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ENVIRONMENTAL INFORMATION SYSTEMS IN BELARUS
AN OECD ASSESSMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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FOREWORD

Environment is an important component of the programme of assistance of the OECD Centre for Co-operation with the Economies in Transition (CCET). Activities in this field are designed to draw on the experience gained in the OECD during the past twenty years, as well as on the work of other international organisations. They also take into account the conclusions of the meetings of European Environment Ministers at Dobris (1991) and Lucerne (1993). The CCET programme is focused on three main themes:

-- integrating environmental considerations into the process of economic restructuring;
-- institution building; and
-- environmental information and policy reviews.

This report falls under the third theme. It is based on a review of environmental information systems conducted by a joint OECD-World Bank mission* to Belarus in March 1993 and on subsequent discussions which took place in a workshop in September 1993, held under the auspices of the OECD Group on the State of the Environment.

The report assesses the adequacy of environmental information systems in Belarus against the background of the changing needs for environmental information in the transition to a market economy. It makes specific recommendations which, overall, highlight the importance of implementing cost-effective means of collecting and analysing environmental information and of establishing institutional arrangements which would facilitate the co-ordination and exchange of such information. The report also encourages greater information dissemination efforts to raise domestic public awareness of environmental issues. Finally, it recommends integration of the domestic information system into a broader international framework as a means of promoting contacts, and collaboration, with the international professional community.

The preparation of the report contributed to, and benefited from, the elaboration of an "Environmental Action Plan" by the Government of Belarus and the World Bank. The report is published under the responsibility of the Secretary-General.

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Belarus has been an independent state since September 1991 and is undertaking economic and social reforms to consolidate democracy and a market economy. Work is also under way to develop environmental legislation, institutions and policies appropriate to the rapidly changing circumstances. This process will take time to bear fruit. Today, environment is one of many competing priorities.

This report reviews environmental information systems in Belarus with respect to the changing role environmental information has to play in a market-based, democratic society: contributing to monitoring and enforcement of compliance with regulations and environmental policies; assisting with sectoral policy integration efforts; informing decision-makers, the public, the private sector, NGOs and interest groups on environmental conditions and trends and, more generally, providing information on progress towards national and international goals of sustainable development.

A first conclusion is that the present environmental information systems in Belarus constitute a good base for further progress. The response of Belarus to the OECD Questionnaire on the State of the Environment showed, for example, that data are available for a number of important environmental areas. An existing body of scientific knowledge and experience in research institutes and administrations provides a good foundation for successful reforms of the environmental information systems.

A commendable achievement is the 1992 report on the state of the environment in Belarus. It is a promising step towards development of a broad picture of pressures on the environment, consistent information on environmental quality, and information on the trends in environmental quality, emission reductions and mitigation efforts. In the future, this should lead to a mechanism that provides an overview of environmental conditions and trends so that national authorities will be in a position to compare the state of the environment with policy targets and to co-ordinate environmental programmes at the national, regional and city levels.

Consideration needs to be given to implementing cost-effective approaches for collecting and analysing environmental information, as well as establishing institutional arrangements which promote co-ordination and integration of inputs. Further improvement of the quality and reliability of environmental information in Belarus is important if credible domestic systems are to be developed. Strengthening Belarus' involvement in broader international co-operative monitoring efforts and providing closer links with the international community should also promote the creation, diffusion and use of environmental information.

The principal recommendations of this review are:

-- A clear mandate should be given to a specific organisation to co-ordinate and integrate the information delivered by the monitoring and statistical agencies. The output of this work should be targeted at supporting strategic policy making. Funds for carrying out this activity should be allocated on the basis of a multi-year integrated programme;

-- The enforcement of environmental legislation is a high priority. Thus, up-to-date national registers of emissions in water and in the atmosphere and of discharge permits issued should be maintained. The registers should fulfil criteria of timeliness, co-ordination and accessibility at the local government level;

-- An environmental baseline should be established now so that there will exist a benchmark against which the environmental consequences of changes in production, consumption and environmental management can be evaluated. Priority attention should be given to sinks of environmental pollution (soil, groundwater, biota), to areas where an increase in stress is expected (surface water), and to the reproducibility of the measurements over a relatively long time span. Not all the parameters included in the baseline need be permanently monitored: review dates could be set at which some consolidation of the baseline parameters could be made;

-- The collection of economic information relating to the environment will play an increasingly important role both for environmental and economic decisions. This includes information on expenditure for pollution abatement, projected clean-up costs for contaminated land and water areas, and projected expenditure on conservation measures. Such information is an important input to priority-setting and to indicating the costs and benefits as well as the trade-offs involved in decision-making;

-- Consideration should be given to reducing the number of fixed stations monitoring air and water quality. Mathematical modelling should be introduced and used to the maximum extent possible to simulate the quality of environmental media on the basis of emission data or statistics on sectoral economic activities;

-- Efforts to integrate the environmental information system into the broader international framework need to be strengthened. This could include participation in activities jointly organised by countries and international institutions, exchange of personnel on a bilateral basis and language training for experts;

-- Environmental information and communication programmes need to be strengthened to raise public awareness of environmental issues. Information needs to be provided in a user-friendly manner and using a variety of media. Experience gained in preparing the 1992 State of the Environment report should be consolidated.

Introduction

This report has been prepared under the auspices of the OECD Environment Policy Committee's Group on the State of the Environment. This Group has supported the outreach of its activities to countries in Central and Eastern Europe in several ways. Firstly, in 1991 reviews of the environmental information systems in three "Partner in Transition" countries (the former Czechoslovakia, Hungary, and Poland) were undertaken. The reviews and selected environmental indicators were published in a report entitled "Environmental Information Systems and Indicators - A Review of Selected Central and Eastern European Countries". This report presented for the first time selected environmental indicators for these countries in a manner consistent with those for OECD Member countries.

Secondly, the 1992 OECD Questionnaire on the State of the Environment was distributed to OECD Member countries and the four "Partner in Transition" (PIT) countries (the Czech Republic, Hungary, Poland and the Slovak Republic). The responses were published in the 1993 OECD Environmental Data Compendium.

Thirdly, the OECD has recently initiated a programme of environmental performance reviews of OECD Member countries. The aim of the reviews is to help Member countries improve their individual and collective performances in environmental management. The declaration of European Environment Ministers meeting at Lucerne, Switzerland in April 1993 requested that the OECD extend this pilot programme to Belarus, Bulgaria and Poland. This report will be an input to the performance review of Belarus.

Thus, within the context of the CCET environmental work and continuing the initiative established by the previous reviews of environmental information systems in central and eastern European countries, this report has been prepared to fulfil the following objectives:

-- to assess the adequacy of environmental information systems in Belarus in light of the changing needs for environmental information resulting from the transition to a market economy, and to propose recommendations; and

-- to provide an input to the Environmental Action Plan for Belarus currently being prepared by the Belarussian government and the World Bank.

The review is organised in two parts: Part I presents an analysis of the Belarussian environmental information system and identifies areas where it can be strengthened. Part II concerns environmental indicators and is based on the responses to the 1992 OECD Questionnaire on the State of the Environment.

1. Demands for Environmental Information

Belarus[**] has been independent from the former USSR since September 1991. The transition to a market economy is re-orienting both the relationship between the economy and the environment, and the role of the State. At the same time, the establishment of democratic government has altered the roles of, and public expectations about, environmental information. Environmental information

[**] Annex B provides background information on the geography, economy and state of the environment of the country. Annex C is a map of Belarus.

is no longer a tool used for supporting the preparation and implementation of State plans. In the new political and social environment, reliable and accurate environmental information is needed to support measurement of progress towards national and international goals of sustainable development; as a tool for monitoring and enforcing compliance with regulations and environmental policies; as an instrument for sectoral policy integration; and as a means of informing decision-makers, the public, the private sector, NGOs and interest groups.

As the economic reforms deepen, scarce economic resources, declining productivity in the short term and increased social stress, together with the continued costs associated with mitigation of the Chernobyl accident, compel policy-makers to redefine priorities for environmental information. The first priority is to upgrade the quality of environmental information in those regions (oblasts), and economic and natural resource sectors where the greatest risks to human health and irreversible environmental damage occur (e.g. concerning hazardous waste management, air and groundwater pollution). Such information supports the implementation of priority environmental actions and efforts to integrate environmental concerns into sectoral policies.

Another important issue is the need to remove information "roadblocks" which impede economic reform and investment. Information on the state of the environment should, for example, assist privatisation efforts by providing timely and reliable information to prospective investors and public authorities alike. This applies particularly to liability for contaminated land and water.

Among the decisions to be taken is the degree to which companies will, upon privatisation, inherit responsibility for existing pollution. Environmental liability for sites previously contaminated by hazardous substances is a deterrent for western companies considering investment in central and eastern Europe. The policy to be adopted in Belarus was undecided at the time this report was prepared. It is clear, however, that existing soil pollution on premises that change ownership will have to be formally assessed. Precise rules for this have to be adopted, both in legislation and in operational guidelines. The experience of other countries undergoing economic reform provides a useful starting point for examination. One major problem will be the need to establish the administrative framework. Another problem concerns the availability of sufficient technical expertise to perform assessments at sites and plants.

At the plant level, managers should have access to information on recycling opportunities, energy-efficient process operations and simple "housekeeping" measures to improve workplace safety and operation. Linking in to existing international and, where they exist, domestic data bases on techniques for pollution prevention and control or on alternative technologies provides a valuable source of relevant information for plant managers.

A specific problem in Belarus is the massive radioactive contamination stemming from the Chernobyl disaster, which left the country with one-fifth of its territory contaminated. The response programme to this disaster currently consumes 11 per cent of the State budget. This programme is the focus of concern and discussion by policy-makers and there is substantial disagreement between Belarussian authorities and the International Atomic Energy Agency (IAEA) on the interpretation of studies which underpin the programme. The Environmental Action Plan for Belarus suggests that much of the Chernobyl response programme should now change from the accident-response mode to a less resource consuming state. On the other hand the number of nuclear facilities in countries adjacent to Belarus (power stations in Russia, Ukraine and Lithuania) may justify setting up real-time radiation monitoring as a precautionary measure.

Belarus produces and exports a wide range of industrial products. It thereby generates a wide range of wastes, including hazardous wastes such as heavy metals stemming from electroplating industries; toxic agricultural chemicals; oil wastes mixed with soil and grit; foundry sand from metal

casting; paint wastes, often containing lead; lubricant and coolant wastes; and vanadium discharged from power plants. No environmentally sound waste treatment and waste disposal facilities yet exist in the country, although facilities are being planned and domestic technical know-how exists in principle. The corresponding management system has also to be developed. The only source of information on the quantity of hazardous waste is a questionnaire which was distributed only once. It is urgent that Belarus establish a cradle-to-grave tracking system for hazardous waste. Such a system is only of value when it is detailed (i.e. at the level of waste shipment/waste type/local enterprise establishment), up-to-date and accessible at the local level. The data handling demands should therefore not be underestimated. Useful examples, including experience of the start-up difficulties, exist in a number of OECD countries.

The serious contamination of ground- and surface-water poses a health risk in Belarus. Reported nitrate levels far exceed the maximum allowable concentration for drinking water and excessive microbiological contamination of shallow wells has also been reported. In addition, artesian wells are affected. Intensive animal husbandry, which is the dominant sector in Belarussian agriculture, is correlated with the heavy nitrate contamination. To contain the health risks associated with water resources contamination, a package of measures is being proposed in the Belarus Environmental Action Plan including the delivery of drinking water by truck to villages that await connection to the piped water supply. An information base on the principal parameters of the chemical and microbiological quality of groundwater used for potable supply should be established and publicly available. This is an obvious area where the experience gained from the Chernobyl monitoring programme can be used. The database should support decisions on measures to be taken at the level of communities and also provide quality tagging of individual wells.

The manure surpluses from intensive husbandry require attention in agricultural and environmental policies. A monitoring system can be cost-effectively set up using overseas experience, involving the use of a calculation model, conversion coefficients for minerals and analysing farm level statistics.

Complementing the establishment of an environmental baseline is the collection of economic information about the environment. Given that resources are scarce it is particularly valuable to have information on the costs and benefits of alternatives so that actions, their cost-effectiveness and the financial and environmental trade-offs involved can be considered in choosing among options. Such information is also an important contribution to priority setting. Information could be collected on expenditures for pollution abatement, projected clean-up costs for contaminated land and water areas, and projected expenditures on conservation measures, for example.

2. Design of Environmental Information Systems

In Belarus the role of, and expectations about, environmental information have changed. Information systems must now satisfy new functions in which the State monitors and regulates market-based economic activities. This requires that the objectives, the implementation methods and monitoring/evaluation procedures of environmental information systems be clearly specified at the outset. A balance must be struck so that the systems can deliver multiple objectives: providing an overview of environmental conditions and trends, ensuring the collection of information in a cost-effective manner, minimising the reporting burden on the private sector, contributing to assessments of progress towards national and international goals of sustainable development, supporting the development of an integrated strategy for environmental policy and the integration of sectoral and environmental policies, providing information for the enforcement of legislation, and enhancing wider public awareness of environmental issues.

It should be recognised that environmental information systems are comprised of numerous components, some of which have an immediate, specific purpose (e.g. enforcement of legislation or the identification of local health hazards) and others which have a more general role within the overall system (e.g. monitoring of trends). Strengthening the relationship between the specific and general tasks of environmental information systems requires the establishment of clear objectives for the whole system reinforced by strong co-ordination of the contributing components.

2.1 Institutional Arrangements

It is useful to distinguish between those agencies concerned with environmental information, and those whose focus is more on environmental management.

In terms of environmental information collection, the State Department for Hydrometeorology (Glavgidromet) has principal responsibility for the monitoring of the ambient environment. It monitors air quality; water quality in rivers and lakes; soil contamination; radioactive contamination; and transboundary pollution. It also has responsibility for emergency control (early warning, declaration of alarm status) and receives notification of accidental emissions.

General responsibility for maintaining statistics rests with the State Committee of Statistics (Goskomstat). Within Goskomstat the Division of Social Statistics, Health and Ecology handles environmental statistics. Its main task is to collect and treat data from stationary air emission sources. Those production enterprises emitting more than 100 tonnes (or according to toxicity of emissions) report their emissions to the Division and the data is used to collect pollution taxes and fines. Data collection for environmental expenditures is to be undertaken and the methodology is currently being developed. Goskomstat is also involved in the collection of data for forest statistics.

The Ministry of Forests (Minleskhoz) monitors forest resources, while the Belarus Geology Service (Belarusgeologia) undertakes this task for mineral resources and groundwater.

The administrative arrangements for environmental management in Belarus are complex and have essentially been inherited from the former USSR. A Commission on Ecology and Rational Resource Use and the Commission on Problems of the Chernobyl Disaster advise Parliament. National parks are under the responsibility of the Council of Ministers of the Belarussian Republic.

The State Committee of Ecology (Goskomekologia) handles pollution control from industry and transport; mineral extraction permits; the environmental impact assessment process; and waste management. The central office is divided into five inspectorates according to the media controlled: water protection; air protection; soil, forests and minerals use and protection; wildlife protection and hunting control; and environmental impact assessment. The seven regional offices (one in each oblast and one for Minsk) have similar organisational structures. At the district level there are 117 inspectorates who report to the relevant regional (oblast) office.

The Ministry of Agriculture and Food (Minselkhozprod) is responsible for water quality in irrigation and drainage water; monitoring soil contamination; and protecting food quality.

The Ministry of Health (Minzdrav) has responsibility for protecting drinking water quality; maintaining air quality in work places and homes; and preventing food contamination. Minzdrav also monitors diseases in the population.

Several research institutes have played, and will continue to play, an important role in developing the Belarussian environmental information system. Of particular note is the Research Centre "Ecology", established by Goskomekologia in 1992. It has responsibility for the co-ordination

of methodology for environmental protection and the rational use of natural resources. The institute plans to establish a monitoring division which will be responsible for integrating and interpreting data provided by other agencies and has presented a proposal for an integrated monitoring system. It is also providing environmental education courses to administrators and inspectors, and assists in preparing environmental plans for cities and towns.

Annex D presents a diagrammatic summary of the administrative arrangements for environmental information flow in Belarus. Although there are numerous organisations/ state committees, the institutional structure is fragmented and administrative overlaps are common. This is, for example, apparent from the three environmental monitoring networks, run respectively by Glavgidromet, the Ministry of Health and Goskomekologia: each collects information for a specific purpose and little exchange or pooling of data occurs. There is also little vertical information exchange between different levels of government.

Thus, more attention needs to be given to improving institutional arrangements for co-ordinating information flows within and between organisations. Improved co-ordination among the relevant organisations should help to raise cost-effectiveness. In this respect, co-ordination is needed between the organisation which records emissions from point sources and the organisation which has the task of calculating diffuse emissions (from traffic, agriculture, etc.). Experience from OECD countries has pointed to the inefficiencies created by overlapping definitions and unnecessary duplication of work.

Responsibility for co-ordinating environmental information generation and flow should be unambiguously centralised in one organisation, possibly Goskomekologia. Funds for monitoring should be allocated on the basis of a multi-year integrated programme.

An autonomous institute, to ensure independence, should have the mandate and capability to integrate the information delivered by the various monitoring agencies. By means of modelling, geographical information processing, forecasting and data interpretation, the output of this work should be targeted at supporting strategic policy setting and as an input to developing integrated sectoral and environment policies.

One implication of the transition process is the shift of some responsibilities for producing environmental information from statistical offices to environment organisations. While this shift can help to strengthen the linkage between environmental information and decision-making, statistical offices will continue to play an important role. In particular, statistical offices can reinforce consistent use of internationally-agreed definitions and terminology in domestic environmental information systems and help to integrate the national environmental monitoring system with the national statistical system.

Debates about centralisation versus decentralisation of environmental management are an important issue in central and eastern Europe, often focused on the appropriate split of decision-making powers between different levels of government. The need to balance specific local needs against broader national needs is a difficult issue which must take account of the democratisation of society as well as the efficient organisation of an environmental information system. At each administrative level (oblast, raion) consideration could be given to designating a single agency responsible for environmental affairs. For example, the draft Environmental Action Plan for Belarus advocates the concept of tradeable emission rights in airshed "bubbles" and parts of river basins. This would require a specific agency at a specific level to maintain a comprehensive, legally binding and preferably public register of emission rights and transfer of rights.

2.2 Data Quality

The quality of Belarus' environmental data is generally compatible with international standards. However, contamination of samples, lack of laboratory equipment and poor statistical analysis undermine their credibility. Reports of World Bank mission-visits to analytical laboratories praised the performance of devoted laboratory staff, notwithstanding shortages of equipment and supplies. The reports noted, mostly on the judgement of the reporting agencies themselves, a handful of data series that were suspected of large systematic error, such as dust in air, oxygen demand in surface water, and strontium-90.

The reporting of hazardous waste generation needs to be substantially improved. There is much doubt about the accuracy of responses by enterprises to questionnaires. As noted in the previous section, it is important that Belarus develop a sound reporting and data management system for hazardous waste (cradle-to-grave tracking system).

Efforts are needed to make data recording more systematic and transparent, reduce discrepancies between data from different sources and ensure the independence of data suppliers. For example, examination of data generated from different sources provides an opportunity for feedback about their quality and relevance. The routine matching of discharge or emissions data with data on ambient concentrations via dispersion methods is one approach. The production of statistics by autonomous institutes may also help improve the credibility of the outputs.

To stimulate improvements in data quality, a first step could be to review the existing arrangements for information collection and analysis and to consider changes which would establish a framework for better institutional co-ordination and the reduction of monitoring networks. The second priority is to focus on improving the processes of information collection at the technical level, such as providing selective funding for the purchase of equipment and supplies. For example, incentives may be offered to producers of essential primary data to seek formal certification to international quality standards. This initiative need not be limited to government institutions but may also include private enterprises, for example commercial analytical laboratories.

Instrument inter-calibration programmes should be maintained. Where they were disrupted with the dissolution of the former USSR, they should be renewed. To a certain extent this will develop on its own account as regional and international professional contacts are taken up again and new ones forged. The costs of these programmes are usually modest but may still be a stumbling block during the transition period. The recently established Environment Fund could include instrument inter-calibration as an activity eligible for support.

2.3 Data Collection and Treatment

Although information on industrial emissions is being collected, it is not processed into a nationally consistent and readily accessible database or set of databases. Information on permits ("ecological passports") is available for consultation at Goskomekologia but has not been systematically processed because of resource limitations. A relatively large number of administrations are involved in contacts with the enterprise units, both nationally and at the local level. However, co-ordination between their information bases, and their actions with respect to dealing with emission sources, is lacking.

National registers of emissions to water and air should be developed, incorporating information on discharge permits. These registers should be accessible to local authorities to assist them in monitoring programmes, and they should provide information in a timely manner for policy-makers as an input to national policy setting. OECD countries and international institutions may be able to

share their experience as part of technical assistance efforts. Given the size of Belarus (see Annex B), it would be prudent to concentrate on developing a single national database for each subject, rather than setting up databases at the level of regions (oblasts) or below. The national register of established enterprise units, kept by the Goskomstat, should serve as a common base to ensure consistency between the emissions register, the permit register and the tracking system for chemical waste. Furthermore, by appointing one agency to be the co-ordinating body, an unambiguous information flow could be established between the suppliers of information and its co-ordinated dissemination. The national register should have sufficient flexibility to include new activities which emerge during and after the transition period.

As a priority, however, greater use should be made of modelling techniques and sample surveys to support policy development in the transition period, for estimating non-point source emissions and for projection studies. It is important to strengthen capabilities in modelling, geographical information processing, forecasting and data interpretation.

Consideration should be given to establishing an environmental baseline in order to have a reference base against which the environmental consequences of the transition to a market economy can be assessed. Priority attention could be given to gathering information on sinks of environmental pollution (soil, groundwater, biota), to areas where an increase in environmental stresses is anticipated (e.g. surface water) and to ensuring that measurements can be reproduced over time. Not all the parameters in the baseline need be permanently monitored: a date could be specified at which a comprehensive review would be undertaken.

2.4 Monitoring

At present the monitoring system of Belarus is being reviewed. All agencies involved in monitoring participated in this exercise, with Goskomekologia taking a leading role. The objective of the review appeared to be to increase the number of samples, sample stations and parameters analysed and to divide the associated tasks. This is contrary to what would seem necessary if the system is to address priorities and become cost-effective, i.e. analysing information needs and priorities, optimising the delivery of the required information, introducing mathematical modelling, and reorganising and channelling data from overview, cross-sectional or cross-media studies to a central point for subsequent dissemination.

The existing number of stations for monitoring air, surface water and groundwater quality should be reduced as well as the parameters which they record. Experience in OECD countries over the past ten years in the optimisation of monitoring networks, especially in air monitoring, could be drawn upon. Furthermore, mathematical modelling should be used to the maximum extent possible to estimate the quality of environmental media on the basis of emission data, which in their turn may be estimated on the basis of statistics on sectoral economic activities. With fewer stations (and a reduced number of parameters to measure), the provision of better or more cost-effective equipment at each station may be achievable. For example, in relation to urban air quality, low-cost passive monitoring devices can be used to generate the necessary information on distribution patterns.

Possibilities for cross-media and multiple exposure monitoring should be examined. Such monitoring can help in tracking trans-media movement of pollutants and their effects on environmental quality and human health. Similarly, using biological sampling as a complement to physical-chemical monitoring techniques can be cost-effective in determining water quality or compliance with permit conditions/standards.

Soil quality has been identified as a particularly important issue in Belarus. It is suggested, however, that systematic and continuous monitoring of soil quality should not be started within the

next few years. Anything more than very modest background monitoring would require too many resources and would probably not result in giving a different direction to environmental policy. It may be more effective to direct scarce analytical capacity to identify and implement priority actions in the clean-up of contaminated sites. The soil pollution information that is generated by the procedures associated with privatisation should be publicly accessible, not only for legal purposes but also to assist consultation efforts when prioritising actions for soil clean-up.

Improved enforcement of environmental legislation is a high priority in Belarus. Measurements in support of enforcement should preferably be carried out by or under the supervision of the environmental inspectorates concerned. A combination of high quality mobile equipment and self-monitoring by enterprises may be considered. This would require that enterprises meet nationally defined monitoring and reporting standards, either through the installation of in-house monitoring equipment and employment of appropriately qualified personnel or by hiring consultants who meet government standards of certification.

Self-monitoring by enterprises, supplemented by random checks by a monitoring authority, would alleviate the direct costs to government of undertaking this activity. This can eventually lead to environmental auditing of an enterprise's performance. Priority should be given to checking enterprises with poor compliance records. Belarussian industry is a significant consumer of ozone-depleting substances. The Environmental Action Plan notes that it is intended to prepare a strategy and seek funding for the phase-out of their use. An administrative procedure for monitoring the use of specific permitted substances is necessary to carry out this strategy.

In a market-based economy enterprises will need to be convinced that the monitoring information they supply is required for a defined purpose and that it can be collected cost-effectively. Principles of confidentiality need to be defined and reinforced by appropriate legislation.

2.5 Financing

Two special environment-related taxes have been introduced in Belarus. First, in order to finance the Chernobyl monitoring programme, an 18 per cent tax on wages - except for those in the agriculture sector - was introduced. This covers about two-thirds of the programme expenses. Second, an ecology tax was introduced in 1991 consisting of fees on pollution and on extraction of natural resources. The revenues are split according to a fixed formula between the different levels of administration and are intended to finance environmental protection measures.

Earmarking of environmental taxes and charges is a difficult issue (see OECD, 1993b). Most OECD countries are phasing out earmarked revenues because of risks of inefficient use of resources. However, in transition economies, the low level of environmental expenditures, and the severe pressure on the state budget, can make earmarking a practical transition measure for priority investments. That being said, the normal costs of government costs should be borne by the state budget. Thus, if the decision is made to retain earmarking of the revenue collected from these taxes, the allocation of the revenue should be consistent with the defined environmental policy priorities. Environmental monitoring, as a public activity, should be supported from the state budget as soon as possible.

The pricing of environmental information is an emerging issue. At present there is free exchange of information between organisations or State committees whereas exchanges with other parties (sometimes working for government or for international bodies) may involve requests for payment. A consistent policy position needs to be found for government-produced information. One possibility is to follow overseas patterns in this area and make standard information available at marginal costs. The definition of standard information is established in the form of programmes of work and this principle is applied equally to information requests from within and outside government.

Where information is to be used for commercial profit, royalties or other arrangements should be set accordingly. Information on the environment of Belarus that was collected at public cost during the period of Soviet governance (for example by the Central Research Institute for Complex Development of Water Resources) should be considered public property.

2.6 International Co-ordination and Contacts

Contact with the international professional community is lacking or limited. This is a significant handicap, and is another legacy from Belarus' link with the former USSR. Professional travel was severely limited. The only institute that did not mention problems in this respect was the Central Research Institute for Complex Development of Water Resources, which had an all-union role during the period of Soviet governance.

Strengthening international co-ordination and contacts confers mutual benefits. Belarussian officials and experts learn of international methodologies, new research directions and equipment as well as obtaining insight into how their national environmental information systems might be improved. Their international colleagues learn more about the environmental conditions in Belarus, and the European region more generally, as well as potential opportunities for collaborative research. Such contacts also facilitate the development of cost-effective technical and institutional arrangements for establishing regional information-sharing networks.

To assist international collaboration, Belarus should identify a single contact agency through which all data inquiries could be directed. Information seekers would know whom to send inquiries to and the Belarussian authorities would be able to co-ordinate their responses through a single national focal point.

A programme to improve access to international expertise should be developed. Possible elements include:

- adopting international classification systems for environmental information, such as that of the UN-ECE;
- aligning information collection systems with those of the broader international community, e.g. OECD/Eurostat, UN-ECE, European Environment Agency Task Force;
- bilateral exchange of experts on specific topics;
- assistance to attend international meetings, conferences, etc.; and
- language training for specialists.

3. Dissemination of Information

In the past, environmental information was characterised by its secrecy and the highly selective presentation of statistics. Consequently, public awareness and understanding of environmental issues is limited.

Strategies for disseminating information to the public still appear inadequate to improve general awareness. For example, there is a huge contrast between the handling and diffusion of information on radiation and on Chernobyl-related problems and the availability of information on

chemical pollution. Radiation information is made available to local administrators and the general public in an accessible format. The response to the Chernobyl disaster created useful know-how with regard to radiation data gathering, synthesis and dissemination. A general recommendation is to work towards reproducing this know-how in other areas.

Integrated (and forward-looking, and interpretative) reporting on the environment is needed at the national level in support of national environmental policy. The review of environmental monitoring that is presently being carried out by the Belarussian authorities also comes to this conclusion. For lower level administrative units and for specific themes, overviews compiled with the aid of models have a potential role in the efficient allocation of scarce resources. The models and data need not be complex. Possible applications include impact ranking in air management areas and river basins, with the purpose of prioritising permits to be revised. (This report does not discuss the administrative co-ordination needed to act on the basis of the information.) The scenario analysis run by the World Bank in preparation of the Environmental Action Plan for Belarus is an example. The model indicated an increase in gross discharges to surface water relative to emissions to air during the next decade under all economic scenarios that were evaluated.

Basic instruments for informing the public on environmental conditions already exist. Goskomstat published a book on environmental statistics in 1990 and the next book was planned to be published in 1993. In addition to a generally open attitude to public inquiries, Goskomstat issues a press-release on emissions twice a year. Environmental reports for the Soviet Union as a whole were published in 1990 and 1991. The first State of the Environment report for Belarus was released by Goskomekologia and the research institute "Ekologiya" in 1992. Despite the small number of copies printed, its focus on statistics and its availability in one language only, the production of such a report is a commendable achievement and the experience gained should be consolidated.

The provision of environmental information and its wide dissemination is an important objective in its own right. However, it should be seen as one component of a wider strategy to improve public education and awareness of environmental issues. Building partnerships with the private sector, NGOs and trade unions is vital if this broader goal is to be attained. In addition environmental education should be incorporated within school and university curriculums.

The Public Information and Education division of Goskomekologiya should be strengthened in order to improve the capacity to manage public communications, develop education programmes and co-ordinate with NGOs. The possibility of establishing an environmental resource centre open to the public should also be investigated. There is successful experience in OECD countries of such centres. Some employ a mix of media, for instance a telephone service in combination with short television flashes, whilst others act as communication "banks" connecting information seekers and suppliers.

The development of an environmental communication strategy is a dynamic process. There is no one "model" strategy. Developing materials appropriate to the audience (e.g. information kits, brochures, fact sheets on general and specific environmental issues) and assessing user feed-back to refine the techniques used for information dissemination are useful elements of any communication strategy.

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The State Committee for Ecology and the Research Institute "EKOLOGIA" (1992), *Prirodnaya sreda v respublike Belarus: sostoyanie i problemy*, Minsk.

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Annex A

List of Officials Consulted and Organisations Visited

The State Committee of Ecology (Goskomekologia)
Dorofeev, A M, Chairman
Voitov, I V, Head, Department of Economics and Regulation of Use of Natural Resources
Tylets, V D, Department of Economics and Regulation of Use of Natural Resources
Shkatulov, I S, Head, Inspectorate for Water Use

State Department for Hydrometeorology (Glavgidromet)
Skuratovich, I M, Deputy Director
Metveenko, I, Head, Republican Centre of Radiation and Environmental Monitoring

State Committee on Statistics and Analysis (Goskomstat)
Gasjuk G I, Deputy Chairman
Lossovskaya, L; Milevich L; Malachovskaya, V and Rybchik L, Division for Social Statistics, Health and Ecology

Ministry of Health (Minzdrav)
Filonov, V P, Vice Minister
Germanovich, F A, Director, Department for Hygiene, Sanitary and Prophylaxy
Kurganskaya, G, Leading Specialist, Hygiene and Epidemiology Directorate

Ministry of Forestry (Minleskhoz)
Romanovsky, V P, Vice Minister
Kuzmenkov, M V, Head of Division

Land Reform Committee
Krupenin, O M, Vice Head of Division

State Committee for Chernobyl (Goskomchernobyl)
Markovsky, N M, Vice Chairman
Tushin, N

Council of Ministers
Maximovich A M, Head Officer, Main Department of Industrial and Economic Services and of Nature Reserves
Head Officer for Belovezhskaya Reserve
Administrator from Chernobyl Commission

Central Research Institute for Complex Development of Water Resources (TsNIIKIVR)
Usenko, V S, Director
Kovsh P V, Deputy Director
Fashchevsky, B V, Head, Laboratory for Ecological Rating of Water Regime

Research Centre "Ecology"
Vaaks, V, Director
Levkevich, V E, Head, Monitoring and Information Division, Berezina Biospheric Reserve
Srybnyi A V, Head, Monitoring Background Station
Valetov, V, Biologist

Academy of Sciences, Ekomir - remote sensing
Kovaliov, Aleksandr A, Director

Youth Ecological Movement "Belaya Russ"
Dorozhko, S V, Co-ordinator

City of Borisov (160 000 inhabitants, 80 km from Minsk)

Elkind, V M, Head, Ecology Inspection
Tushinsky, P M, Vice Chairman for Ecology, Raion Executive Committee

Kuzmich, L F and Enpolsky V, Factory producing tractors (BATE)

Statsky, V I, Belarussian Association of Nature Protection (oblast level)

Annex B

Overview of Geography, Economy and State of the Environment in Belarus
(Extract from *Government of Belarus and the World Bank, 1993: Environment Strategy Study*)

Belarus has an area of 207,600 km (about two times the size of Hungary or Bulgaria), stretching 560 km from North to South and 650 km from East to West. It is bordered by Poland in the West, Russia in the East, Lithuania and Latvia in the North and Ukraine in the South. Extensive plains dominate the landscape - the highest elevation is only 307 meters above sea level. A chain of hills running latitudinally divides the country into a northern part where rivers drain into the Baltic Sea and a southern part which belongs to the basin of the Black Sea. The climate is mild continental (monthly average temperatures are in the range of -7 to +18 centigrade) and moderately wet, resulting in an abundance of marshy land which covers more than 20 per cent of the country. Apart from potassium chloride and peat, Belarus lacks significant mineral resources.

Belarus was declared an independent republic in September 1991, following the disintegration of the political and economic system of the former Soviet Union. Soviet centralized industrial development policy made Belarus the "assembly line of the Union". It specialized in high-skilled labour intensive activities such as machine building, textiles, wood products, meat and dairy production. In addition, Belarus became a significant producer of mineral fertilizers and basic chemical and petrochemical products. Systematic under-pricing of energy and raw materials led to usage per unit of output substantially higher than in market economies. Prevailing technologies, often out-of-date and inappropriate, produced high volumes of waste. Price distortions, subsidies and the absence of private property rights created a bias against investments in pollution abatement, adequate maintenance of existing plants and recycling. Environmental laws were left largely unenforced. Although the republic level environmental protection agency had been established quite a long time ago (in 1961), its powers were limited due to lack of an adequate legal basis and overlapping institutional responsibilities with other agencies.

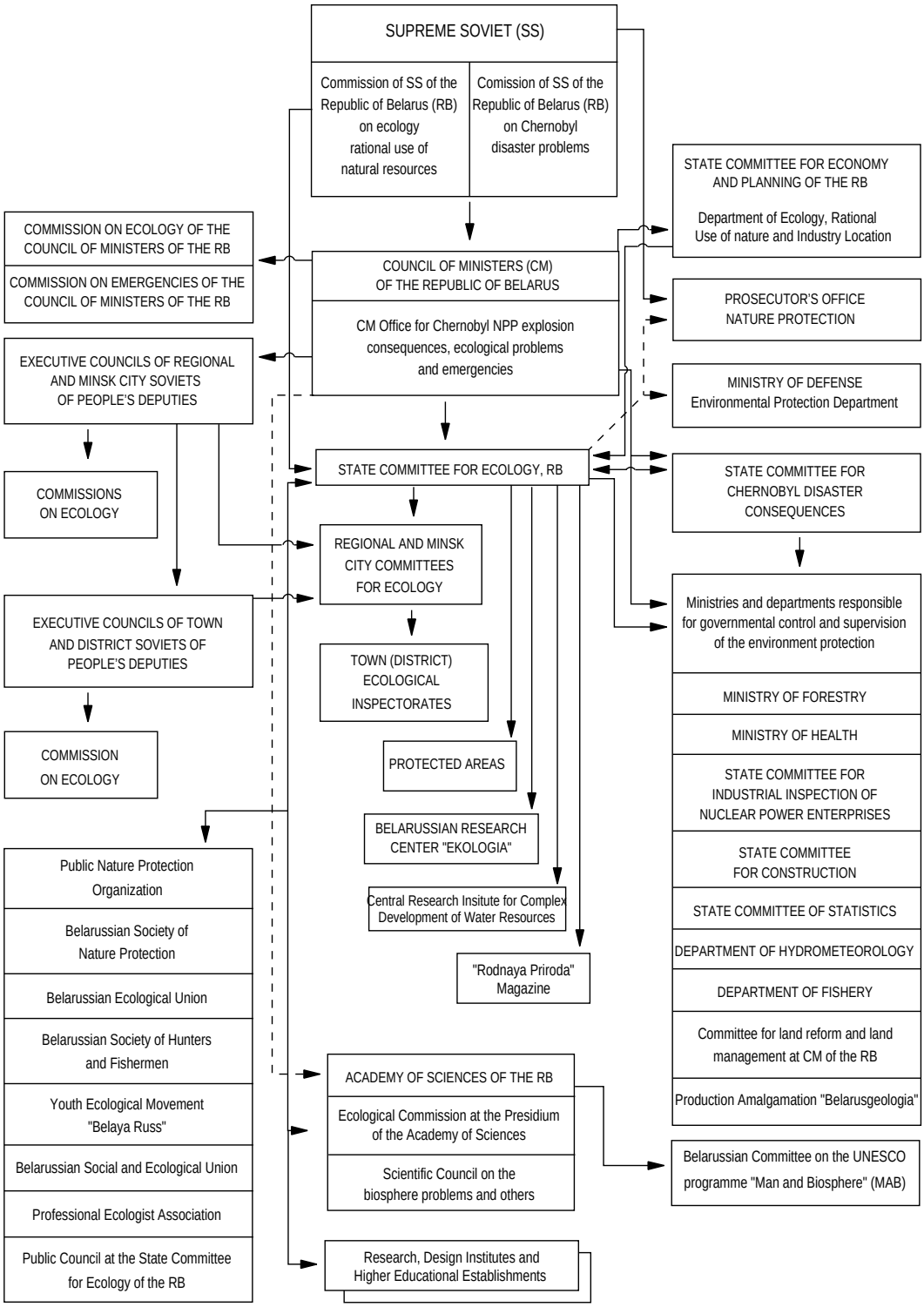
The environmental legacy of the former system in Belarus is not all negative, though. There were important initiatives and achievements in every decade since the Second World War. As a result of a massive reforestation and afforestation effort, the area of forests increased by almost 50 per cent between 1945 and 1973. In the same period, the total territory and the number of protected areas was substantially expanded. Major investments in secondary wastewater treatment were undertaken in the late 1970s and the early 1980s. Since 1980, a substantial decrease of air emissions has been achieved due to improved particulate emissions control and increased reliance on natural gas. Environmental awareness has sharply increased due to the aftermath of the Chernobyl accident, resulting in the establishment of a large number of non-governmental organizations. In 1991, a system of pollution fees was introduced which attempted to internalize environmental concerns into economic decision making.

Annex C

Map of Belarus

Annex D

Administrative Structure for Environmental Protection in Belarus



Source: The State Committee for Ecology of the Republic of Belarus (1992).
Governmental Report on the State of the Environment in the Republic of Belarus.

Annex E

Selected Environmental Data and Indicators

The development of environmental indicators for Belarus forms part of a broader work programme on environmental indicators carried out under the auspices of the OECD Group on the State of the Environment. Environmental indicators have already been published for OECD countries[***] as well as for the Partners in Transition Countries (PIT) Hungary, Poland and the former Czech and Slovak Federal Republic.

As part of the OECD assessment of the environmental information systems of Belarus, the Belarussian authorities agreed to fill in the joint OECD/Eurostat Questionnaire on the State of the Environment. This Annex E is based on the replies to the Russian version of the questionnaire and presents selected environmental indicators.

The data, which the OECD Secretariat received and treated in December 1992, were complemented and confirmed during a mission to Minsk in March 1993. Significant efforts were undertaken by Belarussian authorities to follow definitions and methodology in the OECD/Eurostat questionnaire. This support and compilation effort is gratefully acknowledged by the OECD Secretariat.

The OECD assessment of environmental information systems in several economies in transition forms the context and the basis for comparison of the environmental indicators of Belarus: where possible, indicator values for Belarus are presented alongside values for the former CSFR, Hungary, Poland and PIT (partners in transition) and OECD[****] averages. Differences among countries in methodologies and data quality remain, however, and caution needs to be exercised when using these data in an international context.

In Annex E, data points refer to the period prior to the separation of the Czech and the Slovak Federal Republic. The data are therefore presented for the entire former CSFR. Where possible, however, this is supplemented by separate information on the two Republics. Comparisons between countries are on a per capita basis, i.e., the size of the population was used for normalisation of environmentally relevant variables. To date, sufficiently reliable and internationally comparable data on national accounts aggregates are still unavailable; therefore, no comparisons using GDP as a denominator were made.

[***] See, for example OECD (1991), *Environmental Indicators: A Preliminary Set*; and OECD (1993), *Environmental Information Systems and Indicators: A Review of Selected Central and Eastern European Countries.* Further conceptual and development work on environmental indicators can be found in OECD(1993), *OECD Core Set of Indicators for Environmental Performance Reviews: Synthesis Report by the Group on the State of the Environment, Environment Monograph 83.*

[****] OECD averages include western Germany only.

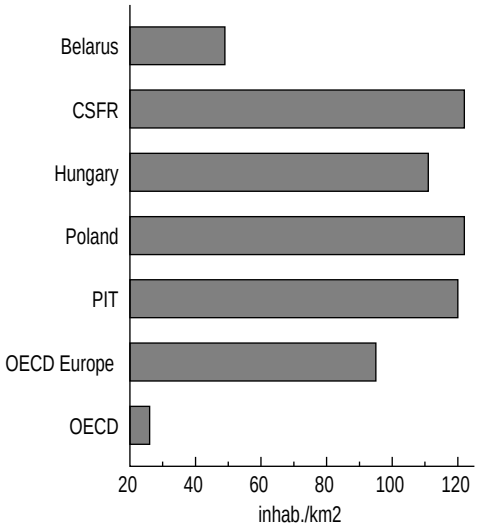
POPULATION

Population is a major determinant of environmental conditions and environmental pressures: population density means density of human activity and is correlated with pollution and with resource use. A cycle of population growth, declining per-capita income and acceleration of pollution and natural resource use is often an important determinant of environmental and social problems in developing countries.

The indicator proposed presents residential population trends over the last two decades and population density in 1990. It shows that, on average, population growth has been below OECD levels over the past 20 years.

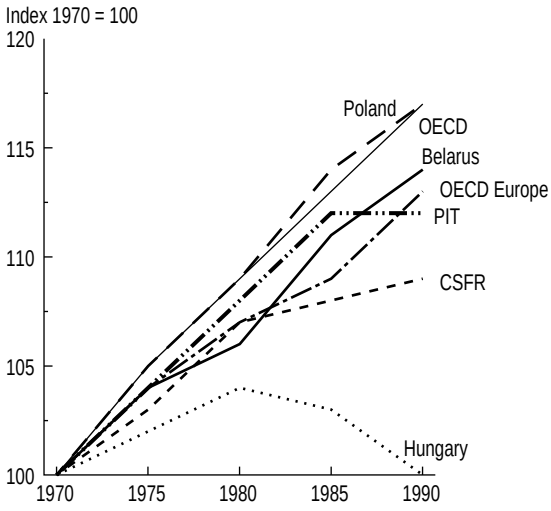
Population Density

State, 1990



Total Population

Trends



	Population (1000 inhabitants)					Change (%)	Population Density (inh./km2)
	1970	1975	1980	1985	1990	1970-1990	1990
Belarus	9002	9367	9560	9975	10259	14.0	49
CSFR	14334	14802	15311	15499	15661	9.3	122
Czech Rep.	9805	10063	10327	10337	10363	5.7	131
Slovak Rep.	4529	4739	4984	5162	5298	17.0	108
Hungary	10337	10532	10707	10649	10361	0.2	111
Poland	32526	34022	35578	37203	38119	17.2	122
PIT	57197	59356	61596	63351	64142	12.1	120
OECD Europe	369029	383572	393988	404055	416640	12.9	95
OECD	714762	750772	780454	808325	838787	17.4	26

Notes:
‣ Population is defined as all nationals present in or temporarily absent from a country and aliens permanently settled in the county (resident population).
‣ Density is calculated using the value of total land area including inland waters (e.g. rivers, lakes, artificial waters, coastal lagoons) but excluding coastal waters (e.g. estuaries) lying on the landward side of the "normal base line" along the coast.

Source: OECD, FAO, national reports

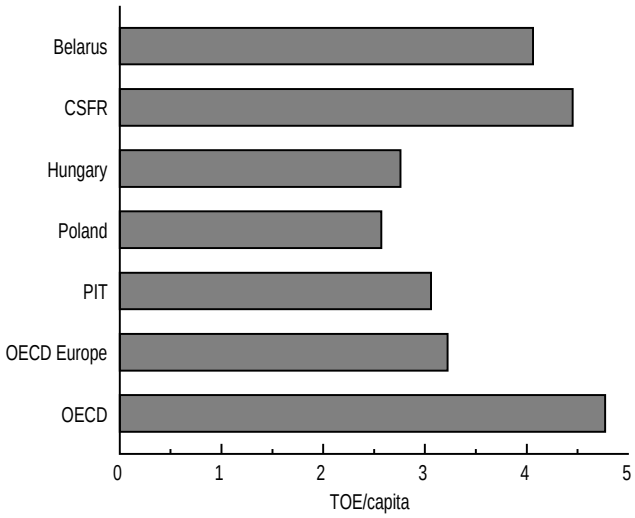
ENERGY INTENSITY

Energy production and use generate many environmental impacts, which vary according to the relevant fuels but are always of concern. In this context, reducing the energy intensity of an economy - for instance through cost-effective energy conservation - is a major dimension of environmentally sound energy policies.

Typically, energy intensity is measured as total primary energy supply both per unit of GDP and per capita. Here, the absence of reliable and internationally comparable GDP data confines the measurement of energy intensity to the per capita expression.

The table presents absolute values in terms of tonnes of oil equivalent (TOE) per capita for the period 1971 - 1990 as well as total primary energy supply (MTOE) for 1990.

Energy Supply per Capita, 1990



	Trends in Total Primary Energy Supply (TPES) per Capita (TOE/capita)					Change (%)	TPES (MTOE)
	1971	1975	1980	1985	1990	1971 - 1990	1990
Belarus	..	..	..	3.81	4.06	..	41.7
CSFR	4.01	4.30	4.79	4.89	4.45	10.9	69.6
Hungary	1.88	2.23	2.64	2.86	2.76	46.9	28.6
Poland	2.52	2.92	3.50	3.40	2.57	2.2	98.0
PIT	2.77	3.14	3.67	3.67	3.06	10.3	196.2
OECD Europe	2.76	2.81	3.06	3.04	3.22	16.6	1342.1
OECD	4.29	4.35	4.64	4.50	4.77	11.3	4002.9

Notes:

‣ Total energy supply is made up of indigenous primary energy production + imports - exports - international marine bunkers and +/- stock changes. Primary energy means hard coal, lignite and other solid fuels, crude oil and natural gas liquids (NGL's), natural gas, nuclear and hydro-electricity, geothermal and solar energy.

‣ OECD aggregates: 1971 data refer to 1970.

Source: IEA-OECD, national reports

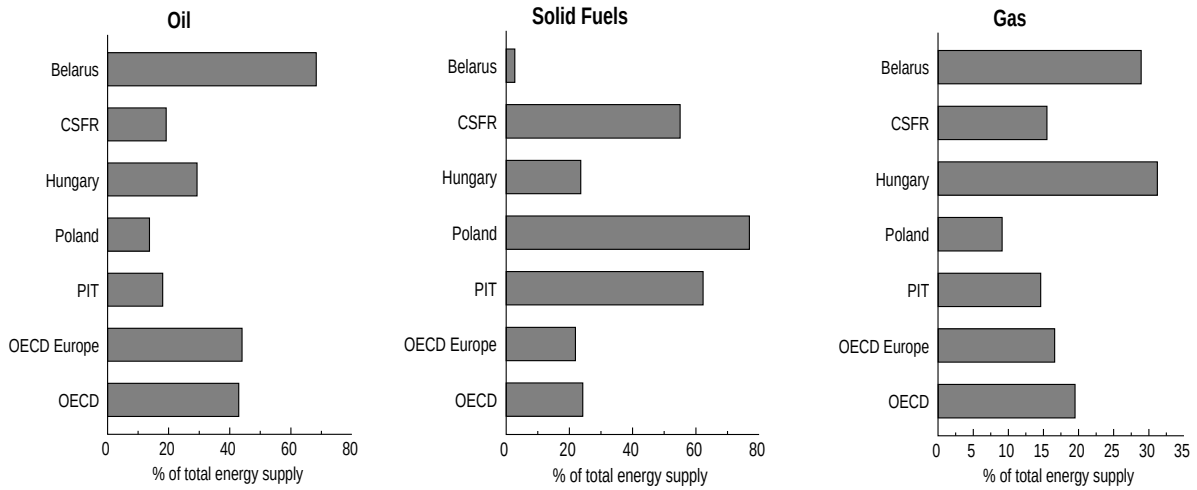
STRUCTURE OF ENERGY SUPPLY

Structural changes in energy supply have a major influence on environmental performance since the nature of environmental effects differs greatly from one source of energy to another. For instance:

- traditional atmospheric pollution is largely associated with the combustion of fossil fuels at local and regional levels (urban smog, acid rain);
- risks relating to the various stages of the nuclear fuel cycle and problems connected with the disposal of high-level radioactive wastes are linked to nuclear power generation;
- global atmospheric problems relating to greenhouse gases such as CO_2 come from fossil fuel use;
- extraction and transport risks (e.g. risks to coal miners, oil spills) are also linked to the extraction and use of fossil fuels.

The indicator presented expresses energy supply by source as a percentage of total energy supply.

Total Energy Supply by Source



Energy Supply by Source (% of Total)

	Oil			Solid Fuels			Natural Gas			Nuclear			Hydro etc.		
	1971	1985	1990	1971	1985	1990	1971	1985	1990	1971	1985	1990	1971	1985	1990
Belarus	..	77.0	68.3	..	4.0	2.7	..	19.0	28.9	-	-	-	..	..	..
CSFR	20.2	22.5	19.2	75.4	61.9	55.0	3.4	10.7	15.5	-	4.1	9.2	0.4	0.5	0.5
Hungary	35.8	33.1	29.3	47.2	29.0	23.6	15.1	29.0	31.2	-	5.6	12.5	0.1	0.2	0.1
Poland	10.8	12.9	13.7	83.0	79.5	76.9	6.0	7.4	9.1	-	-	-	0.2	0.1	0.1
PIT	17.2	18.7	18.0	75.8	67.2	61.4	6.2	11.3	14.6	-	2.0	5.1	0.3	0.3	0.3
OECD Europe	61.4	..	43.9	26.5	23.8	21.9	7.9	15.6	16.6	1.3	12.4	14.3	2.9	3.2	3.0
OECD	53.6	43.4	42.7	22.3	25.6	24.3	20.7	19.3	19.5	0.9	8.7	10.6	2.5	3.1	2.9

Notes:

- Country totals based on this table may not quite add up to total energy supply due to electricity imports and exports not included here.
- CSFR, Hungary, PIT: % change and per capita data include 1989 figures.
- OECD aggregates: 1971 data refer to 1970.

Source: IEA-OECD, national reports

AIR POLLUTANT EMISSIONS

Man-made sulphur oxides are predominantly emitted by energy production in utilities, followed by industrial combustion and industrial processes. They contribute not only to local and urban air pollution but also to large scale air pollution problems through long distance transport in the atmosphere. They may thus have negative effects on human health and on ecosystems (e.g. lake acidification, forest damage). Together with nitrogen oxide emissions, they play an important role in the acidification of the environment.

Man-made nitrogen oxides are emitted by transport sources, as well as by other energy uses and industrial processes. They contribute both directly and as a precursor of photochemical smog to local and urban air pollution. They also contribute to large-scale air pollution problems through long distance transport in the atmosphere. They may thus have a negative effect on human health and on ecosystems.

The indicator presented expresses total emissions in relation to the number of inhabitants. The lack of reliable and internationally comparable data on GDP makes it impossible to calculate another useful indicator of emission intensity: NOx and SOx per unit of GDP.

Emissions per Capita, late 1980s

	SOx Emissions (1000 tonnes)					Change (%)	Per Capita (kg/cap.)	NOx Emissions (1000 tonnes)					Change (%)	Per Capita (kg/cap.)
	1985	1987	1988	1989	1990	1987-199	1990	1985	1987	1988	1989	1990	1987-199	1990
Belarus	..	758	698	657	635	-16.2	61.9	..	263	262	263	281	6.8	27.4
CSFR	3150	2960	2800	2774	..	-6.3	177.4	1127	965	950	960	..	-0.5	61.4
Hungary	1404	1292	1218	1085	..	-16.0	104.5	263	276	259	249	..	-9.8	24.0
Poland	4300	4200	4180	3910	3216	-23.4	84.7	1500	1530	1550	1480	1280	-16.3	31.6
PIT	8854	8452	8198	7769	..	-8.1	89.6	2890	2771	2759	2689	..	-9.6	28.3
OECD Europe	15100	14700	14100	13800	13800	-6.1	33.4	12400	12900	1300	1300	1310	1.6	31.4
OECD	42700	41500	41400	41100	40200	-3.1	48.3	35900	36100	3660	3660	3670	1.7	43.8

Notes:

- When interpreting these data, it should be borne in mind that definitions and estimation methods may vary from country to country, and that comparisons among countries should be subject to caution.
- CSFR, Hungary, PIT: % of changes and per capita data include 1989 figures.
- OECD aggregates: Data are rounded and include estimates.

Source: OECD, EMEP, UNECE, WRI, national reports

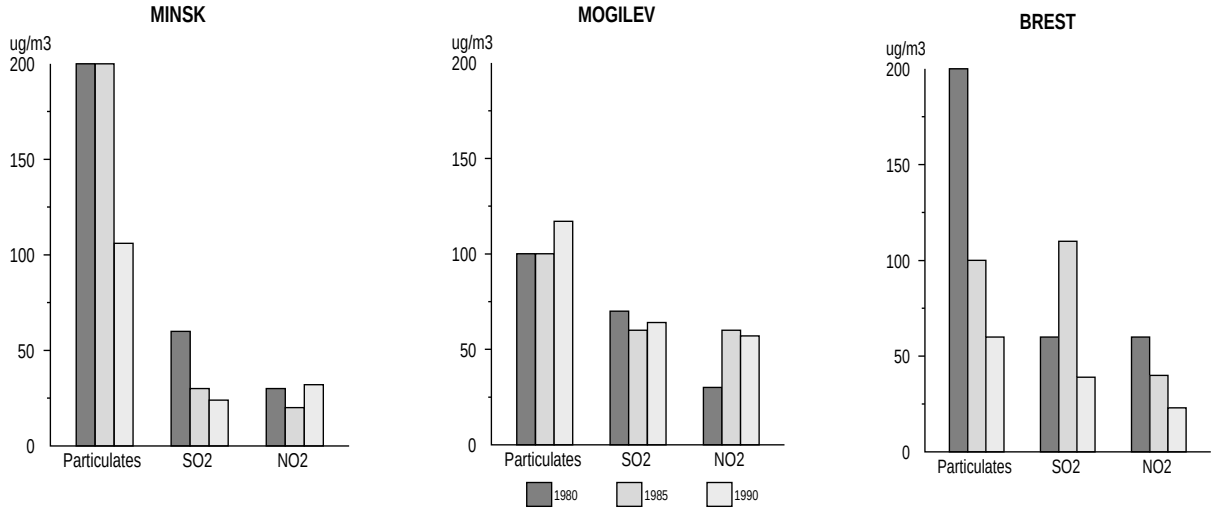
URBAN AIR QUALITY

Air quality is of economic, ecological and social importance given the implications it has for human health (especially the respiratory system) and more generally for the quality of life (e.g. odours, decreased visibility). Air pollution can also cause damage to the natural environment as well as degrade cultural and historical features, monuments, etc. through, for instance, acid precipitation. It interacts with local climatic conditions and with air pollutant emissions (see previous indicators). Many problems concerning urban air quality relate to pollution by SO_2, particulates, NOx, oxidants, CO, volatile organic compounds and heavy metals.

Air pollution in cities is of primary interest because most man-made sources of pollution originate there and because it significantly affects the quality of air breathed by city-dwellers.

Urban air quality indicators can be partly expressed through annual average concentrations of SO_2, particulate matter and NO_2 at monitoring sites located in cities, as these pollutants are directly emitted from man-made sources. This indicator can conceal important seasonal differences within the same city. Methods of measurement, number and location of measuring sites vary from one city to another.

Urban Air Quality in Belarus, selected cities



		Particulates (µg/m3)				SO2 (µg/m3)				NO2 (µg/m3)			
		1980	1985	1988	1990	1980	1985	1988	1990	1980	1985	1988	1990
Belarus	MINSK	200	200	193	106	60	30	30	24	30	20	38	32
	MOGILEV	100	100	111	117	70	60	50	64	30	60	85	57
	BREST	200	100	60	60	60	110	51	39	60	40	12	23
Czech Repub.	PRAGUE	178	137	75	68	74	86	43	45	..	77	47	74
Slovak Repub.	BRATISLAV	90	53	85	93	38	44	28	21	18	25	25	29
Hungary	BUDAPEST	..	10	9	..	..	40	35	..	..	34	27	..
Poland	WARSAW	48	75	49	51	47	54	23	24	52	67	71	57

Notes:

‣ Air quality is measured in terms of annual mean concentrations of SO2, particulates and NO2. The cities selected are major ones, in which a notable portion (5-10%) of the population is concentrated and and in which several measuring stations are located.

‣Hungary: data for particulates refer to soot.

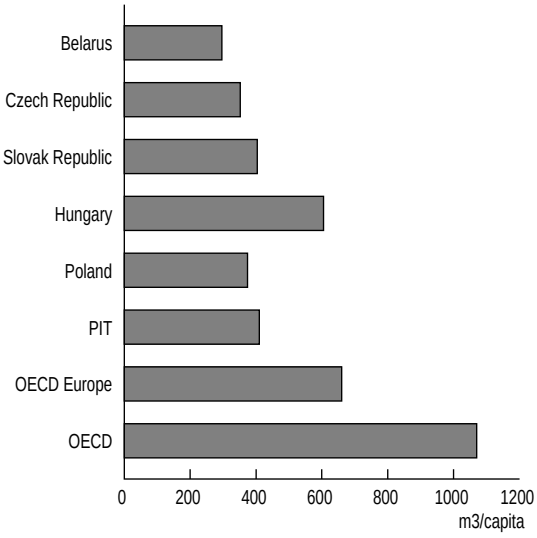
Source: OECD

USE OF WATER RESOURCES

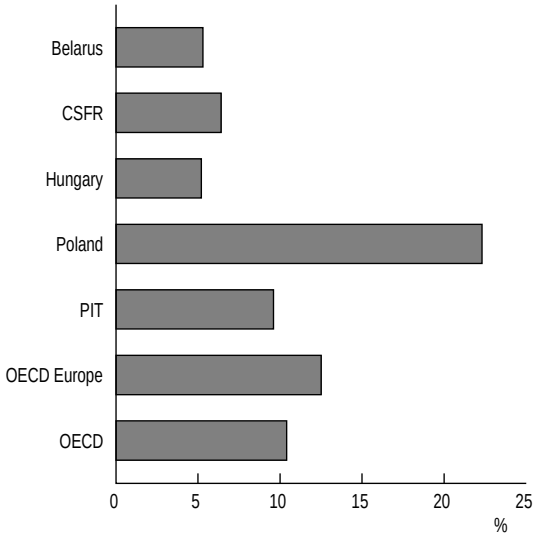
Water withdrawal is a major pressure on freshwater resources. In the more arid countries or regions and during periods of drought, water resources may be limited to such an extent that the demand from activities such as public water supply, irrigation, cooling of electrical power plants or industrial processes can be met only by going beyond a sustainable use of the resource in terms of quantity and possibly of quality.

One condition for the sustainable use of water resources can be expressed by an indicator founded on water resource accounting: water withdrawal (demand) as a percentage of gross annual availability of water (supply). The latter aggregates the quantity of water received during an average year from precipitation in the country and from inflowing rivers from neighbouring countries.

Total Withdrawal per Capita



Intensity of Use (Withdrawal as % of Annual Availability)



	Intensity of Water Use Total Water Withdrawal as % of Gross Annual Availability					Total Water Withdrawal	
						million m3	m3 per capita
	1970	1975	1980	1985	1990	1990	1990
Belarus	..	..	3.4	4.9	5.3	3035	296
CSFR	4.8	..	6.2	6.1	6.4	5786	369
Czech Republic	..	..	..	..	..	3647	352
Slovak Republic	..	..	..	..	..	2139	404
Hungary	2.5	3.3	4.0	5.2	5.2	6263	605
Poland	15.8	19.9	22.2	24.1	22.3	14248	374
PIT	6.4	6.1	8.9	9.9	9.6	26300	410
OECD Europe	8.9	9.9	11.9	12.3	12.5	275400	660
OECD	8.5	9.3	10.4	9.9	10.4	900800	1070

Notes:
- When interpreting the data, it should be borne in mind that definitions and estimation methods may vary considerably among countries.
- OECD aggregates: Secretariat estimates.

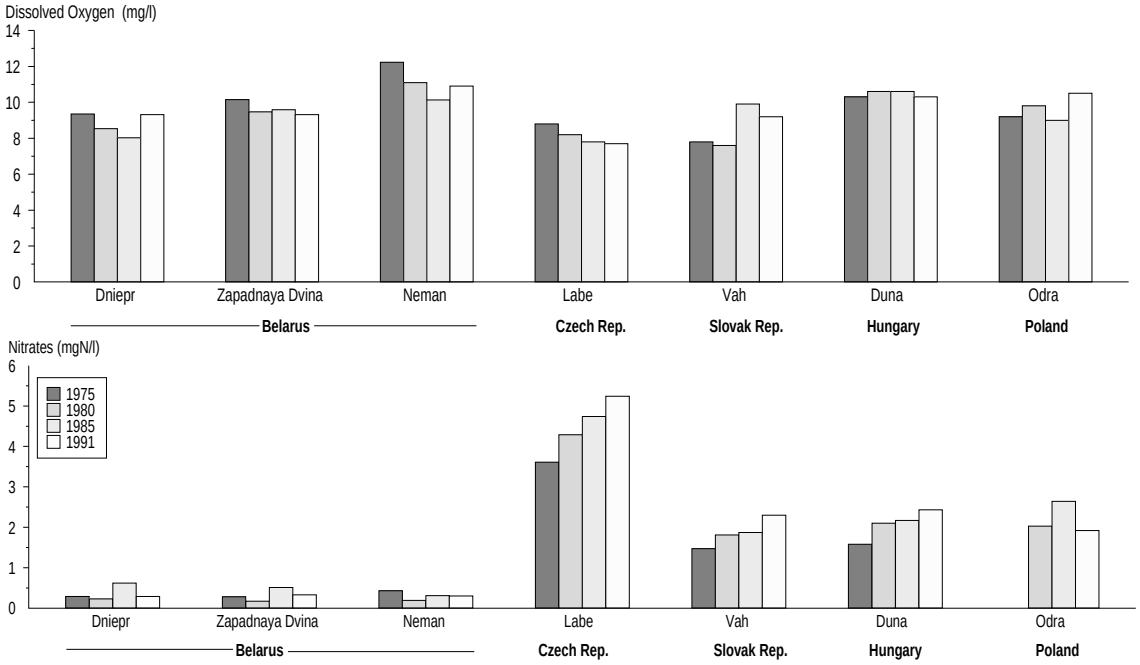
Source: OECD, WRI, BRGM

RIVER QUALITY

Water quality is of economic, ecological and social importance given the many uses of water resources; it supplements and interacts with water quantity issues. But rivers still receive and carry to the sea significant loads of sewage, both treated and untreated, wastes and soiled storm waters. Many problems concerning water quality have to do with pollution by organic matter, by nutrients and by an array of toxic substances. Such pollution can become an obstacle to the sustainable use of river water resources for agricultural, industrial, and recreational purposes as well as for providing drinking water.

Environmental conditions in this regard can be partly expressed by the oxygen content and the nitrate content of river waters. Measured at the mouth or downstream frontier, these indicators give a summary view of the pollution load and the depollution effort on the upstream watershed . Such measurements relate mainly to national objectives, but may have an international dimension for rivers crossing borders or reaching the sea close to frontiers.

Water Quality of Selected Rivers, 1975, 1980, 1985, 1991



		Dissolved Oxygen (mg/l)				Nitrates (mgN/l)			
	Rivers	1975	1980	1985	1991	1975	1980	1985	1991
Belarus	Dniepr	9.35	8.53	8.02	9.31	0.29	0.23	0.62	0.29
	Zapadnaya	10.15	9.47	9.59	9.31	0.28	0.17	0.51	0.33
	Neman	12.23	11.09	10.13	10.90	0.43	0.19	0.31	0.30
Czech Republic	Labe	8.8	8.2	7.8	7.7	3.61	4.29	4.74	5.24
Slovak Republic	Vah	7.8	7.6	9.9	9.2	1.47	1.81	1.87	2.30
Hungary	Duna	10.3	10.6	10.6	10.3	1.58	2.10	2.17	2.43
Poland	Odra	9.2	9.8	9.0	10.5	..	2.03	2.64	1.92

Notes:

‣ Water quality is measured in terms of annual mean concentrations of dissolved oxygen and nitrates. The rivers selected are major ones, draining large watersheds; the measurement locations are at the mouth of downstream frontiers of the rivers.

‣ Belarus: Water quality data should be interpreted with caution mainly because the locations of the sampling points in general are situated close to major wastewater discharges. Measurements do not take into account impacts occurring further downstream than 500 meters. In general, elevated nitrate levels are of concern particularly in drinking water.

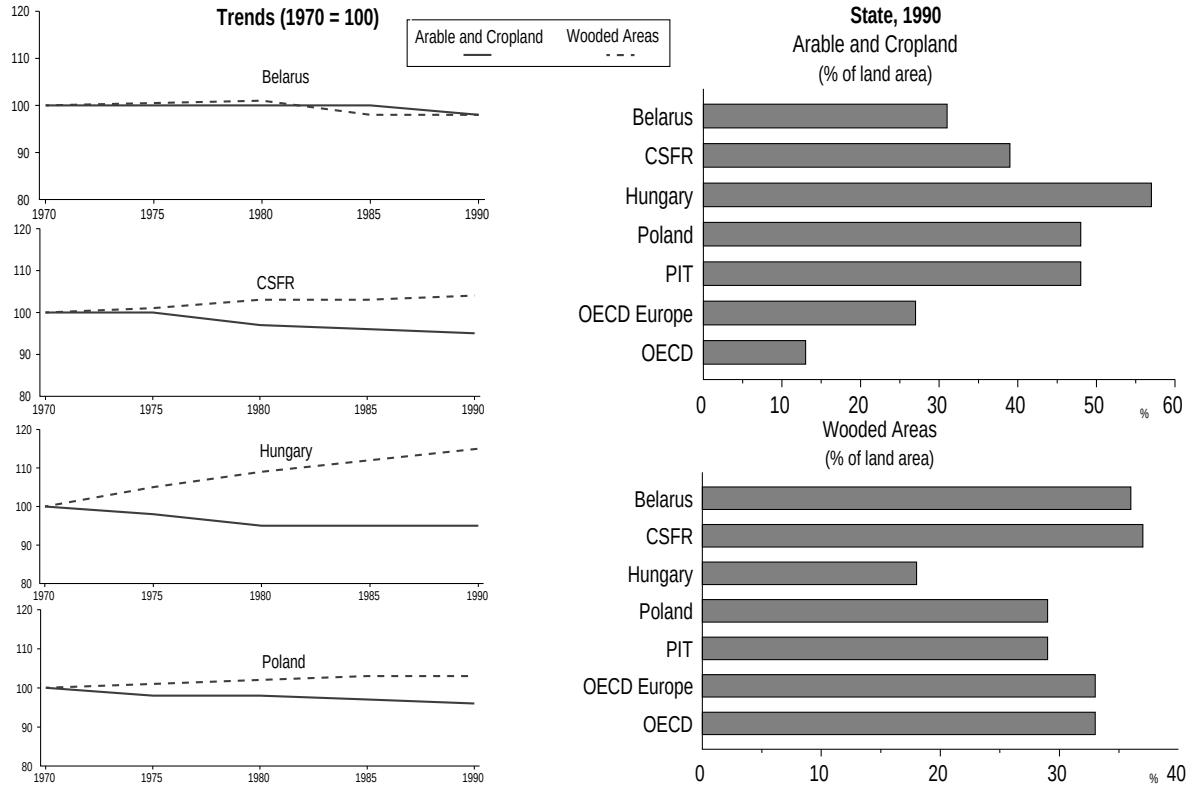
- Czech Republic: Labe - 1991 data refer to 1990.
- Slovak Republic: Vah - 1991 data refer to 1990.

Source: OECD

LAND USE CHANGES

The restructuring of the natural environment through land use changes and the associated farming and forestry practices have major consequences for soil resources, wild life and the quality of air and water over large areas. Areas of arable and cropland and wooded areas provide important information about countries' endowment in agricultural and forest resources, whether these resources are seen in an economic or environmental perspective.

Land Use



	Land Area (1000 km2) 1990	Arable and Permanent Cropland (1000km2)	% of land area 1990	% change 1970-1990	Forest and Wooded Areas (1000 km2)	% of land area 1990	% change 1970-1990
Belarus	203	1990	31	-1.5	74	36	-1.5
CSFR	125	49	39	-5.1	46	37	3.7
Hungary	92	53	57	-5.5	17	18	15.3
Poland	304	147	48	-3.9	89	29	3.2
PIT	522	249	48	-4.5	152	29	4.5
OECD Europe	4237	1145	27	-3.2	1416	33	5.1
OECD	30952	3998	13	1.1	10281	33	1.9

Notes:
The following definitions (FAO classification) have been used:
- Arable land refers to land under temporary crops, temporary meadows for mowing or pasture, land under market and kitchen gardens (including cultivations under glass), and land temporarily fallow or lying idle.
- Permanent cropland refers to land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee and rubber; it includes land under shrubs, fruit trees and vines, but excludes land under trees grown for wood or timber.
- Wooded areas refer to land under coniferous, non-coniferous, or mixed forest, as well as other wooded land.
- When interpreting those data, it should be kept in mind that definitions used in the different countries may vary.

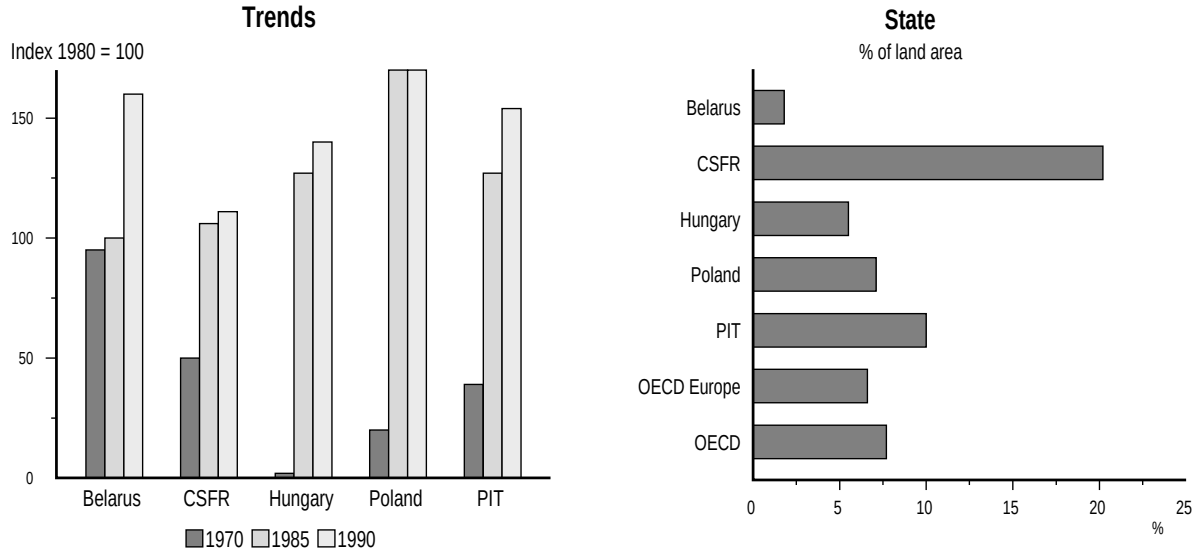
Source: OECD, FAO

PROTECTED AREAS

Nature protection is a goal at both national and international levels. It involves different levels of protection for different types of land and ecosystems ranging from full protection, to partial protection and to policies to promote multiple uses of land in farming or forest areas. Protected areas contribute to preserving ecosystems, protecting habitats of wild life species, and maintaining a relationship between man and nature.

The proposed indicator refers to land areas under protection levels I to V in the International Union for the Conservation of Nature (IUCN) classification which specifies different levels of restrictions on human activities allowed. These include, for instance, what may be called scientific reserves, national parks, natural monuments, nature reserves, or protected landscapes. Environmental performance in that respect depends both on the designation of the area and on the significance of the restrictions to activities effectively implemented; it is essential with respect to public opinion and to international agreements (e.g. Ramsar Convention, network of biosphere reserves).

Protected Areas



	Protected Areas (km2)				% of land area
	1970	1980	1985	1990	1990
Belarus	2260	2369	2369	3797	1.8
CSFR	11754	23287	24633	25868	20.2
Hungary	81	3649	4635	5111	5.5
Poland	1530	7645	14509	22301	7.1
PIT	13366	34582	43777	53281	10.0
OECD Europe	50000	121000	155000	288500	6.6
OECD	836000	1463000	1850000	2481700	7.7

Notes:

- Protected areas refer to IUCN management categories I-V. Each area, unless it is an island, is greater than 10 km2. National classification may differ.
- 1990 data may not be fully comparable to those of other years, due to a detailed review of the appropriate management category of each site.
- Belarus: IUCN categories I and IV. Data for 1990 include also the Polessky natural reserve. National classification includes a system of lightly protected areas and greenbelts of protected forests not included here. Total protected areas under the Belarus classification cover 11 015 km2, or 5.3% of the total land area.
- CSFR: 1990 data refer to 1989.
- Poland: IUCN data do not cover all the areas protected by law in Poland. These cover 55 109 km2 or 17.6% of the total area.
- OECD aggregates: Data are rounded and include estimates.

Source: OECD, IUCN

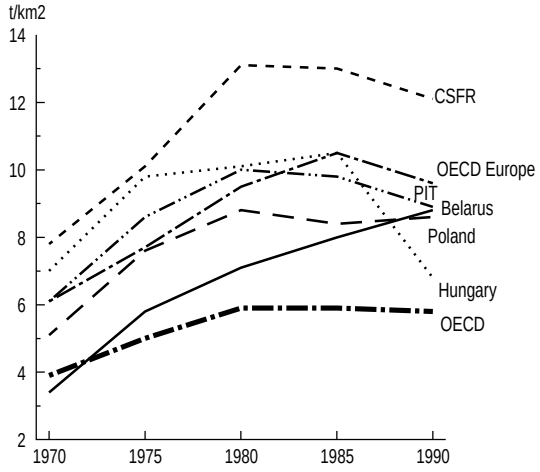
USE OF NITROGENOUS FERTILIZERS

Nitrogen is one of the major plant nutrients. However, the intensive use of nitrogenous fertilizers in agriculture can give rise to undesirable side-effects on the environment. It is a major diffuse source of pollution of water systems. Together with phosphates, nitrates play a major role in the eutrophication of rivers, lakes and coastal waters; nitrate pollution of groundwater is causing serious concern. Nitrates can also have negative effects on human health.

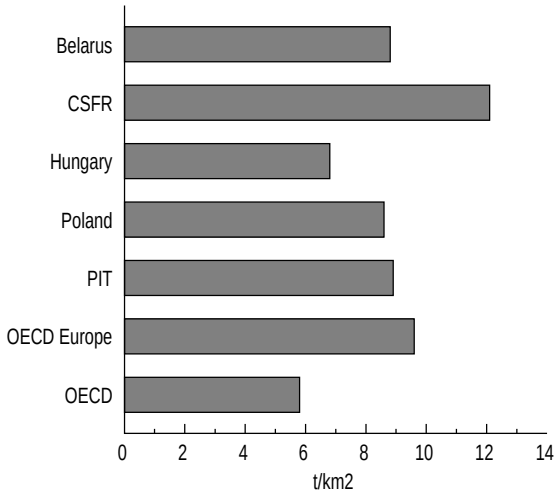
An indicator of intensity of use of nitrogenous fertilizers in agriculture - expressed as the amount of commercial nitrogenous fertilizers per km2 of arable and permanent cropland - relates to the likely environmental pressure from such fertilizers (in the absence of effective pollution abatement technology), which in turn might be a limiting factor for the sustainable development of agriculture.

Nitrogenous Fertilizers

Trends



State



	Nitrogenous Fertilizers Applied on Arable and Permanent Cropland (tonnes/km2)					Change (%)
	1970	1975	1980	1985	1990	1970-1990
Belarus	3.4	5.8	7.1	8.0	8.8	159
CSFR	7.8	10.1	13.1	13.0	12.1	48
Hungary	7.0	9.8	10.1	10.5	6.8	-3
Poland	5.1	7.6	8.8	8.4	8.6	69
PIT	6.1	8.6	10.0	9.8	8.9	46
OECD Europe	6.1	7.7	9.5	10.5	9.6	70
OECD	3.9	5.0	5.9	5.9	5.8	53

Notes:

‣ Data refer to the nitrogen (N) content of commercial fertilizers, and relate to apparent consumption during the fertilizer year (generally 1 July to 30 June) per unit of arable and permanent cropland.

‣ Belarus: More recently, the consumption of nitrogenous fertilizers has decreased considerably.

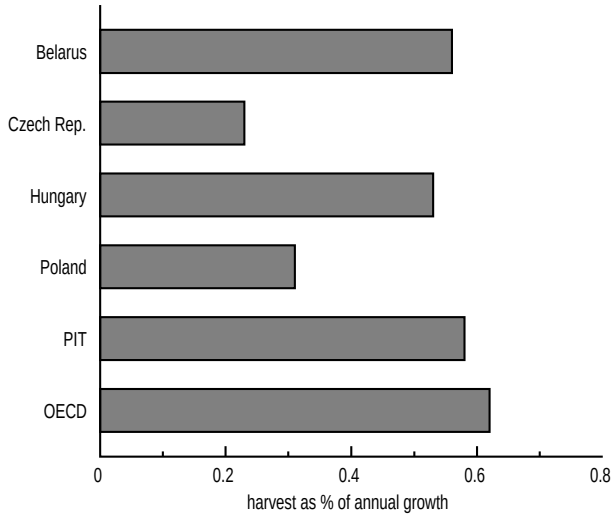
Source: OECD, FAO, IFA

USE OF FOREST RESOURCES

Forest resources have many functions: ecological, economic and social. The harvesting of timber is a major activity in many countries. It draws on forest resources to provide wood for domestic uses as well as export. One of the aims of forest management methods is to ensure that timber removal does not offset resource regeneration.

One indicator of timber resource use can be derived from forest resource accounting: annual harvest (on the demand side) is expressed as a share of annual growth of the growing stock of trees (on the supply side).

Intensity of Use of Forest Resources, 1990



	Growing Stock m3/ha	Annual Increment m3/ha	Annual Harvest million m3			Intensity of Use Total Harvest/Annual Growth		
	1990	1990	1970s	1980s	1990	1970	1980	1990
Belarus	133.9	3.6	10.4	11.6	11.1	0.67	0.54	0.56
CSFR	..	..	15.4	19.5	18.6	..	..	..
Czech Rep.	239.2	6.6	7.7	7.1	3.9	0.44	0.42	0.23
Slovak Rep.	..	..	..	..	..	..	..	..
Hungary	171.9	6.6	5.0	6.1	5.9	0.85	0.56	0.53
Poland	167.6	5.3	18.7	15.1	14.6	0.44	0.38	0.31
PIT	158.9	5.0	39.1	40.7	39.0	0.59	0.60	0.58
OECD Europe	113.4	3.7	248	278	439	..	..	..
OECD	101.9	2.3	914	914	1656	..	..	0.62

Notes:
When interpreting the data, it should be borne in mind that definitions and estimation methods may vary considerably among countries.
- Forest depletion due to natural losses such as epidemics, fire, windfall or flooding is excluded. Data refer to overbark values.
- Data refer to commercial forests only.
- Hungary: Due to a break in time series in 1972, 1980 data are not fully comparable to previous data.
- OECD totals include Secretariat estimates.

Source: OECD, IIASA

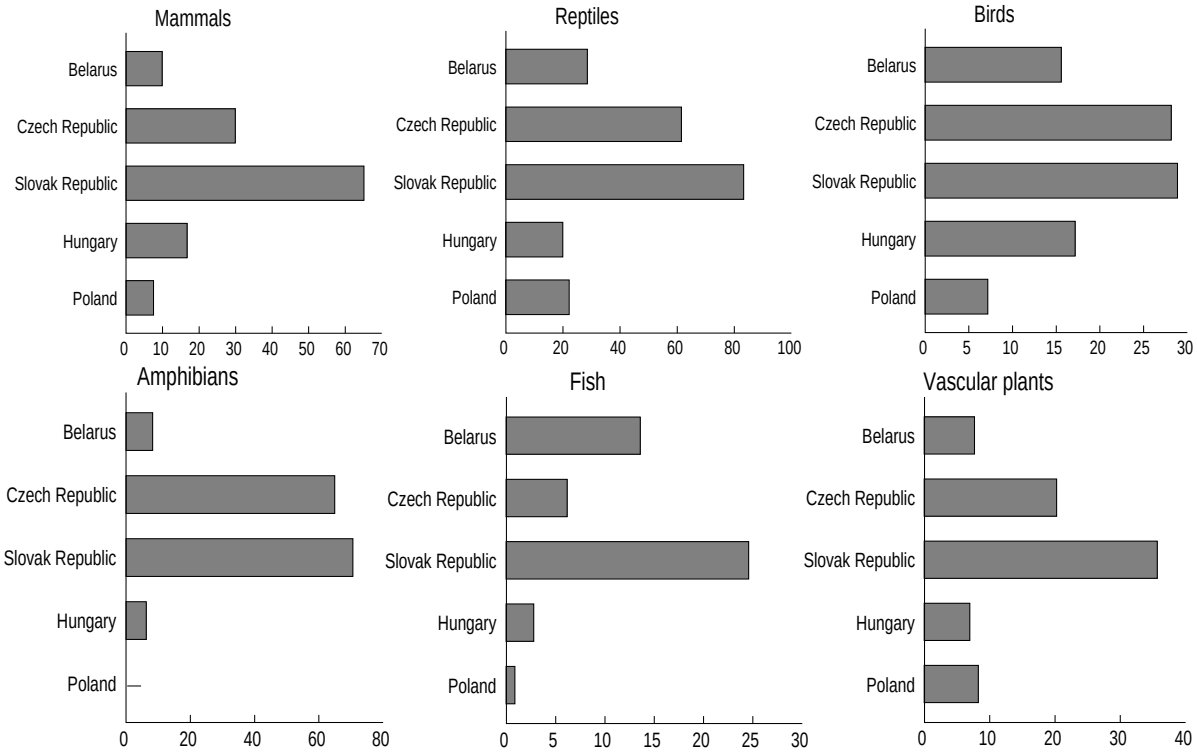
THREATENED SPECIES

Human society is dependent on wild life for material needs, for its role in maintaining life-support systems, and for quality of life. Wild life has economic and political significance far beyond its use as a natural resource. Biological diversity has become a key concern nationally and internationally, but is being lost through extinction of species and populations.

Wild life species are threatened by habitat modification and destruction, excessive or illegal exploitation, and pollution (e.g. oil spills, eutrophication, acidification, toxics such as pesticides).

Environmental conditions concerning biological diversity can be approximated by an indicator expressing the number of threatened species as a percentage of known species. The "threatened" category refers to species known to be both "endangered" and "vulnerable." Definitions do, however, vary from one country to another.

Threatened Species as % of Species Known, late 1980s



	Threatened Species as % of Species Known, late 1980s					
	Mammals	Birds	Fish	Reptiles	Amphibians	Vascular plants
Belarus	9.9	15.6	13.6	28.6	8.3	7.7
Czech Republic	29.9	28.2	6.2	61.5	65.0	20.3
Slovak Republic	65.1	28.9	24.6	83.3	70.6	35.7
Hungary	16.7	17.2	2.8	20.0	6.3	7.0
Poland	7.5	7.2	0.9	22.2	-	8.3

Notes:
When interpreting these data, it should be kept in mind that:
‣ the number of species known does not always accurately reflect the number of species in existence;
‣ the definitions are applied with varying degrees of rigour in the countries, although international organisations such as the IUCN are promoting standardization.

Source: OECD

MUNICIPAL WASTE

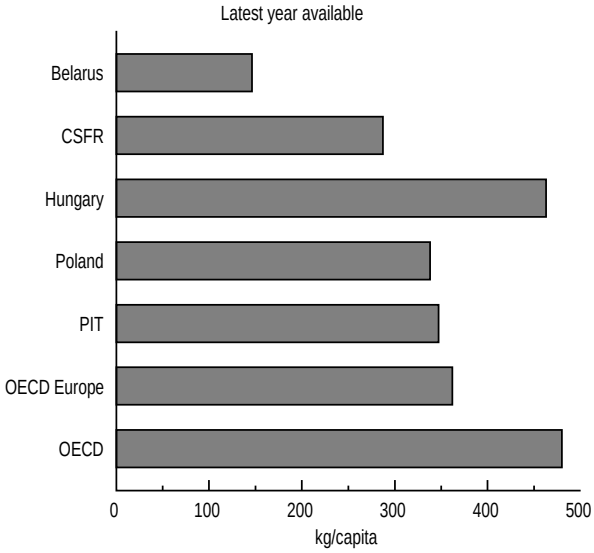
The amounts of municipal waste generated in each country are related to the rate of urbanisation, the types and patterns of consumption, the level of household revenues and lifestyles, and to existing waste management policies.

Disposal of municipal wastes in central and eastern Europe is mostly in landfills, more rarely by incineration or other methods (e.g. composting). It is at the heart of municipal waste management policies and sometimes stirs up public controversy. Disposal is, or should be, supplemented by waste minimisation policies.

One way to compare waste generation at the international level is to express it as municipal waste amounts per capita. This ratio is related to the level of consumption and, to a lesser extent, the pattern of consumption (e.g. behaviour with respect to recycling, adaptation of product design to consumer demands, consumer information such as labelling).

This indicator should be treated with great caution as many differences remain concerning the definitions of municipal waste from one country to another.

Amounts of Municipal Waste per Capita



	Municipal waste generated		
	Year	Total Amounts (1000 tonnes)	Per capita (kg/cap.)
Belarus	1990	1500	146
CSFR	1987	4501	287
Czech Republic	1987	2600	251
Slovak Republic	1987	1901	359
Hungary	1989	4900	463
Poland	1990	12806	338
PIT	late 80s	22200	350
OECD Europe	1990	150000	360
OECD	1990	408000	480

Notes:
‣ Municipal wastes include principally household waste and bulky waste, as well as similar waste from small commercial or industrial enterprises, and market and garden residues, which are collected and treated by or for local authorities.
‣ OECD Europe: includes Secretariat estimates and rounding.
‣ When interpreting these data, it should be borne in mind that definitions and estimation methods may vary from country to country, and that comparisons should be subject to great caution.

Source: OECD

List of Abbreviations used for Data Sources

BRGM: Bureau de recherches géologiques et minières

EMEP: European Monitoring and Evaluation Programme

FAO: Food and Agriculture Organization of the United Nations

IEA: International Energy Agency

IFA: International Fertilizer Industry Association

IIASA: International Institute for Applied Systems Analysis

IUCN: International Union for the Conservation of Nature

UNEP: United Nations Environment Programme

WRI: World Resources Institute