn of the century* (EEA 1999), while a new one is being compiled for the ministerial conference on the environment, which will be held in May 2003 in Kiev.

<sup>2</sup> *Environmental Signals* (EEA 2000, 2001, 2002).

measures taken are already demonstrating the success of policy implementation and are ensuring the achieving of targets set. For those areas where the measures taken thus far have not been sufficient, it will be necessary to prepare special operational programmes as envisaged in the EU's new Sixth Environment Action Programme.

The present State of the Environment Report and the assessment of selected indicators, as pointers to the state of the environment, changes in the environment and implementation of the National Environmental Action Programme, are the basis for continued successful work and the achievement of goals in this field.

## **State and changes in the environment**

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### ***Water***

This chapter deals with the state of water quantities, emissions into water, water exploitation and the water quality. This field is regulated by the new Water Act, which for the purpose of managing water divides Slovenia into two river basin districts, the Danube and the Adriatic river basin district.

#### **Water quantities**

Slovenia is marked by major differences between the areas with the highest precipitation in the north-west of the country and the least precipitation in the east, where particularly in summer there are often water shortages and lengthy summer droughts. The mean annual quantity of all water potentially available in Slovenia amounts to 32.1 km<sup>3</sup>, and on average 16,000 m<sup>3</sup> of water is available each year per inhabitant, which is significantly higher than the European average. As much as 41 % of the water that flows each year across Slovenian territory comes in from Austria. Analyses of the trends of significant flows, which are spread across most of Slovenia, point to a growing trend of large flows and a falling trend of medium and small flows. The circumstances indicate a reduction in the available water in the coastal Primorje region, into which in order to maintain the current state (with increased use and a continuation of trends) it will be necessary to import water from the more abundant river basins. The trend of annually potential available water in Slovenia is falling, on the basis of which one may suspect that the "water deficit" areas will expand.

Reserves of groundwater are spatially unequally distributed. Almost two thirds of reserves are in the central area, in the Sava river basin, while the smallest reserves are in the extreme north-east of the country (the Mura basin) with chiefly intergranular porosity strata and in the extreme south-west of the country (coastal area) with chiefly karstic fissured porosity. The majority of water monitoring stations (41 %) for aquifers with intergranular porosity show a statistically significant fall in areas of groundwater.

#### **Water Emissions**

In the area of collecting, discharging and treatment of urban waste water, intensive implementation is being pursued of the EU urban waste water treatment directive, for which a 10-year transition period was approved in the part of the obligation to construct collecting systems and urban waste water treatment plants. The targets are set out in the regulations and action programme. The indicator Urban wastewater treatment shows that construction work is proceeding according to plans and to the envisaged dynamic. Construction of the majority of the major treatment plants is envisaged by 2005

(Maribor, Ljubljana, Celje, expanding the Koper + Izola treatment plants), so the share of treated urban waste water will also rise significantly (figure 1).

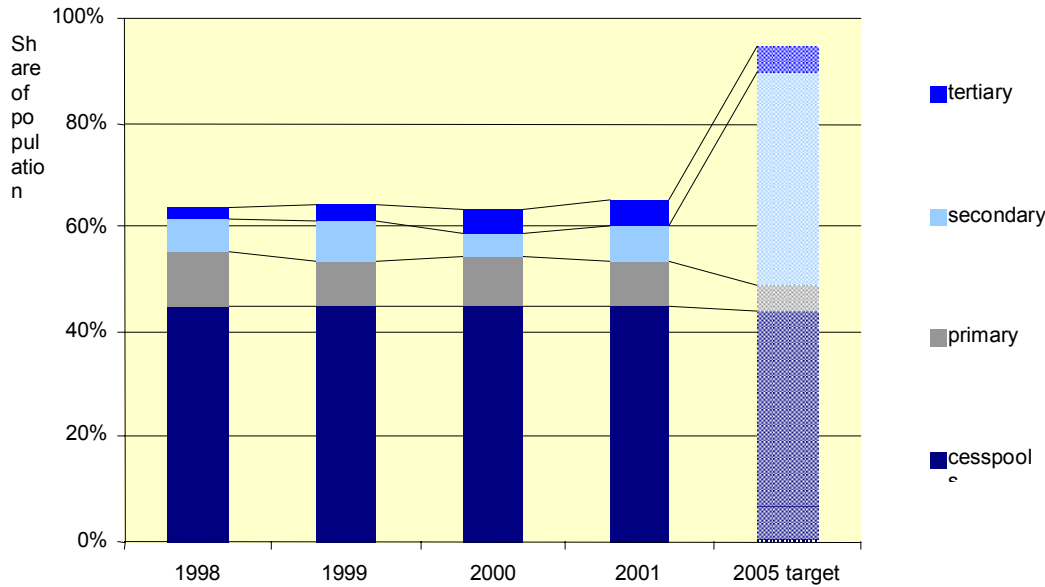


Figure 1: Share of Slovenian population whose urban waste water is treated in waste water treatment plants and cesspools and the target share envisaged for 2005

Source: Waste water treatment plants database, EARS 2002; expert estimate.

Data on emissions of dangerous substances from sources of pollution are collected within the national Environmental Agency of the Republic of Slovenia (EARS) on the basis of reports on sources of pollution. In 2000 a total of 543 sources of pollution were identified, including 86 sources with mainly biodegradable waste water from the food industry and 457 industrial sources whose waste water contained dangerous substances. A review of emissions into water of substances on list I (uniform standards) indicates that from point sources there are no significant emissions of such substances into the aquatic environment (total annual quantity of mercury 0.7 kg and 14 kg of cadmium in 2000 from all point sources). The largest share of heavy metals discharge are produced by industrial plants for the production of metals and metal fabrications, followed by plants producing chemicals and chemical products, synthetic fibres, leather, footwear and leather products, and to a lesser extent by certain other industrial operations. The largest quantity of metals discharge in 2000 was in the Sava (14.9 t) and Drava (1.5 t) basins.

Monitoring of the discharge of nutrient salts of nitrogen and phosphorus and certain other pollutants from the land into the sea indicates that the heaviest loading is in the interior of Koper Bay. The main sources of pollution are inadequately treated urban waste water from the Koper treatment plant, which flow out into the lower stream of the Rižana river, added to which certain waste waters from the hinterland and industrial plants flow directly into the Rižana and Badaševica rivers. Conditions are especially critical in summer when the river flow is reduced and there are high temperatures, with results at the mouths of the Rižana and Badaševica indicating anaerobic processes. Similarly, waste water that is not fully treated flows directly from the pumping station at Izola directly into the sea, 300 m from the shoreline, along with industrial waste water from the settling tank at the Delamaris factory.

## Water use

In Slovenia groundwater is the main source of drinking water, while surface water is used primarily for technological water requirements. In the period 1997–2001 the index of water use has not changed, since there is a large amount of available water in comparison with what is consumed. According to the records of water payments, 70 % of water is used for cooling, 16 % as drinking water and 14 % as technological water.

## Water quality

The national programme of water quality monitoring includes river water quality, groundwater aquifers and springs, lakes and the sea, and on this basis a database has been set up covering data on the defined physico-chemical, chemical and saprobiological parameters.

*Surface waters:* Quality and trends are shown by the River water quality index, which ranks the sample points with regard to the parameters into four quality classes. The first class of quality comprises unpolluted surface watercourses (1 % of sampling points on the Soča, Koritnica and Kamniška Bistrica rivers at the sources). In the period 1992–2000 a trend of quality improvement was observed. An increase was observed in the share of the second quality class (good status) corresponding to a reduction in the amount of heavily polluted watercourses. The share of watercourses ranked in the fourth quality class has not changed in recent years (around 5 % of sampling points) (figure 2).

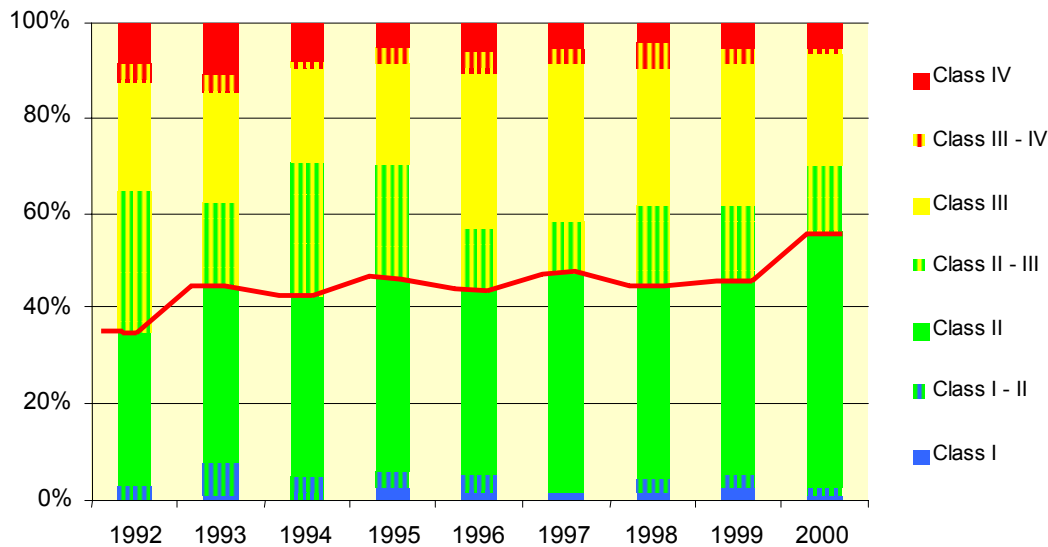


Figure 2: River water quality index – share of sampling points in specific quality classes

Source: Uniform water quality monitoring database, EARS 2002.

The state of the sea's quality is assessed by means of the so-called trophic index, which takes account of concentrations of dissolved nitrogen, phosphorus and chlorophyll, saturation with oxygen and transparency of the sea. In the period 1997–2000 the index shows values indicating moderately eutrophic water.

*Groundwater:* In Slovenia the period 1997–2000 was marked by the most critical pollution of groundwater by pesticides, chiefly atrazine and its metabolite diethyl-atrazine, and by nitrates. In this period the aquifers in north-eastern Slovenia experienced the heaviest pollution with nitrates. Long-term measurements of the nitrate content in groundwater show a general falling trend, yet despite this the average nitrate

content for the three year period 1998–2000 is still higher than the permissible limit values of 25 mg NO<sub>3</sub>/l in the Prekmurje, Mura, Apače, Drava, Ptuj, Sorško and Krško polje areas, in the Lower Savinja Valley, the Bolska and Kamniška Bistrica valleys (figure 3).

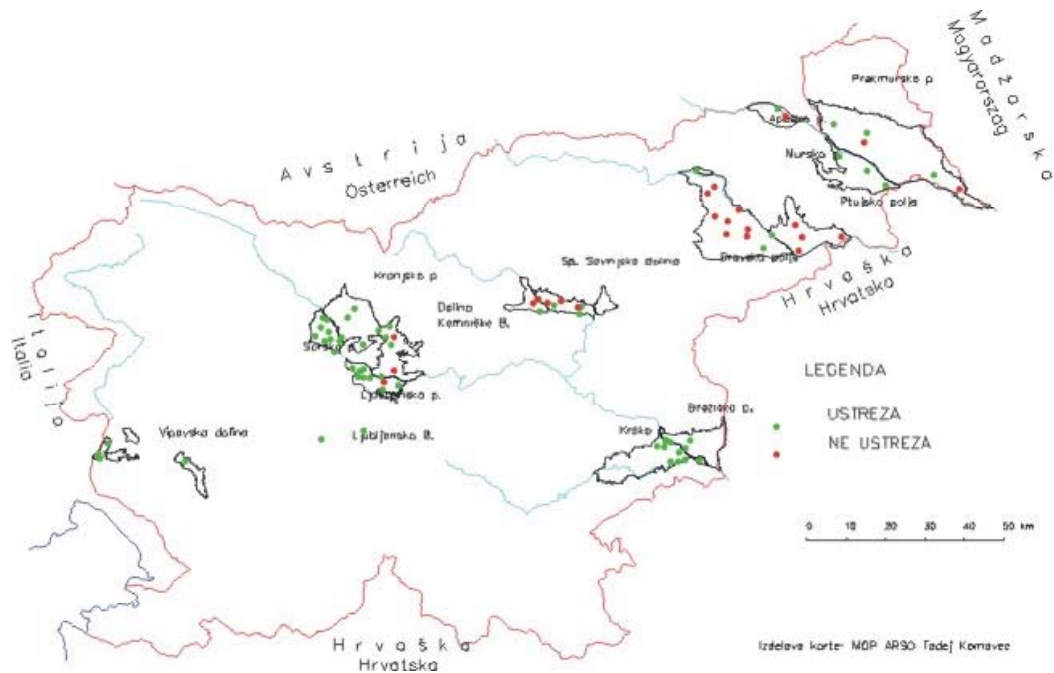


Figure 3: Suitability of groundwater in terms of nitrate content at individual sampling points in 2000

Source: EARS

Legend: (green dot) SUITABLE / (red dot) UNSUITABLE

Limit values for the amount of pesticides in 2000 were exceeded in 7 of 13 aquifers (the Prekmurje, Drava, Ptuj and Sorško polje areas, Lower Savinja Valley, the Bolska and Kamniška Bistrica valleys). Limit values were exceeded to the greatest extent by the pesticides metholachlor and atrazine and its metabolite diethylatrazine (figure 4).

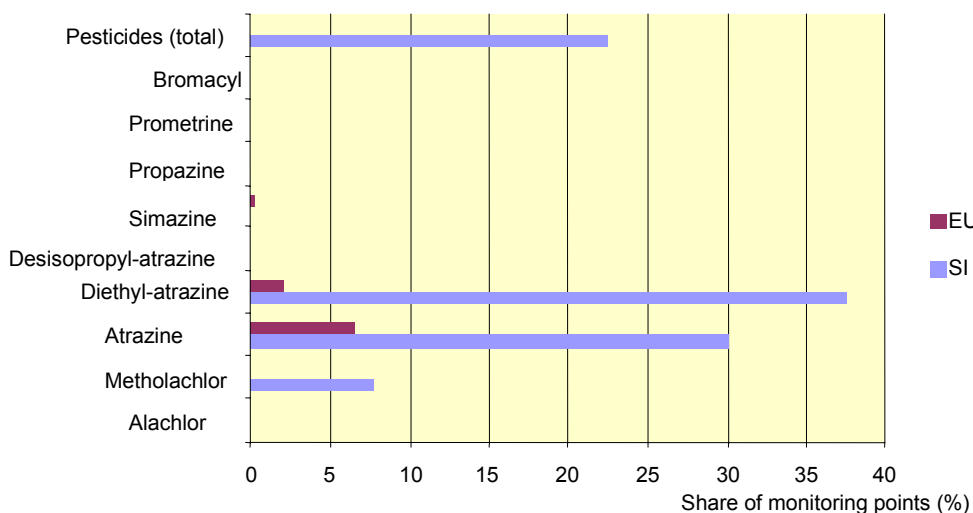


Figure 4: Share of monitoring points where the concentration of an individual pesticide in 2000 exceeded 0.1 µg/l, and the sum of pesticides exceeded 0.5 µg/l – comparison with the EU

Source: Uniform water quality monitoring database, EARS 2002.

## Air

This chapter deals with the air quality, emissions of substances and transboundary air pollution, climate change and the Kyoto Protocol and the thinning of the ozone layer. The quality of outdoor air in Slovenia is affected chiefly by the emission of substances within the country, but an important part is also played by the long-range transboundary air pollution.

### Air quality

Measurements of air quality in the monitoring network have been conducted over the longest time for sulphur dioxide (SO<sub>2</sub>). In the period 1977–2000 (figure 5) average annual concentrations of SO<sub>2</sub> fell dramatically. At Šoštanj the concentrations dropped significantly owing to the operation of the desulphurisation apparatus, while limit values are occasionally exceeded in the surroundings of the Trbovlje thermal power plant.

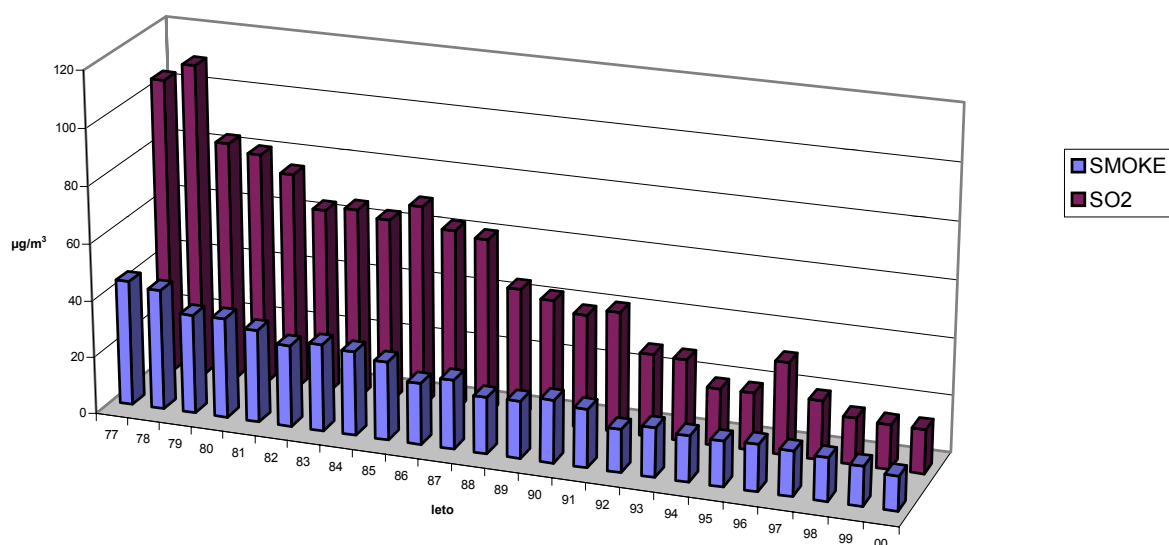


Figure 5: Average annual values of the index of air pollution by acid gases (I(SO<sub>2</sub>)) and smoke in Slovenia – average for 12 locations

Source: EARS

Of the other pollutants, limit values are occasionally exceeded by concentrations of ozone, especially in spring and summer, when the conditions are favourable for the onset of photochemical reactions. Other substances only rarely exceed limit values.

### Emissions

*SO<sub>2</sub> in the period from 1980 to 2000:* From 1980 to 2000 the annual emission of SO<sub>2</sub> in Slovenia fell by 59 %. The largest share of the entire emission of 96,000 t SO<sub>2</sub> in 2000 was produced by thermal power plants and heating stations, accounting for 87 %. In

1995 SO<sub>2</sub> emissions fell significantly compared to the previous year owing to the operation of a desulphurisation unit at block 4 of the Šoštanj thermal power plant, and also owing to the lower sulphur content in the liquid fuel following the new regulation on the quality of liquid fuel. A further reduction has been aided by the desulphurisation unit at Block 5 of Šoštanj, which started operation in the second half of 2000.

*NO<sub>x</sub> in the period from 1980 to 2000:* After 1992 emissions of NO<sub>x</sub> started to increase, owing in particular to the greater density of motor vehicle traffic; the increase has been large despite the continuously growing number of vehicles with catalytic converters. After 1997 NO<sub>x</sub> emissions fell markedly owing to a reduction in consumption of motor vehicle fuel (cross-border sales fell). The greatest share of the entire NO<sub>x</sub> emissions is contributed by road transport (motor vehicle traffic), accounting for 63 % in 2000.

Since 1995 there has also been an important and marked reduction in emissions of lead, since in that year the new regulation on the quality of liquid fuel entered into force. Since 2001 the sale of leaded fuel has been prohibited in Slovenia, and this has meant a further reduction in lead emissions from motor vehicle traffic.

Transboundary air pollution is a problem for the whole of Europe, and is being resolved in a harmonised way through the Convention on Long-Range Transboundary Air Pollution, from 1979. Under this convention, European countries are responsible for reducing emissions in Europe. Slovenia is a net exporter of sulphur, since the exported quantity of sulphur is greater than the imported amount. In the case of nitrogen oxides (NO<sub>x</sub>) and reduced nitrogen (NH<sub>3</sub>), export out of the country is greater than import.

### Climate change

After 1986 greenhouse gas (GHG) emissions started to fall and bottomed out in 1991 and 1992, then started rising again. The growth trend of these emissions has come to something of a halt in recent years. Of the various sectors, the largest share of emissions is created by the production of electricity and heating, followed by transportation (figure 6).

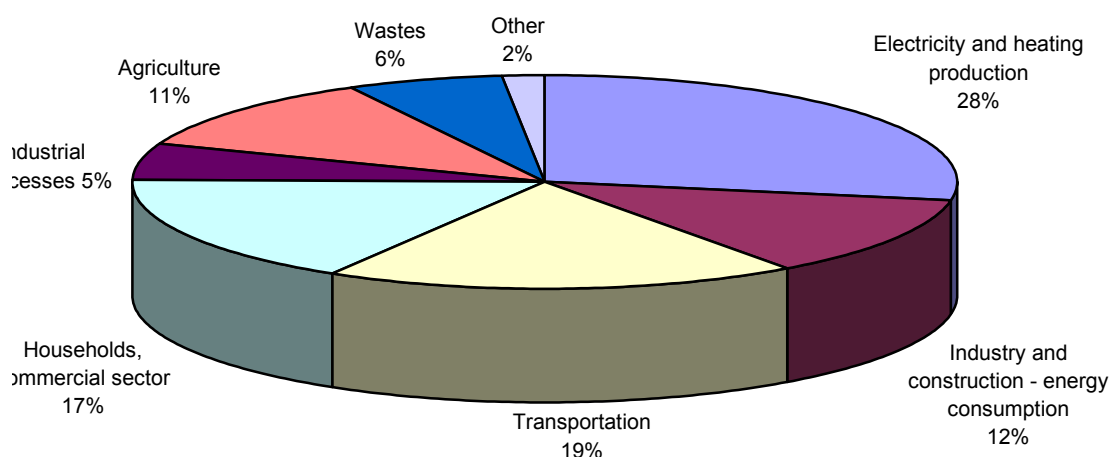


Figure 6: Emission of direct greenhouse gases CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, CF<sub>4</sub>, C<sub>2</sub>F<sub>6</sub>, HFC, SF<sub>6</sub> (expressed in equivalents of CO<sub>2</sub>) by sector (1999)

Source: Ministry of the Environment, Spatial Planning and Energy

The Kyoto Protocol (1997) sets out the obligations of the industrialised countries (the countries in annex I to the convention), such that in the first target period of 2008–2012

they reduce or limit GHG emissions relative to the start year (for Slovenia by 8 % relative to 1986). Projections of GHG emissions up to 2020 have been made, through measures already taken and alongside measures still planned for implementation. All the necessary measures will be defined in the action programme for reducing GHG emissions, which is in preparation.

#### Ozone depleting substances

Phasing out the use of chlorofluorocarbons (CFC) has been in progress since 1995. By 2002 their use had been greatly reduced (the entire annual consumption of CFC's in Slovenia fell by approx. 90 %). The use of partly halogenated chlorofluorocarbons (HCFC) is also being abandoned, and currently does not exceed 11 % of the permissible level of calculated consumption for Slovenia. Slovenia does not produce any ozone depleting substances.

### ***Soil***

This chapter deals with the characteristics of the soil in Slovenia, loss and pollution of soil, and fertilising and the effect of fertilisers on the environment.

#### Loss of soil

The greatest problem of soil loss is its destruction and removal in a single encroachment, usually during various construction works, where the best agricultural soil is most at risk. In the period 1993–1997 the area of roads and soil built over increased by 4078 ha, forests by 74,677 ha, while agricultural land was reduced during this period by 81,092 ha.

#### Soil pollution

To date systematic soil pollution research has been conducted in areas covering approximately 13 % of Slovenia's territory (only 8 % in 1999). Heavy metals (zinc, cadmium, lead) limit values have been exceeded at locations surrounding industrial centres (in the area of Celje, at certain locations surrounding Maribor and Jesenice) (figure 7). The majority of identified dangerous organic substances appear in the soil in low concentrations.

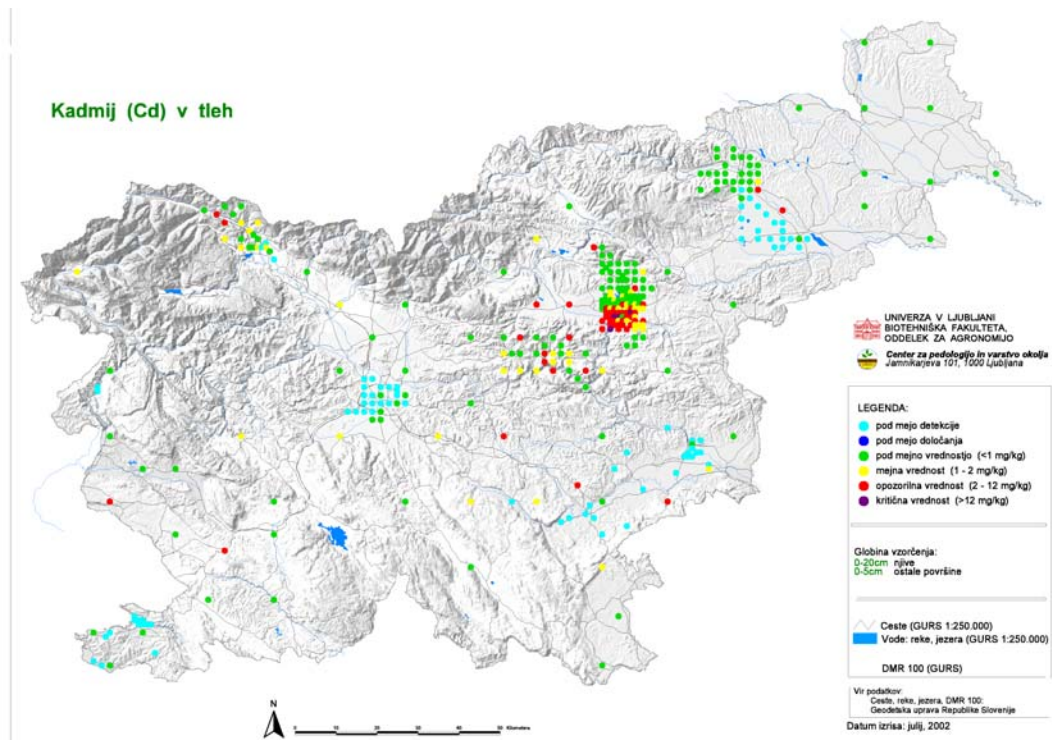


Figure 7: Content of cadmium (mg/kg d.m.) in topsoil (0–5 cm or 0–20 cm) in researched areas

Legend: **under detection limit**, **under determining value**, **under limit value**, **limit value**, **alarm value**, **critical value**,

Depth of sampling: 0-20 cm (fields), 0-5 cm (other surfaces)

### Fertilising and effect of fertilisers on the environment

Pollution chiefly of groundwater by excess nutrients from agriculture represents a problem, particularly in areas where agricultural land is in close contact with shallow-lying groundwater and farming is intensive (areas of shallow brown soil in the Mura, Sava, Drava and Savinja river basins). The latest data for Slovenia indicate that on average the nitrogen balance is positive (+ 64 kg N/ha), which also means that in 55 % farmers are fertilising excessively.

### ***Nature and biodiversity***

This chapter deals with the conservation of biodiversity through the conservation of habitat types and habitat species, through the conservation of species, and *in-situ* conservation through the designation of areas of conservation importance. The regulation of the international market in animal and plant species is given a special presentation.

#### Endangered species and habitat types

Slovenia is one of the pre-eminent European countries in terms of biodiversity. For the better known taxonomic groups the category of threat of species is shown in figure 8. In Slovenia there are approximately 850 narrow endemits, the majority of which are associated with underground habitat types, Alpine and sub-Alpine grasslands and cliffs and scree slopes. The habitat types with significant numbers of endangered species

which are endangered owing to loss of this habitat type, are primarily dry and wet grasslands, coastal, marine and inland waters.

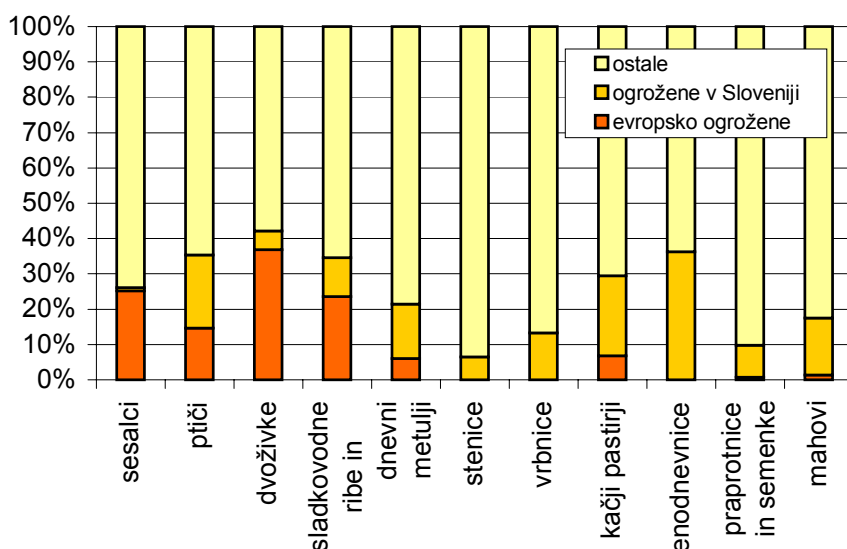


Figure 8: Share of selected endangered animal and plant species

Source: Ministry of the Environment, Spatial Planning and Energy

Legend: other / endangered in Slovenia / endangered in Europe

mammals / birds / amphibians / freshwater fish and lampreys / diurnal butterflies / Hemiptera/ Plecoptera / dragonflies / mayflies / ferns and shoots / mosses

### In situ conservation

For the *in situ* conservation of species and habitat types, NATURA 2000 areas will be identified, in line with the objective criteria of EU directives. The procedure for identifying these areas and areas of national importance (ecologically important areas) is in progress.

In Slovenia the protected areas of various categories currently cover 8 % of the national territory. The major part of the surface area covered by Slovenia's protected areas is taken up by the Triglav National Park, which includes primarily mountain and forest habitats. An expert proposal has also been drafted for determining natural assets, and this has recorded 5232 structures, of which 1373 enjoy legal protection (natural monument, nature reserve and monument of designed nature).

Trade in plant and animal species, which includes trade in parts thereof (skins, tusks etc), reaches amounts to tens of billions of US dollars each year around the world. Over the past ten years it has also been growing in Slovenia. This field is regulated by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In Slovenia the largest share of imports of live animals is accounted for by birds and reptiles, while mammal fur, reptile skins and hunting trophies account for the major portion of imported animal parts (figures 9 and 10). The majority of imported animals are intended for sale in Slovenia, although some are sold on to other countries by Slovenian companies.

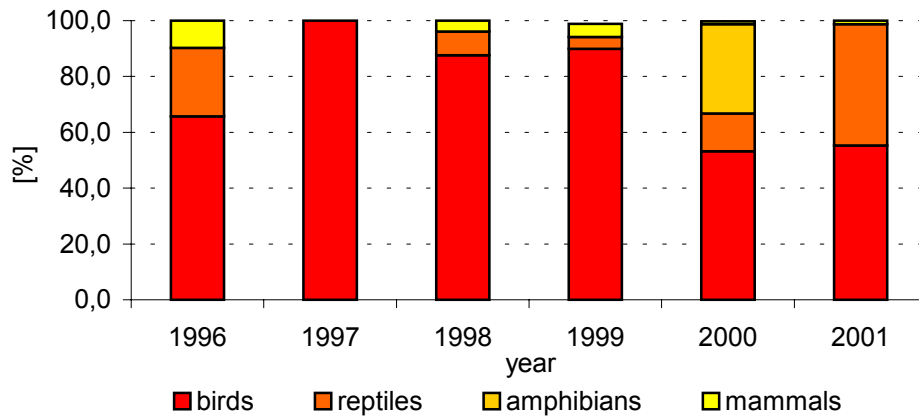


Figure 9: Import of live animals protected under the CITES convention

Source: Ministry of the Environment, Spatial Planning and Energy, EARS

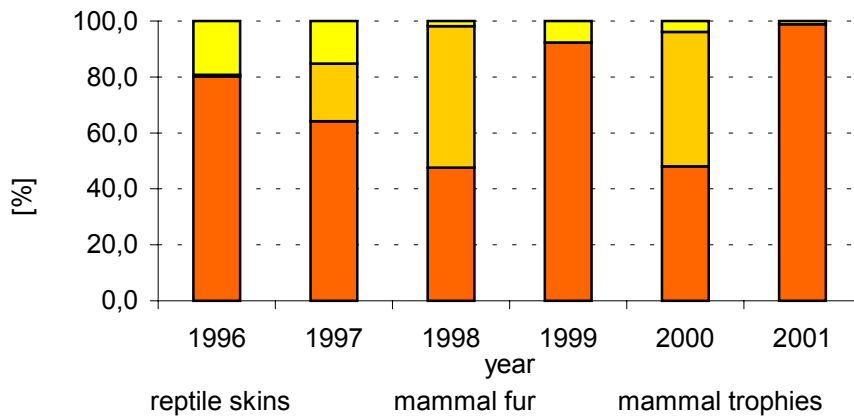


Figure 10: Import of animal parts protected under the CITES convention

Source: Ministry of the Environment, Spatial Planning and Energy, EARS

## Waste

This chapter deals with the generation various types of waste, the transboundary movements of waste (import, export) and waste management.

Human activities produce each year 1.7 million tons of waste, or 873 kg per inhabitant. The generation of hazardous waste is growing. A major increase was recorded in 2001 compared to 2000 (by 43,503 t) (figure 11). In part this increase can be ascribed to the changed methodology of reporting, and to the change in the classification list, while there was also an increase in the number of those liable to report (by 64).

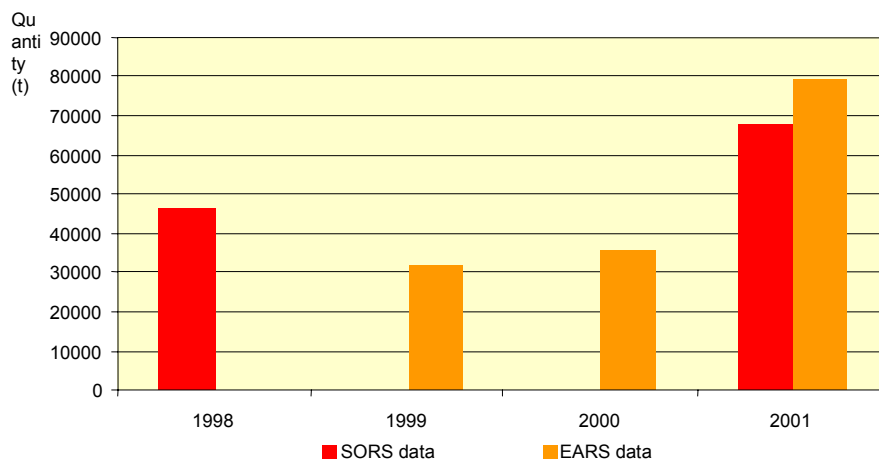


Figure 11: Generation of hazardous waste

Source: Waste Management database, EARS 2002; Statistical Yearbook 2000 and 2001, SORS (Statistical Office of the Republic of Slovenia) 2001.

Data show that around 450 kg of municipal waste per inhabitant is generated each year in Slovenia. Owing to the changed methodology of data collection, it is not possible to identify any trend. According to data from the European Environment Agency, there is a trend of growth in the generation of municipal waste in the member states (for 1999 the average quantity was 500 kg/inhabitant/year).

The share of the population incorporated into the public service of regular collection and removal of municipal waste is rising continuously. From approximately 76 % in 1995 the share grew to 93.4 % in 2001. Thus far 70 % of the municipal waste management public service contractors have started implementing separate collection of waste.

Waste management methods are still dominated by land filling, at 51 active municipal landfills. In line with the regulations on landfill of waste the operation of 21 landfills is due to cease by 2004, and a further 13 landfills will cease operation by 2009. After 2008 a total of 17 landfills should still be operating, and by then they will have adjusted to the prescribed demands. Only one hazardous waste landfill is operating in Slovenia (Metava), and this takes around 500 t of waste each year (mainly from the greater Maribor area).

#### Import and export of waste

In 2000 a total of 4702 tons of hazardous waste were exported, only to EU countries (Austria, Germany, Belgium and the United Kingdom). Of this, 4177 tons of hazardous waste were exported for removal procedures and only 525 tons for recycling. In 2000 a total of 22,326 tons of hazardous waste were imported from Croatia, Hungary and Romania for recycling, of which 22,280 tons were waste lead batteries sent at MPI Mežica and 45.6 tons were acid and base solvents at the Celje zinc works.

#### Waste incineration

In Slovenia there are two waste incinerators that have obtained licences for incinerating waste (LEK d.d., Ljubljana and PINUS TKI d.d., Rače), and five waste incineration plants (Energetika Ravne d.o.o., Ravne na Koroškem, Salonit Anhovo d.d., Anhovo, OPTE Ptuj d.o.o., Ptuj, Glin Pohišstvo d.o.o., Nazarje and ETRA 33 d.d., Ljubljana), which have obtained licences for processing waste (the use of waste as fuel).

The report also deals with the issue of managing waste from agriculture and forestry, mining and power generation, construction, sewage sludge and other types of waste, for which the rules and methods of management are or will be governed by special regulations (waste oils, end of life vehicles, end of life tyres, waste of electrical and electronic equipment, batteries, asbestos, PCB/PCT, waste from TiO<sub>2</sub> production, medical waste, slaughterhouse waste and packaging waste).

### **Noise**

Noise is increasing in the natural and living environment. The levels of noise in a given area are directly linked to the density of population. In the urban environment noise generally exceeds that in the rural environment, with the population numbers increasing twice as quickly in urban areas as in the non-urban environment.

The main factor of environmental noise is road traffic. In recent years there has been a dramatic rise in the number of motor vehicles registered, while a significant amount of the noise in cities is produced by outdated vehicles (especially urban passenger transport vehicles). According to noise measurements in Ljubljana, the wider area of the city centre has an above-average noise load. Around 50,000 residents are estimated to be living in these areas, representing approximately a fifth of Ljubljana's inhabitants.

Noise loading was calculated for all 6156 km of national roads in 1999. The total number of excessively burdened buildings during day and night is 10,526 in the day and 10,365 in the night, most of them lying alongside class I main roads.

### **Biotechnology – genetically modified organisms (GMO)**

This year saw the adoption of the Management of Genetically Modified Organisms Act, on the basis of which it will be necessary to register units in which work with GMO's will be conducted, permission or approvals will have to be obtained for work with GMO's for an individual safety class and permission will be needed for the deliberate release of GMO's into the environment and for placing GMO products on the market.

Currently work with GMO's is being conducted in 21 closed systems, most of them (12) at university faculties, 5 at public institutes and 4 at units within companies. In 19 cases genetically modified microorganisms are being used, in 5 cases transgenic plants, in 5 cases transgenic animals and the remaining 3 closed systems are dealing with genetically modified cell cultures, human and animal cell cultures and embryo cells.

No controls have yet been put in place for the import of GMO's, although given the data on imports of the two main types of maize and soya by origin of import it can be concluded as highly probable that genetically modified organisms are also present.

### **Chemicals**

On the basis of the chemicals act, since 1999 within Slovenia's national chemicals office records have been set up for producers and importers of dangerous chemicals, and data on dangerous chemicals has been systematically collected. The list has entries for 12,813 reports of placing dangerous chemicals on the Slovenian market. The share of imported chemicals amounted to 86 %, and the share produced in Slovenia was 14 %. The major portion of chemicals were in the group that are harmful to health (4775). By

far the largest share of dangerous chemicals (10,774) is intended for industry and craft establishments, 1771 are intended for general use, and only a minor portion (443) is for use in agriculture and specialised shops.

## ***Radiation***

This chapter deals with natural and artificial radioactivity in the environment and radioactive waste.

Natural radioactivity levels are higher in the central and south-western parts of the country. Extensive research on radon concentrations in all schools and kindergartens in the country has shown that in the majority of buildings (72 %) the concentration was under 100 Bq/m<sup>3</sup>, while in 2 % the values exceeded 800 Bq/m<sup>3</sup>. In two kindergartens the concentrations exceeded 2000 Bq/m<sup>3</sup>. Appropriate mitigation work was carried out in these buildings.

Artificial radioactivity in the environment is a consequence of global radioactive contamination, the operation of nuclear plant, the mining and processing of uranium ore and contamination linked to technologically enhanced sources of natural radioactivity.

A comparison of the contamination of Slovenian territory with the levels of long-lived radio-nuclide <sup>137</sup>Cs directly after the Chernobyl accident (1986) and 10 years later showed that contamination in the upper layer of soil had dropped to less than a half, and the <sup>137</sup>Cs had already penetrated into the lower levels. The heaviest contamination at time of the accident was found at foothills of the Alps due to high precipitation (50–70 kBq/m<sup>2</sup>), while the range in the central Slovenia was around 20–25 kBq/m<sup>2</sup>.

### Radioactive waste

At the end of 2001 the entire quantity of low and intermediate level radioactive waste, excluding mine waste, was around 2300 m<sup>3</sup>, and spent fuel amounted to around 90 m<sup>3</sup> or 260 tons of heavy metal. Since there is no repository for radioactive waste, all radioactive waste and spent fuel are stored temporarily in storage. Low and intermediate level radioactive waste generated during the operation of the nuclear power plant is stored in adjacent on-site storage. All other low and medium level radioactive waste from the various small-scale producers is stored in the Central Radioactive Waste Storage at Brinje near Ljubljana. Only low level radioactive waste from the closed uranium mine of Žirovski vrh has been disposed of on the tailings dumps.

From the aspect of long-term management of radioactive waste and spent fuel, the most important thing is selection of permanent solution. The siting of a repository is an extremely challenging project because of low public acceptance. The evaluation of the environment and selecting potential zones was concluded in 2001. The confirmation of the suitability of the location is much more challenging due to participation of the local communities. According to optimistic projections this could be concluded by 2005, when the construction of the disposal site would also be started.

## ***Natural and other disasters***

This chapter deals with major natural and other disasters – those that might endanger or affect human life or health, might damage the environment or cause large-scale damage to property.

More than 300,000 ha of Slovenian territory is in danger of flooding. Major and extensive flooding can be expected across 94,000 ha of surface area. Furthermore, over 2500 ha of urban area is also prone to flooding. More than half (54 %) of all the flood-prone area is in the Sava River basin, with 42 % lying in the Drava basin and 4 % in the Soča and tributaries basin. Over a quarter of Slovenia's inhabitants live in areas where catastrophic floods are possible (floods with a return period of 50 years and more). There are frequent landslides, occurring on a third of the country's territory. The forests most at risk from fire are in the sub-Mediterranean part of the country, in the Sežana forest management area. In this area 90 % of all forest areas destroyed are the result of fire. The areas most at risk of earthquakes are Ljubljana, Idrija, Tolmin and Krško-Brežice. Around a third of all inhabitants live in areas where earthquakes of the 8<sup>th</sup> and 9<sup>th</sup> level on the EMS scale are possible.

Of the accidents linked to industrial activities and transport, those most dangerous for the environment and human health are accidents involving dangerous chemicals. In 2002 new legislation came into force, and in order to reduce the risk to people and the environment from major accidents involving dangerous chemicals it defines obligatory measures for the operators of "hazardous industrial activities". The measures cover reporting sources of risk to the competent bodies, elaborating a safety report and planning measures to be taken in the event of accidents and informing the residents in their vicinity of possible major accidents.

Each year on average one traffic accident occurs involving spillage of a major quantity of hazardous substance, most commonly petroleum or its derivatives, and in addition to petroleum, in recent years there have been minor spills of acetic acid, hydrochloric acid, various paints and varnishes.

### ***Electromagnetic radiation (EMR)***

In comparison with natural radiation, the intensity of artificially created radiation through the technological revolution has increased dramatically. On the 22 existing high tension electricity cables (seven cables of 400 kV, five of 220 kV and ten of 110 kV), thus far limit values have not been exceeded. It is estimated that owing to low frequency electromagnetic radiation from cables, around 130 km<sup>2</sup> of territory is unsuitable for residences, and this represents 0.6 % of Slovenia's entire territory.

High frequency electromagnetic radiation in the environment, which is a consequence of telecommunications equipment, radio and television emitters and radars, is always found at high-altitude locations, so there are no residential and other buildings in their vicinity and there is no possibility of excessive exposure to EMR.

In Slovenia as at 10 May 2002 a total of 436 permits had been issued for setting up base stations for mobile telephones. The radiation loading is under the permitted limit values, and is excessive only in the direct vicinity of antennae at the base stations in the main beam of the antenna's radiation characteristic. Results of measurements in the surroundings of base stations show that nowhere does the loading of the residential and natural environment with EMR exceed the limit values set out in the regulation.

## **Human health**

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The quality of drinking water is regularly monitored. In the majority of cases public water supply is appropriate and adequate. In 2000 almost 155,000 (7.8 %) citizens still had no drinking water supplied from the public water supply. Hydric epidemics appear in systems that are unmanaged, without water protection zones arranged, and where the state of catchments and equipment is poor.

Drinking water microbiological research has shown that there are more unsuitable samples where there are also relatively more medium and small-scale public water supply systems. In 2000 the most frequently exceeded recommended value (0.1 µg/l) was for the pesticide atrazine. Another cause of unsanitary drinking water is the excessively high concentration of nitrates, particularly where groundwater in agricultural areas is used as the drinking water source. In 2000 there were four public water supply systems with permanently excessive nitrate concentrations (50 mg/l as NO<sub>3</sub>), all in the area of supervision of the Murska Sobota Health Protection Institute.

### Quality of natural bathing water

In 2000 a total of 170 bathing locations were recorded and inspected, most of them in running water (suitable water quality in the Kolpa and Soča rivers, fecal pollution identified in the bathing sites along the Sora, Sava Bohinjka and Sava Dolinka, the Savinja and partly the Krka), followed by bathing locations in standing water (all samples suitable) and seaside bathing areas (75 % of bathing areas attained criteria of good quality bathing water).

This chapter also deals with the health suitability of foodstuffs, the influence of polluted air on human health, and exposure to solar radiation, while an estimate is also made of the costs of the harmful effects of the environment in Slovenia in 2000.

## **Integration of environmental protection considerations into sectoral policies**

### ***Agriculture, forestry, hunting and fishing***

In the last five years the consumption of mineral fertilisers has eased off, and in 2000 amounted to 174,620 tons (or 397 kg/ha of arable land). Nitrogen nutrients predominate, and account for 45 % of all inputs. From 1990, with 27,169 t, nitrogen consumption grew to 34,847 t, but in recent years this has eased off (figure 12). Despite recent measures, this easing off does not yet seem to be sufficiently established.

Livestock herd sizes have not changed significantly in the last five years, with increases only in the numbers of horses and sheep. The application of nitrogen through livestock manure amounts to 154 kg/ha of agricultural land. Slovenia is therefore still characterised by a 1 : 2 ratio between nitrogen from mineral and animal fertiliser. The annual application of nitrogen through livestock manure is limited to 210 kg/ha, but a new limit value as of 1 January 2003 sets a limit of 170 kg/ha; this value is also provided by EU directives.

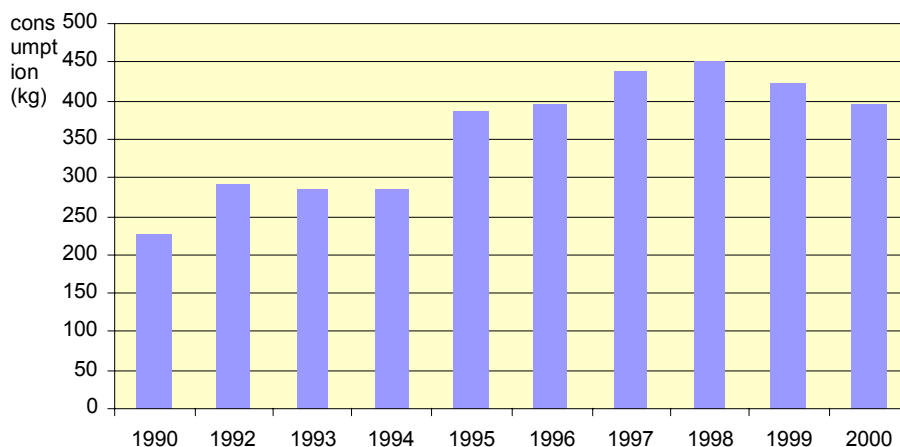


Figure 12: Consumption of mineral fertiliser in kg per hectare of arable land in Slovenia from 1990 to 2000

Source: Statistical Yearbook of the Republic of Slovenia 2001, SORS

In recent years the use of plant protection agents has continued to increase, from 1495 t in 1995 to 1602 t in 2000. Total consumption of such agents amounted to 3.6 kg/ha of arable land, placing Slovenia among the bigger users in Europe.

April 2001 saw the adoption of the Slovenian Agri-Environmental Programme (*Slovenski kmetijsko okoljski program - SKOP*), the intention of which is to popularise agricultural production that will meet the needs of consumers, protect their health, ensure sustainable use of natural resources and facilitate the preservation of biodiversity and the characteristics of the Slovenian landscape. A total of 23,298 applications for subsidy have been submitted, the greater part for sustainable livestock, organic farming and Alpine pasture. Measures were approved for 83 % of the area requested, and this represents 5.6 % of all agricultural land in use.

Taking account of the increased area under forests over the last 50 years, forest timber stocks have increased 2.5 times. An important feature is that in the growth of the timber stocks of Slovenia's forests, each year more than 3 million tons of CO<sub>2</sub> are extracted from the air.

Defoliation in forest stands point in particular to the effect of polluted air on trees. There are high levels of defoliation among fir, pine and oak trees. Beech trees have the highest share of healthy crowns, and they are also the species showing the least signs of damage (figure 13). Owing to the major lag of felling behind new growth in the past decade, forestry plans envisage an increase in the possible felling, although this should in total not exceed 65 % of the stands of evergreens and 53 % of deciduous trees.

This chapter also sets out the main characteristics of hunting and fishing in Slovenia.

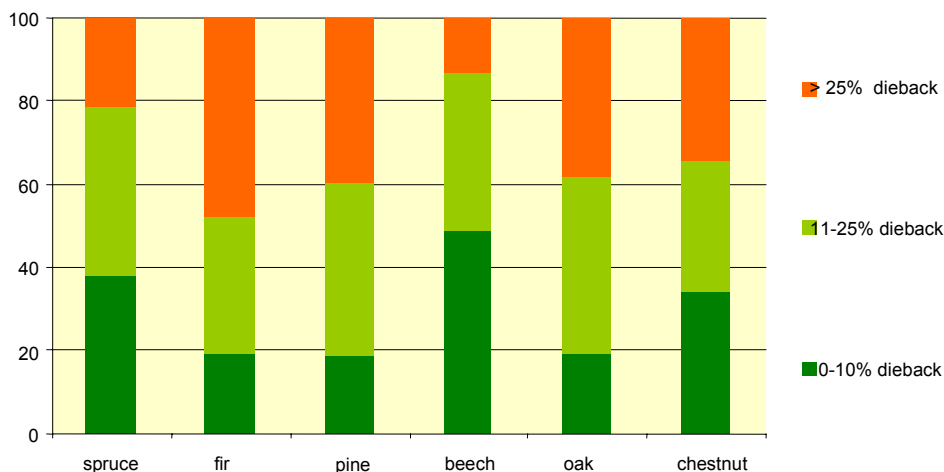


Figure 13: Share of trees in defoliation classes by tree species in 2000

Source: Forest Institute of Slovenia, 2002

## Energy

The work done thus far in the area of economical energy consumption, technological renovation and modernisation of industry is already bringing positive effects in both the environmental and economic aspects. Slovenia is improving its energy intensiveness and its energy efficiency.

In comparison with 1995, the production of available primary energy in 2000 was 3.1 % higher, with the reduction in the use of coal and an increase in the use of gas fuels and in the share of hydro power. The share of all renewable energy sources (RES) in the available primary energy is slowly growing, and in 2000 reached 9.4 % (the highest share held by hydro power and other solid fuels) (figure 14). Since the share of RES is also less than 7 % in the EU energy balance, under the EU energy policy a precise strategy and action programme have been determined for achieving the 12 % share of renewable energy in satisfying the total energy requirements of the EU by 2010.

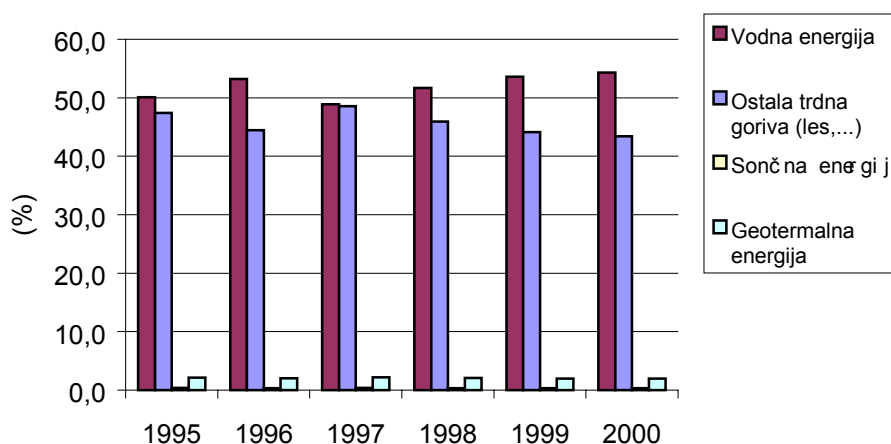


Figure 14: Structure of renewable sources (1995–2000)

Source: Statistical Yearbook of the Slovenian energy sector

Legend: Hydro energy / Other solid fuel (wood, etc) / Solar energy / Geothermal energy

The quantity of total final energy is growing, primarily in the transport and in the sector of other consumption, while in the industrial sector consumption of final energy has fallen.

As part of the efforts for long-term reduction of emissions, rehabilitation was finished on the Šoštanj thermal power plant, involving flue gas desulphurisation. This meant a 60 % reduction in SO<sub>2</sub> emissions at Šoštanj from 2000 to 2001. Rehabilitation work is also under way at the Ljubljana power station and heating plant to reduce NO<sub>x</sub> emissions at block 3.

### ***Transport***

Environmental loading from transport is becoming increasingly intensive. The transportation infrastructure physically encroaches on the environment, while the traffic upon it burdens the environment through potential hazards for people and the environment (accidents, spills) and through emissions of harmful substances. Transport consumes a third of all primary energy and is one of the biggest and most widespread consumers of non-renewable energy sources.

Despite the technical improvements to motor vehicles, owing to the increased need for mobility, greenhouse gas emissions into the atmosphere are growing. The situation is being made worse by the changing structure of transport, since the share of road traffic is continuously growing and that of rail transport is not. Freight transport, especially on the roads, is increasing in its entirety, although the share remains below the average for the EU countries.

In passenger transport the trend of diminishing use of public transport is becoming more pronounced, both in urban and intercity passenger transport. The reduction in the number of passengers has a consequent effect on the economy of public transport, and makes it more difficult to upgrade the fleet of vehicles. The comparative advantages of private transport are therefore increasing. Given the growth in the number of motor vehicles and increased mobility, there has been a concomitant rise in the consumption of motor fuel and along with it emissions of CO<sub>2</sub>, the major greenhouse gas. The age structure of vehicles is favourable (the average age of vehicles is 6.8 years), and there is also a growing proportion of motor vehicles equipped with catalytic converters.

### ***Industry***

Industrial pollution touches on all areas of environmental protection. This chapter shows the air and water emissions from industry, from which it is clear that almost all emissions (more than 90 %) are generated in so-called large industrial plants. For these facilities, in line with the IPPC directive (on the integrated prevention and pollution control) a standard environmental permit will be introduced, and this may only be obtained if the company fulfils the determined criteria.

In Slovenia there are 10 active industrial waste dumps and one hazardous waste dump. In addition to the active waste dumps there are also a range of abandoned dumps created by inappropriate land filling of industrial waste. These are the tar dump at Maribor, the industrial waste dump of Globovnik near Ilirska Bistrica, and the iron hydroxide and ash dump at Kidričevo. These old burdens require special technical solutions and major investment, and their rehabilitation is envisaged in the strategic guidelines for waste management.

Voluntary participation by organisations in the system of environmental management is enabling industry and other organisations to exercise more effective control over their own impact on the environment, and this is reflected in various activities of individual organisations, such as continual improvements in environmental management, consistent observance of environmental protection regulations and so forth. In the area of environmental management Slovenia has brought in the ISO 14001 series standard. The number of ISO 14001 series certificates awarded in the period from 1997 to 2001 has grown (figure 15). A total of 136 certificates were awarded, of which large industrial plants received 15. By industrial activity most certificates were gained in the area of metals and metal products production, and in the production of chemicals, chemical products and synthetic fibres.

Building upon the ISO 14001 standard through implementation of the EMAS system and the awarding of an environmental label for products by the competent Slovenian bodies will be enabled upon Slovenia's accession to the EU.

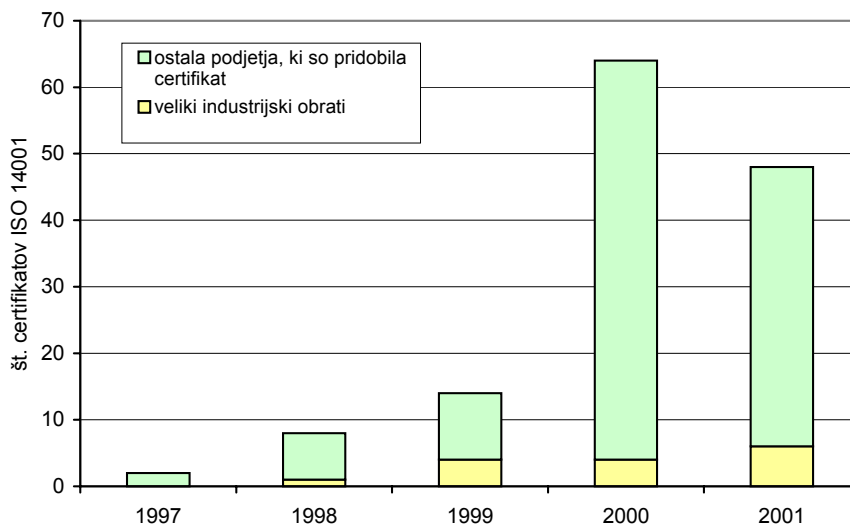


Figure15: Number of ISO 14001 certificates received in the period from 1997 to 2001 by all companies and in particular by large industrial plants

Source: Slovenian Chamber of Commerce, 2002.

Legend: no. of ISO 14001 certificates / other companies that have obtained the certificate / large industrial plants

## ***Tourism***

Tourism generates environmental stress primarily through travel, accommodation and infrastructure. The greatest pressures are during the high points of the tourist season, when tourists crowd into small areas (mainly during the holidays in the seaside and mountain resorts). At this time in Slovenia's coastal municipalities there are 50 % more people than the permanent population, and there is an equal rise in the generation of solid waste. In this zone the quantity of available drinking water is lowest in the summer months, while the estimated consumption of water for tourism purposes is at least 3 times higher. The quantity of waste water increases, and this adds to the undesired eutrophication of the already very shallow Slovenian sea. Similar problems are also encountered at Bled.

In the mountains, the environment is seriously stressed by ski resorts and their accompanying infrastructure. The arranging of ski resorts involves construction work which contributes to the changing extent of forests and water regimes. In the areas of ski resorts it is the timid animal species that are most affected (e.g. the capercaillie). For example, in the area of Pohorje and Kozjak in the 80's a total of 37 active capercaillie breeding grounds were known, and in 2000 there were only 16 left. The surface area of the ski resorts had in this time grown significantly. Tourism, and even more so certain forms of recreation, exert great stress on sensitive habitat types (such as caves), and on areas where sensitive species breed (such as the lynx, owls and birds of prey, the black stork and bird nesting colonies).

## **Financing environmental protection**

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Fulfilling the targets and measures set out in the National Environmental Action Programme has in recent years been pursued mainly through the provision of public sources of funding. Increasingly, and particularly over the past year, private capital interests in investing in the area of environmental protection have become more developed, and this is reflected in the rise in the current and capital costs of commercial companies and in the gradual expansion of the number of partnership agreements concluded for the cooperation of the public and private sectors in constructing municipal infrastructure and providing public services for environmental protection.

In 2000 the Environment Ministry's budget amounted to 17.3 billion SIT, in 2001 it was 21.7 billion SIT, and in 2002 it was 31.7 billion SIT, which is a consequence of taking over the sector of energy from the Ministry of Economy. In recent years the greatest growth has been in the share of capital transfer funds for construction of municipal infrastructure, owing largely to an increase in funds from foreign donations and a corresponding increase in the share of proprietary participation in co-financing of the foreign donation, and owing to increased subsidies to private operators and private companies for interventions in renewable energy sources.

The share of funds earmarked for environmental protection in the total expenditure of municipalities rose from 4.19 % in 2000 to 5.76 % in 2001. The value of disbursed loans from the national Environmental Development Fund, the public fund for financing the construction of local infrastructure, grew from 1.6 billion SIT in 1999 to 2.6 billion SIT in 2001. There was also a growth in the value of disbursed loans from the Environmental Development Fund in financing environmental investments by commercial companies; from 1.9 billion SIT in 1999 it rose to 2.3 billion SIT in 2002.

In recent years, implementation of the "polluter pays" principle has become a major source of financing environmental protection policy measures, and both a positive trend and a continuously increasing scope has been recorded. The share of contributions attributable to environmental loading has been rising year-on-year in all tax revenues of the Slovenian budget. In 2002 it was expected to account for 3.4 % (figure 16).

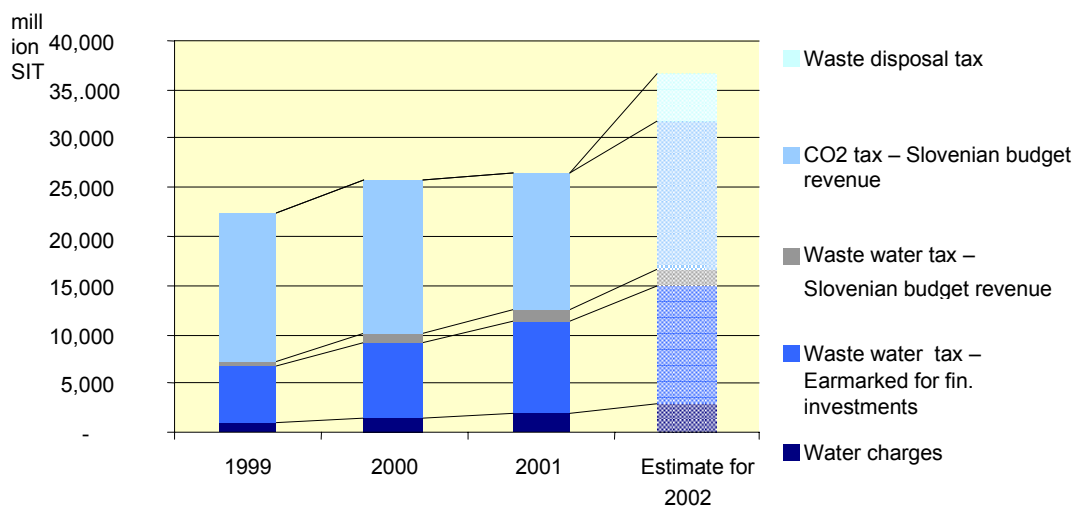


Figure 16: Financial effects of environmental loading contributions

Source: Ministry of Finance (Balance sheet of national budget expenditure and revenues), General Customs Office, internal data of the Environment Ministry and EARS (Water payments, taxes and concessions database, Sources of pollution database, Waste management database), 2002

## Local public services for environmental protection

Providing local public environmental protection services (mains drinking water, collecting, discharging and treating of urban waste water, municipal waste management, public sanitation and cleaning of public areas, arranging of public paths, pedestrian zones and green areas, inspection, oversight and cleaning of heating facilities, smoke flues and ventilation shafts for air protection) is the task of local communities, i.e. the municipalities. An average of 62 contractors perform the local public services of mains drinking water, collecting, discharging and treating of urban waste water, municipal waste management and disposal of the remainder of municipal waste. The majority of them are organised as public companies, owned entirely by the municipalities, or they are state public works companies.

It has been established that the organisation to date of public environmental protection services has not been appropriate, something particularly evident in the irrational level of organisation and the excessive number of companies, which for the most part are involved in all local commercial public services, but at the same time with activities outside the system of public services. With the reform of local self-government the situation deteriorated, since the smaller new municipalities started establishing their own public companies or public works units for performing all the public environmental protection services. The majority of problems can at least be mitigated or in fact entirely eliminated by linking up municipalities and merging financial and personnel resources.

## Accession to the EU and international cooperation

This chapter deals with the negotiation process and the securing of transition periods, institutional strengthening as part of the alignment with the European Union and certain tasks in connection with this, such as reporting to the EU. In the area of the environment Slovenia is ready for the duty to report, since with this in mind test reports have already

been drafted, the institutions bound to report have been determined and the reporters appointed.

The chapter presents Slovenia's cooperation in the European Environment Agency, which was the first EU body to accept into its ranks the candidate countries before their actual accession to the EU. It also describes the available EU financial resources for carrying out capital projects in the associate member states.

Within the context of international cooperation, the most important international activities of the Environment Ministry are listed. These include cooperation with the Global Environment Fund (GEF) and the United Nations (Slovenia was elected a member of the UN Commission on Sustainable Development for the period 2001–2003). In recent years Slovenian representatives have been in numerous high-profile positions in international organisations, such as members of the Environmental Policy Committee of the UN Economic Commission for Europe, the European Environment Agency, the UN Framework Convention on Climate Change, and in particular its Kyoto Protocol on reducing greenhouse gas emissions.

The chapter provides a list of all signed international agreements. In recent years numerous international agreements have been ratified, including the CITES Convention on International Trade in Endangered Species of Wild Flora and Fauna, the Convention to Combat Desertification, which is the fundamental UN convention for soil protection, and the Kyoto Protocol.

## **Education, information and public cooperation**

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In the period 1997–2002 approximately 113 million tolar were allocated to providing environmental information, awareness raising and education, via annual public tenders. Numerous projects were supported, such as the Water Detective, the European mobility week, Geotrip, and the Eco-school as a way of life. Communication projects were carried out in support of waste management and nature protection, and in preparation for the World Summit on Sustainable Development a special information campaign was carried out under the banner “Slovenian initiative for sustainable development – Today I am shaping the future”. Numerous publications have also been produced (newsletters, handbooks, posters and so forth).

In 2001 there were 105 environmental non-governmental organisations registered in Slovenia, numbering 25,549 members and around 150,000 sympathisers. The Ministry of the Environment is co-financing NGO programmes and projects through public tenders. Funds are growing each year, and this year NGO programmes and projects were co-financed to the tune of 30 million SIT. In April 2001 at the first environmental forum a programme of cooperation was adopted between the Ministry and environmental NGO's under the banner “Partnership for the Environment”, involving a three-year cooperation plan between the partners.

## **Implementing the National Environmental Action Programme (NEAP)**

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This chapter deals in detail with the implementation of the National Environmental Action Programme (NEAP), with an explanation being given for the implementation of each individual measure in all areas of the NEAP (pursuing an improved state of the aquatic environment, waste, conservation of biological diversity, protection of the air and climate, the soil, noise, risk, radiation and measures to support implementation of

the programme). Upon analysis of the implementation it was determined that certain measures are no longer relevant, since the area is arranged differently, or rather certain measures are not in harmony with the requirements of EU directives.

Owing to the limited availability of data on spending for environmental protection, the chapter on financing implementation of the NEAP is abridged. What is significant is that spending, both by the public and the private sector, for the purpose of implementing the NEAP is growing from year to year. The largest portion of funds have been invested in the areas of water protection and management, waste management and air protection, which have been identified in the NEAP as being more costly. Public sector funds are also growing as a result of the influx of the foreign donations that Slovenia has succeeded in obtaining, for the most part precisely in the area of environmental protection. Another key instrument is concessions on tax payments for waste water, which those public sector organisations liable to pay have channelled entirely into the construction of collecting systems and treatment plants. A positive trend of growth is indicated by the volume of loans taken by private commercial companies from the Environmental Development Fund.

The majority of spending has been in the public sector. Private sector funds have been evident primarily in the area of investments in reducing emissions into water, reducing air pollution and in measures to modernise production and reduce waste, as well as in rehabilitation of waste disposal sites.

The Ministry of the Environment, Spatial Planning and Energy has determined that there are no major deviations from the programme, and that the programme is being implemented in all areas and within the framework of available funds.

## Appendix: Environmental indicators

<b>State and changes in the environment</b>		Period
<b>Water</b>		
1. Water use	☺	1997-2001
2. Urban waste water treatment	☺	1998-2001
3. River water quality index	☺	1992-2000
4. Nitrates in groundwater	☺	2000
5. Pesticides in groundwater	☹	2000
<b>Air</b>		
6. Sulphur dioxide emissions	☺	1990-1999
7. Nitrogen oxide emissions	☹	1990-1999
8. Exceedance days of sulphur dioxide threshold values	☺	1992-2000
9. Exceedance days of ozone threshold values	☹	
<b>Ozone and climate change</b>		
10. Consumption of ozone depleting substances	☺	1989-2000
11. Greenhouse gas emissions	☺	1999
<b>Soil</b>		
12. Land use and land cover change	☹	1995
13. Nitrate directive implementation	☺	2002
<b>Nature and biodiversity</b>		
14. Protected areas	☺	1992-2002
15. Forest decline and tree defoliation	☺	1985, 1991-2001
<b>Waste</b>		
16. Generation of municipal waste	☹	1995-1999
17. Generation of hazardous waste	☹	1998-2001
18. Transboundary movements of hazardous waste	☺	1995-2001
<b>Integration of environmental considerations into sectoral policies</b>		
<b>Agriculture, forestry, hunting and fishing</b>		
19. Agri-environmental measures	☺	2001
20. Pesticide consumption	☹	1992-1999
21. Fertiliser consumption	☺	1990-2000
<b>Energy</b>		
22. Final energy consumption	☺	1990-1999
23. Renewable electricity	☺	1990-1999
<b>Transport</b>		
24. Average age of vehicle fleet	☺	1995-2002
25. Vehicles meeting emission standards	☺	1990-1999
26. Freight transport – modal split	☹	1995-2001
<b>Health</b>		
27. Drinking water quality	☺	1999-2001
28. Bathing water quality	☺	1996-2001
<b>Financing and economic instruments of environmental protection</b>		
29. Environmental expenditure	☺	1999-2001