

**ENVIRONMENTAL INFORMATION SYSTEMS IN THE RUSSIAN FEDERATION
AN OECD ASSESSMENT**

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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FOREWORD

Environment is an important component of the programme of activities coordinated by the OECD Centre for Co-operation with the Economies in Transition (CCET). Drawing on the experience gained in the OECD countries and the work of other international organisations, the CCET work programme includes activities aimed at advising central and eastern European countries (CEECs) and the New Independent States (NIS) of the former Soviet Union on the introduction and implementation of environmental policies compatible with a market-based economy. The CCET environmental programme focuses on three main themes, which reflect priorities identified in the conclusions of the Environment for Europe Ministerial Conferences held at Dobris (1991), Lucerne (1993) and Sofia (1995). The themes are:

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

This OECD Assessment of the Environmental Information Systems of the Russian Federation falls under the third theme. It is based on work undertaken by an OECD review mission to the Russian Federation in April 1994, as well as the outcome of an OECD/UNEP seminar "Integrated Environmental Information Systems in Support of Decision Making on the Oblast Level" and an OECD workshop "The Development of the Unified Environmental Monitoring System in The Russian Federation", which were both held in Moscow in January 1995. The results of the assessment were discussed at a workshop held under the auspices of the OECD Group on the State of the Environment.

The report assesses the adequacy of environmental information systems in the Russian Federation against the background of the changing needs for environmental information in the current process of economic transformation. It makes specific recommendations that highlight the importance both of implementing cost-effective means of collecting environmental information to meet priority information needs, and of establishing institutional arrangements to facilitate the co-ordination, integration and exchange of such information. The report also encourages greater information dissemination efforts in order 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 report is published under the responsibility of the Secretary-General.

Salvatore Zecchini
OECD Deputy Secretary-General
Director of the CCET

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AVANT-PROPOS

L'environnement est un élément important du programme coordonné par le Centre pour la Coopération avec les Économies en transition de l'OCDE (CCET). S'inspirant de l'expérience acquise dans les pays de l'OCDE et des travaux d'autres organisations internationales, le programme de travail du CCET vise à donner aux pays d'Europe centrale et orientale (PECO) et aux nouveaux États indépendants (NEI) de l'ancienne Union soviétique des conseils pour l'adoption et la mise en oeuvre de politiques d'environnement compatibles avec une économie de marché. Le programme pour l'environnement du CCET s'articule autour de trois thèmes correspondant aux priorités identifiées dans les conclusions des Conférences ministérielles intitulées "Un environnement pour l'Europe" tenues à Dobris (1991), à Lucerne (1993) et à Sofia (1995). Ces thèmes sont les suivants :

- l'intégration des considérations environnementales dans le processus de restructuration économique ;
- la création d'institutions ; et
- l'information sur l'environnement et l'examen des politiques dans ce domaine.

La présente évaluation par l'OCDE des systèmes d'information sur l'environnement dans la Fédération de Russie s'inscrit dans le troisième thème. Elle s'appuie sur les travaux effectués par une mission d'examen de l'OCDE en Fédération de Russie en avril 1994, ainsi que sur les conclusions d'un séminaire OCDE/PNUE et d'un atelier OCDE respectivement intitulés : "Integrated Environmental Information Systems in Support of Decision Making on the Oblast Level" et "The Development of the Unified Monitoring System in The Russian Federation", tous deux tenus à Moscou en janvier 1995. Les résultats de cette évaluation ont été discutés lors d'un atelier organisé sous les auspices du Groupe de l'OCDE sur l'état de l'environnement.

Ce rapport évalue l'adéquation des systèmes d'information sur l'environnement en Fédération de Russie par rapport à l'évolution des besoins en informations environnementales lors du processus actuel de transformation économique. Il fait des recommandations spécifiques qui soulignent l'importance de la mise en oeuvre de méthodes efficaces de collecte de données environnementales qui répondent aux besoins prioritaires d'information et de la mise en place de dispositifs institutionnels qui facilitent la coordination, l'intégration et l'échange de ces informations. Le rapport encourage aussi à renforcer les efforts de diffusion de l'information afin de sensibiliser davantage la population nationale aux problèmes d'environnement. Enfin, il recommande d'intégrer le système d'information national à un cadre international plus large afin de favoriser les contacts et la coopération avec la communauté professionnelle internationale.

Ce rapport est publié sous la responsabilité du Secrétaire général.

Salvatore Zecchini
Secrétaire général adjoint de l'OCDE
Directeur du CCET

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* Team members/
Membres de l'équipe: ▶ Jan Bakkes, National Institute of Public Health and Environmental Protection, the Netherlands
▶ Jaroslav Benes, Czech Environment Institute, Czech Republic
▶ Dimitrii Kolganov, State Institute of Applied Ecology, Russian Federation
▶ Fedor Kozak, UNEP/INFOTERRA, Kenya
▶ Marie Mojaïsky, ECAT-St Petersburg, Russian Federation
▶ Paul Rump, Environment Canada, Canada
▶ Otto Simonett, UNEP/GRID, Norway
Consultants: ▶ Reginald Noble, Bowling Green State University, USA
▶ Andrea Matte-Baker, UNEP Regional Office for Europe
OECD/OCDE Secretariat: ▶ Bo Libert

ENVIRONMENTAL INFORMATION SYSTEMS IN THE RUSSIAN FEDERATION:
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ENVIRONMENTAL INFORMATION SYSTEMS IN THE RUSSIAN FEDERATION: AN OECD ASSESSMENT

SUMMARY AND CONCLUSIONS

Introduction

After having been the centre of gravity of the Soviet Union from 1917 to 1991, the Russian Federation is presently engaged in a re-orientation towards a market-based economy. This includes a move towards less government intervention, as well as decentralisation of responsibilities to subnational levels of administration.

The objective of this report is to review environmental information systems in the Russian Federation against the changing role which environmental information has to play during the transition period and beyond. In the transition period, the environmental information system must be adapted to:

- i) assist in developing and enforcing environmental legislation and policies;
- ii) support decision making particularly at subnational levels;
- iii) help improving the coherence of sectoral and environmental policies;
- iv) inform the public, the emerging private sector and NGOs on environmental conditions and trends; and, more generally,
- v) to support progress towards national and international goals of sustainable development.

As Russia becomes increasingly integrated into international environmental information systems, the demand for such information will also accelerate in respect of both regional and global comparative studies.

The Russian Federation has inherited a solid core of systems for gathering environmental information, especially concerning ambient monitoring and statistical data collection. This is reinforced by the impressive level of technical skills available in the relevant ministries and research institutes. Commendable achievements are the state of the environment reports prepared by the Ministry of Environmental Protection and Natural Resources, as well as regular publications produced by other administrative units and scientific organisations. Furthermore, replies to the OECD Questionnaire on the State of the Environment indicate that data are available for a good number of key environmental parameters. Such factors are encouraging for successful re-orientation of the existing environmental information systems.

Areas for progress

One of the major challenges facing Russia is to strengthen environmental information systems to assist decision making at the sub-national levels. Given the diversity of these regions, the physical size of Russia and the complexities of its administration, progress in this area would be a major achievement.

This review identifies several cross-cutting issues and priority areas for further progress:

- First, re-organising institutional arrangements to promote horizontal and vertical co-ordination and to improve the structure of decision making.

Due to the historical background, the culture of government and public administration in Russia is different from that of OECD countries and, indeed, most central European countries. The current institutional set-up for environmental management is very complex. Responsibilities are scattered and sometimes overlapping among administrations as well as administrative levels. This is leading to fierce competition, which is further exacerbated by the limited human and financial resources available. This situation affects the way in which environmental goals are set and enforced, as well as the effective decentralisation of responsibilities to subnational territories and their capacity to make decisions.

With regard to environmental information systems, there is an urgent need to clearly divide responsibilities between the federal and territorial levels, and to improve arrangements for inter-agency co-operation. More co-operative and result-oriented arrangements could both enhance cost-effectiveness and policy relevance and improve the understanding between the various actors. The proposed Unified State System of Environmental Monitoring (USSEM) addresses this issue and aims to promote co-ordination among the various agencies at federal and sub-national levels. This is a major and much needed development. Effective implementation of USSEM should be given priority attention.

■ Second, moving from data to information that is relevant to sectoral and environmental decision making.

The current environmental information systems do not reflect a consistent analysis of priority needs or demands. A striking feature is the contrast between the large volume of data produced and the difficulty in using them to support decision making. This is of particular concern for the development and enforcement of new environmental legislation and policies, as well as for the new local needs for environmental information.

To meet the new demands, environmental information has to be reliable and credible and more responsive to the needs of the policy-makers and the public. There is a general need for better design interpretation and analysis rather than more data. Instituting effective and manageable quality assurance is a major challenge which is made more difficult by the economic situation and the vastness of the country. While results achieved so far are limited, the various administrative and scientific organisations are aware of these problems and efforts to address them are being developed.

■ Third, increasing public and professional awareness of environmental issues and improving the access to environmental information.

This goal can be achieved only by establishing a clear strategy on environmental information and education. According to Russian law, environmental information is supposed to be freely available to the public. Availability, however, needs to be distinguished from accessibility. In addition to the dispersed nature of environmental information, access is made difficult because of a long tradition of secrecy within the administration and the current economic situation, data being frequently accessible only by agreement or purchase. As a consequence, public awareness of environmental issues remains low and environmental information and communication is barely used in the decision making processes.

Recommendations

■ The future development of environmental information systems in the Russian Federation should be demand-driven and aim at producing better rather than more data. More specifically, this implies:

- The establishment of an effective quality assurance mechanisms to improve the reliability and credibility of data and published materials;
- The evolution towards a more integrated approach to data management and their timely dissemination;
- A prioritisation of information needs focusing on most urgent needs and preparing for longer term developments;
- In the short term, priority should be attached to strengthening the quality of information related to:
 - i) the greatest risks for human health; and
 - ii) irreversible environmental changes particularly those related to privatisation of land and production facilities.

This information should be complemented with an adequate coverage of pressures on the environment, including pollutant emissions and natural resource use, and a better integration of the existing cadastres on water, soil, forests and minerals.

- Over the longer term, the federal government should work towards developing information systems and expertise to:
 - i) support the development and enforcement of environmental legislation and policies; and
 - ii) better recognize the environmental implications of economic and sectoral policies (outstanding sectors are energy, land use planning, transport, and forestry).

Consideration should also be given to the development and use of environmental indicators to follow progress towards policy goals;

- Progress also needs to be made in the provision of information on the economic implications of environmental decisions (e.g. environmental expenditures, cost-benefit analysis)

■ Financing environmental information systems should be given more attention.

- In addition to government funding, it is important to develop new forms of financing and funding mechanisms; these might include international financing institutions, donor countries, as well as partnerships with stakeholders (e.g. the emerging private sector, independent research institutes) associated with specific tasks and results. Consideration should also be given to appropriate ways of budget allocations and financial transfers to the territories particularly for the implementation of the Unified State System of Environmental monitoring (USSEM), including possibilities for joint financing by federal and territorial levels.

■ Another key task is to raise public and professional awareness and facilitate access to environmental information through:

- Including environmental management topics into educational curricula at all levels;
- Ensuring easier and better coordinated access to all environmental data held by public authorities;
- Improving the circulation of facts to the public. This should include the development of a dissemination strategy by the Ministry of Environmental Protection and Natural Resources. The experience gained since 1990 through the publication of state of the environment reports and other regular environmental publications provide a good foundation and should be extended to a broader range of products and users;
- Informing users and the public about the significance and appropriate interpretation of environmental information; and
- Developing partnerships with all parties involved (including the emerging private sector, environmental NGOs, local governments, etc.).

■ There is also a need for further extending existing arrangements for international co-operation in environmental information. In particular:

- Russia's reporting of domestic performance needs to be strengthened in terms of commitments under international environmental agreements to which it is a party. This refers both to commitments on global issues such as climate change and biological diversity and to commitments on regional and transboundary issues such as the protection of the Antarctic and of the Baltic Sea; strengthening domestic capabilities in, and co-ordination of, information collection, treatment and dissemination will there be critical.
- Ongoing work on harmonising definitions, classifications and monitoring protocols with international standards should be further consolidated;
- Exchanges of experience with OECD and other central European countries should be promoted;

■ The success of these developments will depend on the appropriateness and stability of institutional arrangements. In particular:

- Responsibilities between the federal and territorial levels should be clearly divided; the federal government should focus on supporting and co-ordinating developments in the territories;
- Arrangements for inter-agency co-operation should be streamlined and a more co-operative and result-oriented mode of organisation should be adopted;

■ With respect to environmental information systems at the territorial level developments should aim at providing territories with appropriate support and tools for local decision making and taking up their new responsibilities. This will require:

- A critical assessment of local needs in terms of environmental data, methodology, technology and personnel in each territory;
- The establishment by the federal level of a continuing dialogue with lower administrative levels to set up common strategies and basic regulations and provide instructions, and advice to support the development of compatible environmental information systems in the territories; positive initiatives launched at territorial level and experiences from other federal countries could be used as a starting point for discussions and information exchange;
- An appropriate transfer of information between the federal, territorial and local levels of government.

■ With respect to environmental monitoring systems the main objective should be their ability to provide information that can easily be integrated and used support decision making. This requires an optimisation of the current systems and a "thinning out" to leave a core programme that is appropriate to the new information demands. The Unified State System of Environmental Monitoring (USSEM) could achieve this goal. For its effective implementation, the following recommendations should be considered:

- The USSEM should focus on:
 - i) setting up a core programme of federal monitoring;
 - ii) developing a framework for co-ordinated monitoring across all levels of government; and
 - iii) supporting the developments at subnational levels.Priority should be given to the establishment of greater co-operation and a better understanding between the various actors;
- The development of USSEM should draw upon economic calculations evaluating the costs of environmental monitoring systems and assessing their benefits in supporting decision making and informing the public.
- In the short term, the cost-effectiveness of environmental monitoring systems could be raised through:
 - i) establishing an accessible meta-information system to allow better use of data from existing monitoring activities;
 - ii) prioritising information needs with respect to the new demands, a distinction being made between short and longer term priorities (see also above);
 - iii) reducing the number of overlapping and redundant monitoring activities; and
 - iv) expanding the use of modelling and monitoring feedback information (e.g. emissions) to reduce the gathering of information per se.

In the immediate term concrete actions should focus on a few selected pilot projects.

SYSTÈMES D'INFORMATION SUR L'ENVIRONNEMENT DANS LA FÉDÉRATION DE RUSSIE: UNE ÉVALUATION DE L'OCDE

RÉSUMÉ ET CONCLUSIONS

Introduction

Après avoir été le centre de gravité de l'Union soviétique de 1917 à 1991, la Fédération de Russie est en train de se réorienter vers une économie de marché. Cette évolution s'accompagne d'une réduction de l'intervention gouvernementale, ainsi que d'une décentralisation des responsabilités vers des niveaux infranationaux.

L'objet de ce rapport est d'examiner les systèmes d'information sur l'environnement dans la Fédération de Russie par rapport au nouveau rôle imparti à cette information pendant et après la période de transition. Au cours de cette période, il faut adapter les systèmes d'information sur l'environnement pour qu'ils puissent:

- i) aider à l'élaboration et à l'application des lois et des politiques d'environnement;
 - ii) éclairer les prises de décisions, notamment aux niveaux infranationaux;
 - iii) contribuer à l'amélioration de la cohérence des politiques sectorielles et environnementales;
 - iv) informer le public, le nouveau secteur privé et les ONG sur l'état et l'évolution de l'environnement; et, de façon plus générale,
 - v) encourager la progression vers les objectifs nationaux et internationaux de développement durable.
- Au fur et à mesure que la Russie s'intégrera davantage aux systèmes internationaux d'informations sur l'environnement, la demande pour ce genre d'informations s'intensifiera, notamment pour des études comparatives tant régionales que globales.

La Fédération de Russie a hérité d'un solide réseau de systèmes de collecte d'informations sur l'environnement, liés notamment à la surveillance du milieu ambiant et à la collecte de données statistiques. Cet héritage est complété par l'impressionnant niveau des compétences techniques disponibles dans les ministères et instituts de recherche. Les rapports sur l'état de l'environnement préparés par le Ministère de la protection de l'environnement et des ressources naturelles et les publications régulières d'autres administrations et organismes de recherche, sont des réalisations qui méritent d'être mentionnées. En outre, les réponses au questionnaire de l'OCDE sur l'état de l'environnement montrent que des données existent pour un bon nombre de paramètres-clé. Ces facteurs sont encourageants pour la réussite de la réorientation des systèmes d'information actuels sur l'environnement.

Progrès à faire

Un des plus grands défis auxquels la Russie est confrontée consiste à renforcer les systèmes d'information sur l'environnement pour qu'ils puissent contribuer aux prises de décisions aux niveaux infranationaux. Étant donné la diversité des régions concernées, la superficie de la Russie et la complexité de son administration, des améliorations dans ce domaine constitueraient un résultat remarquable.

Le présent examen identifie plusieurs questions transsectorielles et des domaines prioritaires où des progrès peuvent être faits :

- Premièrement, réorganiser les dispositifs institutionnels afin de promouvoir la coordination horizontale et verticale et d'améliorer la structure des prises de décision.

En raison du contexte historique, la mentalité des pouvoirs publics et la culture administrative sont différentes en Russie de celles qui règnent dans les pays de l'OCDE et même, dans la plupart des pays d'Europe centrale. Le dispositif institutionnel en vigueur pour la gestion de l'environnement est fort

complexe. Les responsabilités sont dispersées et se chevauchent souvent entre administrations ou au sein même d'une administration. Cela engendre une concurrence féroce, exacerbée par les faibles ressources humaines et financières disponibles. Cette situation affecte la façon dont les objectifs d'environnement sont fixés et appliqués, ainsi que la décentralisation des responsabilités vers les territoires infranationaux et leur capacité à prendre des décisions.

En ce qui concerne les systèmes d'information sur l'environnement, il est urgent de diviser clairement les responsabilités entre les niveaux fédéral et territoriaux et d'améliorer les structures de coopération entre les divers ministères. Des structures plus propices à la coopération et axés sur des résultats pourraient améliorer à la fois le rapport coût/efficacité et la pertinence politique, et la compréhension entre les différents acteurs. Le Système national unifié de surveillance de l'environnement (SNUSE) proposé actuellement répond à cette attente et favorise la coordination entre les différents organismes fédéraux et infranationaux. C'est là une évolution majeure et des plus souhaitable. La mise en oeuvre effective du SNUSE devrait bénéficier d'une attention prioritaire.

■ Deuxièmement, transformer les données en informations utiles pour les prises de décisions sectorielles et environnementales

Les systèmes actuels d'information sur l'environnement ne résultent pas d'une analyse cohérente des priorités en matière de besoins ou de demande. Le contraste entre l'énorme volume de données produites et la difficulté que présente leur utilisation dans les processus de décision est frappant. Ceci est particulièrement préoccupant lorsqu'il s'agit de mettre au point et d'appliquer de nouvelles lois et politiques environnementales, et lorsqu'il faut répondre aux nouvelles demandes locales d'informations.

Pour répondre à ces nouvelles demandes, l'information sur l'environnement doit être fiable, crédible, et répondre davantage aux besoins des décideurs et du public. D'une façon générale, il vaut mieux améliorer l'interprétation et l'analyse des données plutôt que d'en fournir davantage. L'instauration d'une assurance qualité efficace et maîtrisable est un défi majeur, rendu d'autant plus difficile par la situation économique et l'immensité du pays. Si les résultats obtenus jusqu'à présent restent très modestes, les divers organismes administratifs et scientifiques sont conscients de ces problèmes et s'efforcent de les surmonter.

■ Troisièmement, sensibiliser davantage le public et les professionnels aux questions d'environnement et améliorer l'accès aux informations en la matière.

Cet objectif ne peut être atteint que grâce à une stratégie claire d'information et de formation en matière d'environnement. D'après la législation russe, l'information en matière d'environnement devrait être disponible librement au public. Il faut cependant distinguer entre ce qui est disponible et ce qui est accessible. L'accès aux informations environnementales est difficile, non seulement parce que ces informations sont dispersées, mais aussi parce qu'elles souffrent d'une longue tradition du secret au sein de l'administration, et de la situation économique actuelle; les données ne sont souvent accessibles que dans le cadre d'accords ou par achat. De ce fait, le public reste peu sensible aux problèmes d'environnement et l'information et la communication en la matière font rarement partie des processus de décision.

Recommandations

■ L'évolution future des systèmes d'information sur l'environnement dans la Fédération de Russie devrait être régie par la demande et viser à produire des données meilleures plutôt que plus nombreuses. Cela suppose notamment :

- l'instauration de mécanismes d'assurance qualité efficaces susceptibles d'améliorer la fiabilité et la crédibilité des données et des éléments d'information publiés ;
- l'évolution vers une approche plus intégrée de la gestion des données et une diffusion à bref délai;

- un classement des besoins en information par ordre de priorité, privilégiant les demandes les plus urgentes et préparant les développements à plus long terme ;
- une amélioration de la qualité des informations qui devrait à court terme donner priorité aux :
 - i) risques les plus graves pour la santé humaine ; et aux
 - ii) modifications irréversibles de l'environnement, notamment celles liées à la privatisation des terres et des installations de production.

Ces informations devraient être complétées par une couverture adéquate des pressions sur l'environnement, comme les émissions de polluants et l'utilisation de ressources naturelles, ainsi que par une meilleure intégration des cadastres qui existent sur l'eau, les sols, les forêts et les minéraux.

- A plus long terme, le gouvernement fédéral devrait mettre en place des systèmes d'information et des compétences pour :
 - i) soutenir l'élaboration et le respect des lois et politiques d'environnement ; et
 - ii) mieux comprendre les implications environnementales des politiques économiques et sectorielles (les principaux secteurs étant ceux de l'énergie, de l'aménagement du territoire, des transports et de la sylviculture).

Il faudrait aussi envisager la mise au point et l'utilisation d'indicateurs d'environnement permettant de suivre la progression vers les objectifs politiques ;

- Il faudra aussi améliorer la fourniture d'informations sur les implications économiques des décisions prises en matière d'environnement (dépenses d'environnement, analyse coût-avantage, par exemple).

■ On devrait se préoccuper davantage du financement des systèmes d'information sur l'environnement.

- Il est important de développer de nouveaux modes de financement et de mécanismes de trésorerie pour compléter le financement public ; pour cela on pourrait avoir recours aux institutions internationales de financement ou à des pays donateurs, ainsi qu'au partenariat avec diverses parties prenantes (nouveau secteur privé, instituts de recherche indépendants, etc.) portant sur des tâches et des résultats précis. Il faudrait aussi étudier quelles formes de crédits budgétaires et de transferts financiers vers les territoires seraient les plus appropriées, notamment pour la mise en place du SNUSE, et envisager des possibilités de financement conjoint par les niveaux fédéral et territoriaux.

■ Une autre tâche essentielle consiste à sensibiliser davantage le public et les professionnels et à faciliter l'accès à l'information sur l'environnement grâce à :

- l'inclusion de la gestion de l'environnement dans les curus d'enseignement et de formation à tous les niveaux ;
- un accès plus facile et mieux coordonné à toutes les données environnementales détenues par les pouvoirs publics ;
- une meilleure communication des faits au public. A cet effet, le Ministère de la protection de l'environnement et des ressources naturelles devrait mettre au point une stratégie de diffusion. L'expérience acquise depuis 1990 grâce à la publication de rapports nationaux sur l'état de l'environnement et à la parution régulière d'autres ouvrages en la matière constitue une bonne base qui devrait s'étendre à une plus large gamme de produits et d'utilisateurs ;
- l'information des utilisateurs et du public sur la signification et l'interprétation appropriées des informations environnementales; et
- l'établissement de parténariats avec tous les partenaires concernés (nouveau secteur privé, ONG environnementales, autorités locales, etc.).

■ Il faudrait aussi continuer à développer les dispositions en vigueur pour la coopération internationale en matière d'information sur l'environnement; et notamment:

- fournir davantage d'informations sur les résultats obtenus par la Russie par rapport aux engagements faits dans le cadre d'accords internationaux dont elle est partie ; cela concerne aussi bien les

engagements sur des problèmes globaux comme les changements climatiques et la diversité biologique, que les engagements sur les problèmes régionaux ou transfrontières comme la protection de l'Antarctique et de la mer Baltique. A cet effet, le développement des compétences nationales et le renforcement de la coopération en matière de collecte, de traitement et de diffusion d'informations seront des éléments critiques;

- consolider les travaux en cours sur l'harmonisation des définitions, des classifications et des protocoles de surveillance;
- encourager les échanges d'expérience avec les pays de l'OCDE et d'autres pays d'Europe centrale.

■ La réussite de cette évolution dépendra de la pertinence et de la stabilité des dispositifs institutionnels.
Notamment :

- les responsabilités devraient être clairement séparées entre les niveaux fédéral et territorial ; le gouvernement fédéral devrait surtout encourager et coordonner les initiatives dans les territoires ;
- les dispositifs de coopération interministérielle devraient être simplifiés et un mode d'organisation plus coopératif et davantage soucieux des résultats devrait être adopté.

■ En ce qui concerne les systèmes d'information sur l'environnement dans les territoires, il faudrait qu'ils fournissent aux territoires les moyens et les outils nécessaires aux décisions locales et à assumer leurs nouvelles responsabilités. Cela nécessitera :

- une évaluation critique des besoins locaux dans chaque territoire, en termes de données d'environnement, de méthodologie, de technologie et de personnel ;
- l'instauration par les autorités fédérales d'un dialogue permanent avec les échelons administratifs inférieurs; ce dialogue devrait servir à mettre en place des stratégies communes et des réglementations générales, et à fournir aux territoires des instructions et des conseils qui leur permettent de développer des systèmes d'information sur l'environnement compatibles; des initiatives positives prises au niveau territorial et l'expérience acquise dans d'autres pays à structure fédérale pourraient amorcer des discussions et des échanges d'informations ;
- un transfert d'informations approprié entre les autorités fédérales, territoriales et locales.

■ En ce qui concerne les systèmes de surveillance de l'environnement, leur principal objectif devrait être la fourniture d'informations qui puissent être facilement intégrées et qui soient utiles dans les processus de prise de décision. Pour cela il faut optimiser les systèmes actuels et les "élaguer" de façon à ne garder qu'un programme central adapté aux nouveaux besoins d'information. Le Système national unifié pour la surveillance de l'environnement pourrait remplir cet objectif. Pour que sa mise en place soit efficace, il faudrait considérer les recommandations suivantes :

- Le Système unifié devrait viser à :
 - i) établir un programme central de surveillance au niveau fédéral ;
 - ii) définir un cadre pour coordonner la surveillance à travers tous les niveaux de gouvernement;
 - iii) encourager les progrès au niveau infranational.

La priorité devrait être accordée à l'instauration d'une plus grande coopération et d'une meilleure compréhension entre les divers acteurs.

- Le fonctionnement du Système unifié devrait s'appuyer sur des calculs économiques mesurant les coûts des systèmes de surveillance de l'environnement et évaluant les avantages qu'ils produisent comme outil d'aide à la décision et d'information du public.
- A court terme, le rapport coût/efficacité des systèmes de surveillance de l'environnement pourrait être accru en :

- i) établissant un système accessible de méta-informations qui permette une meilleure utilisation des données provenant des activités de surveillance existantes ;
- ii) établissant des priorités compte tenu des nouvelles demandes d'information et en distinguant les priorités à court et à plus long terme (voir également ci-dessus) ;
- iii) réduisant le nombre d'activités de surveillance faisant double emploi ; et en
- iv) faisant davantage appel à la modélisation et à des informations complémentaires (émissions, par exemple) de façon à réduire la collecte d'informations en tant que telles.

Dans l'immédiat, les actions concrètes devraient se concentrer sur un nombre limité de projets pilotes.

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 and the newly independent states of the former Soviet Union through: reviews of environmental information systems in Poland, Hungary, the Czech and Slovak Republics and Belarus (OECD, 1993 and 1994); dissemination of the OECD Questionnaire on the State of the Environment to these countries, and related data collection, treatment and analysis. This report also forms part of the work programme of the OECD Centre for Co-operation with the Economies in Transition (CCET).

The objective of this report is to review environmental information systems in the Russian Federation and to make recommendations in light of the new role of environmental information in the transition to democracy and a market-based economy.

The review is organised in three parts. Part I presents a general assessment of the existing environmental information systems in the Russian Federation. Part II presents background reports on two important issues: environmental information systems to support decision making on the territorial level, and the development of better integrated and co-ordinated environmental monitoring systems. Part III presents selected environmental data for the country and is based on the responses to the 1994 OECD Questionnaire on the State of the Environment.

INTRODUCTION

Ce rapport a été établi sous les auspices du Groupe sur l'état de l'environnement du Comité des politiques d'environnement de l'OCDE. Ce Groupe a étendu ses activités aux pays d'Europe centrale et orientale et aux nouveaux États indépendants de l'ancienne Union soviétique à l'occasion : d'examen des systèmes d'information sur l'environnement en Pologne, en Hongrie, dans les Républiques tchèque et slovaque et au Bélarus (OCDE, 1993 et 1994), de la diffusion du Questionnaire de l'OCDE relatif à l'état de l'environnement dans ces pays et de la collecte, du traitement et de l'analyse des données connexes. Ce rapport fait également partie du programme de travail du Centre de l'OCDE pour la coopération avec les économies en transition (CCET).

L'objectif de ce rapport est d'examiner les systèmes d'information sur l'environnement en Fédération de Russie et de formuler des recommandations à la lumière du nouveau rôle que les informations sur l'environnement jouent au cours de la transition vers la démocratie et une économie de marché.

L'examen comprend trois parties. La Partie I présente une évaluation générale des systèmes d'information sur l'environnement utilisés dans la Fédération de Russie. La Partie II présente des rapports de synthèse sur deux questions d'importance : les systèmes d'information sur l'environnement à l'appui de la prise de décisions au niveau du territoire, et la mise en place de systèmes d'information sur l'environnement mieux intégrés et mieux coordonnés. La Partie III présente des exemples de données d'environnement concernant le pays et s'inspire des réponses au Questionnaire de l'OCDE de 1994 sur l'état de l'environnement.

PART I GENERAL ASSESSMENT

1. DEMANDS FOR ENVIRONMENTAL INFORMATION

The Russian Federation, with a land area of more than 17 million km², is the world's largest country, with subnational units larger than many of its European neighbours (map, Annex III). Its natural resources are vast, in many cases of global importance. Compared with western Europe, the population density is low, even in the more densely populated European part.

After having been the centre of gravity of the Soviet Union from 1917 to 1991, Russia is undertaking fundamental and often painful economic and social reforms. In this situation, environment must compete against other priorities. Any review of the country must take these circumstances into account.

The institutional arrangements that bind the federal and 89 subnational units of government, or territories**, are not always clear, the division of responsibilities being under development. Due to the historical background, the culture of government and public administration is different from that of OECD countries and, indeed, most central European countries.

The Russian system of environmental management includes elements of all existing branches of power, and is therefore very complex (Annex II). The President and the Presidential Security Council can issue decrees on most issues, including the environment. The Interdepartmental Commission on Ecological Safety under the Presidential Security Council has an advisory role to the Government. Environmental legislation is prepared in the Committee for Ecology and the Committee for Natural Resources and Environmental Management of the lower house of the Parliament (the State Duma). Forest, geological and water resources are managed by separate committees at government level. The co-ordination of environmental activities of various committees and agencies is performed by the Ministry for Environmental Protection and Natural Resources (Minprirody), with its territorial branches, and by the interministerial Government Commission on Environmental Management and Natural Resources, led by a Vice Premier. Minprirody also has overall responsibility for implementation of environmental policies.

This section considers the rise of multiple demands for environmental information in Russia. It provides the background for subsequent sections, which outline how the existing environmental information systems could be reoriented and/or strengthened to respond to these new demands.

1.1 The changing role of the state

The changing role of the state in the Russian Federation has two dimensions, each with implications for the country's environmental information systems.

First, there is the move towards less direct government intervention. Greater emphasis is placed on private responsibility for production activities and land management. This development is leading to increased demands by decision makers, inspectors responsible for enforcement of environmental laws and regulations, the public and the emerging private sector for reliable information on the environment.

Information on past and present pollution at sites and enterprises designated for privatisation is an important issue. Both the procedures for privatisation and the responsibilities of parties need to be clearly

** The 89 territories of the Russian Federation are: 21 republics, six krais (regions), 49 oblasts (provinces), two cities of federal importance (Moscow, St. Petersburg), 10 national autonomous districts (okrugs) and one national autonomous oblast.

defined, e.g. with regard to indemnities for past pollution damage. Liability for past pollution is a major impediment to privatisation, often deterring potential domestic and foreign investors (OECD, 1995). Reliable information on the areal extent and severity of pollution is an important factor in negotiations.

Related to the information needs for privatisation is that of minimising the environmental impact of land use by the estimated 50 million new land owners. To develop land use planning and resource management strategies, qualitative and quantitative information on environmental parameters is required. The information requirement is extensive in administrative terms because subnational systems need to be well organised and operated.

The second dimension of the changing role of the state concerns decentralisation of environmental management responsibilities to the territorial and lower administrative levels. This is a particularly important development for the future organisation of environmental information systems. It is obvious that the responsibility for such systems needs to be brought closer to the level of decision making. Future development must also recognise the diversity among the territories in terms of environmental priorities and approaches to addressing them.

1.2 Priority issues

The current environmental information systems in Russia do not reflect a consistent analysis of priority needs or demands. One reason is that an overall analysis of priorities for the transition stage seems to be lacking. Another impediment is the way that responsibility for environmental information systems is scattered among ministries and agencies so that even if an appropriate analysis is made, it is complicated to act on it.

The most immediate environmental concern facing the country is threats to public health. It has been reported that about 40 per cent of the population lives in heavily polluted areas. Serious localised problems in "hot spots" have been documented, and evidence from territorial health statistics suggests that environmental and other factors combine to adversely affect public health. Others concerns, in no particular order, include deterioration of, or threats of irreversible damage to, ecosystems, biological resources and landscapes, and productivity losses caused by degradation of physical natural "capital" (e.g. soil).

The first priority of environmental information systems should be to support decision making and enforcement of environmental legislation to alleviate the situation with regard to these issues in the short and long term.

The demand for environmental information related to health is great, and cannot be met uniformly across the country; collection and analysis of information at a level lower than territorial are necessary. This also applies to the epidemiological studies organised by the State Committee for Sanitary-Epidemiological Supervision, and to management support systems that reflect local circumstances. Comprehensive epidemiological monitoring throughout Russia cannot be achieved, but there are some general guidelines that should be followed in work aiming to establish a relationship between environment and health. These include:

- consistent georeferencing of health, environmental and social observation data;
- continued registration of the full range of pollutants discharged in production activities and from military installations (in many cases, it suffices to identify pollutants; not all of these substances need to be regularly monitored);
- increased efforts to estimate, cost-effectively, air pollution from road traffic;
- development of know-how and standard methodologies to facilitate the establishment of local environmental information systems linked to a national network.

With regard to the priority directions of environmental information systems during the transition period, effects and issues related to privatisation of land and production facilities are high-ranking. Environmental information is needed to prepare forecasts and simulations (because of the time dimension of irreversibility and depletion), develop indicators and assist in scientific interpretation of data. These elements are being addressed in studies to operationalise the concept of sustainable development. Furthermore, environmental information is an important tool for monitoring progress in meeting national and international sustainable development goals and commitments, such as those undertaken by the parties to the Climate Change and Biological Diversity Conventions.

1.3 New environmental legislation

Lack of environmental information to support the development of new environmental legislation is of particular concern. The tradition of lawmaking inherited from the Soviet Union was not strong on giving clear direction to those responsible for drafting, implementing or enforcing laws. There is a need for information on and comparative analysis of environmental laws in other countries, their performance against stated goals and the "craft" of lawmaking. Strengthening the capacity for critical examination of proposed legislation is also important. Exchanges of experience by Russia with OECD and central European countries is one means of meeting this need.

New environmental laws to replace the outdated Soviet legal structure are introduced incrementally so that the effects of the initial phases can be assessed before further steps are taken^{***}. Information to support this incremental approach needs to be made available rapidly, which can be difficult, given the natural delays before policy measures have an effect on environmental quality. Exchanges of experience can highlight ways to use monitoring information for this purpose.

1.4 Policy coherence

In the new economic circumstances, environmental information will be an important contribution in efforts to improve the coherence of sectoral and environmental policies, especially as regards:

- the environmental effects of federal policies on development in the territories;
- the cost-benefit relationships and trade-offs involved in options for environmental protection and conservation, and technological investment;
- regional strategies for integrated resource management (e.g. in the Caspian Sea and Caucasus Mountain regions);
- preventive strategies to reduce possible future environmental degradation (e.g. the effect on urban air quality of increased urban traffic).

Sectors that stand out because of their potential for economic and environmental gains from improved policy coherence are: energy, given the limitations of the current technology and system inefficiencies; land resources, because of impending privatisation and changes in ownership; transport, given the increasing use of private cars; and forestry, as a future economic opportunity.

^{***} An umbrella law for the environment was approved by the Parliament in 1991. About 20 specific laws were to follow. At the time of the mission, five had been passed (on nature reserves, nuclear waste processing, water resources, an air emissions inventory and use of energy carriers); work on new legislation is intensive. Experience in the European Union has apparently been considered in preparing the laws.

2. DESIGN OF ENVIRONMENTAL INFORMATION SYSTEMS

The role of and expectations for environmental information are changing in Russia. Information systems must now serve new functions consistent with a less interventionist approach by government. It is important for the objectives, implementation methods, and monitoring and evaluation procedures in such systems to be clearly stated at the outset. Furthermore, the systems will need to be able to meet multiple objectives: providing an overview of environmental conditions and trends, ensuring the cost-effective collection of a focused set of information, minimising the reporting burden on the private sector, providing input to reports on progress towards national and international goals of sustainable development, supporting sectoral and environmental policy integration approaches, providing information for enforcement purposes and raising public awareness of environmental issues.

Environmental information systems include elements with an immediate, specific purpose (e.g. monitoring of information as an input to enforcement of regulations) and others with a longer term, strategic role (e.g. spatial and temporal description of trends). Strengthening the relationship between specific tasks and strategic tasks requires the establishment of clear objectives for the whole system, reinforced by strong co-ordination of all the elements.

2.1 Institutional arrangements

As has been noted, the institutional set-up in the Russian Federation is very complex, with responsibilities sometimes overlapping among ministries and agencies as well as among administrative levels (Annex II). This section briefly describes the main actors involved with environmental information systems, which operate on both the federal and territorial levels.

Ministries and agencies

The Ministry for Environmental Protection and Natural Resources, known as Minprirody, has a co-ordinating role among the federal ministries and agencies. It also has a key responsibility for development of environmental policies. It monitors the state of wildlife in federal nature reserves, registers protected areas and collects data on air emissions, waste water and toxic waste. It produces the annual state of the environment report, co-ordinates work on the Unified State System of Environmental Monitoring (USSEM) (Part II section 2) and manages the Environmental Safety of Russia programme (see *Environmental programmes*, below). One constraint on the work of the ministry, shared by most other federal ministries and committees, is its relatively modest budget. A second constraint is its lack of control over most of the sources of environmental information.

Minprirody operates a system of territorial environmental committees, which are responsible for supervising environmental protection measures by enterprises and local government, and for collecting environmental taxes and levies. Together with the environmental branches of the territorial governments, they have a potentially key role to play in strengthening environmental management in the territories.

The Federal Agency for Hydrometeorology and Environmental Monitoring, known as RosGidromet, is responsible for monitoring air, surface water and soil quality. Its comprehensive monitoring networks include 682 air quality stations in 248 cities and towns, and 1 892 inland water quality stations. In addition, separate, extensive monitoring networks focus on: hydrobiology, atmospheric precipitation, snow pollution, transboundary air pollution (EMEP), global background atmospheric pollution (BAPMON), marine water quality, soil quality, integrated impact monitoring of environmental pollution, integrated background monitoring in biosphere reserves (GEMS), and radiation. Its networks are managed by the State Service for Monitoring of the State of Environment (GSN), former OGSNK, Unified System of Observation and Supervision, which has been functioning since 1972. Scientific institutes under RosGidromet handle

resulting information; for instance, the Hydrochemical Institute in Rostov-na-Donu and the Main Geophysical Observatory in St. Petersburg, along with the State Oceanographical Institute and the Institute of Global Climate and Ecology in Moscow, aggregate and analyse the water and air data; the Research and Production Enterprise "Typhoon" (NPO Typhoon) deals with soil and radio-active pollution data.

The State Committee for Sanitary-Epidemiological Supervision, previously part of the Ministry of Health, operates a well-developed network of centres monitoring, *inter alia*, drinking water quality, contamination of air and soil in cities, and food quality, to support enforcement of sanitary regulations. The committee's main concern in relation to the environment is adverse effects on human health. Environmental epidemiology activities exist so far only in pilot programmes and are intensively developed only in some territories (e.g. Perm and Sverdlovsk oblasts, and Moscow).

The Committee for Water Resources, with its 18 catchment-basin management directorates, territorial offices and 18 offices for water reservoir management, collects self-reporting data on water consumption and waste water allocation. These data and information from other sources are integrated to form a water register, or cadastre, mainly used for economic purposes. The committee has its own monitoring programme for surface water quality.

The Committee for Fisheries is responsible for monitoring the state of freshwater and marine fish populations and other aquatic biological resources.

The Committee for Land Resources and Management is responsible for categorising and measuring land, and for maintaining owner/user registers. One of its tasks, which is being intensified, is monitoring land quality (soil fertility, waterlogging and salinisation, contamination, etc.). The information it collects makes up the land cadastre.

The Federal Agency for Forestry monitors the supply, use and quality of Russian forests. The forest cadastre is rich in detail, but is mainly directed towards internal use in the forestry industry.

A fourth cadastre, on mineral resources, is kept by the Committee for Geology and Mineral Resources, which is also responsible for monitoring groundwater quality.

The State Committee for Statistics collects data using the state statistical reporting system, mainly self-reporting information from enterprises and organisations, on topics including atmospheric emissions, waste water discharges, status and use of natural resources, protected areas, public health and environmental capital investment. Other organisations, such as RosGidromet, also deliver data to this committee.

The Agency for Geodesy and Cartography is the focal point for remote sensing data, and is also responsible for cartographic and topographo-geodesic support to many other activities.

A large number of institutes and some other ministries and committees also gather information related to the environment. The Ministry of Agriculture, for instance, monitors the status of game and its habitats, it collects data on toxic and radioactive pollution of agricultural soil; the Ministry of Emergency Situations and Liquidation of Consequences of Natural Catastrophes operates emergency information systems.

Separation of responsibilities for environmental reporting and environmental management is frequently unclear in Russia. For most federal agencies, environmental reporting derives from their management and inspection responsibilities, and they are typically users of their own information. The Federal Agency for Forestry and the Committee for Water Resources, for example, both manage and monitor management of natural resources. Something close to a separation of functions is found in the case of the RosGidromet and the Statistics Committee; the main task of RosGidromet being primary data collection and aggregation, whereas Goskomstat collects and reports an already treated data. This is however, far from representing

an independent assessment of environmental data. The Soviet history of secret information management, and public information that could not be trusted, generated widespread mistrust towards data and information in general, making the need for independent assessment urgent.

The credibility of environmental data assessment could be improved by entrusting the task to a specific body with a well-defined and visible place within the Federal Government. The allocation of this task could also provide opportunities to strengthen links with research institutes and advisory bodies.

Scientific institutes and universities

Institutes of the Academy of Sciences and universities hold valuable scientific data and employ well-trained specialists in, for example, geographical information systems (GIS). These institutes, which are often very large, face uncertainties and adjustment in the new economic circumstances.

Following the collapse of the USSR, some of the union's scientific institutes and data depositories were suddenly beyond the Russian Federation's borders. This, combined with the social and economic changes in the region, disrupted information links and environmental co-operation with some of the newly independent states. In Russia the situation is more favourable than in some of its neighbours: most scientific organisations' central offices were in what became the Russian Federation, which thus inherited most of the management and scientific expertise of such bodies; hence the impressive scientific strength of many organisations and institutes in Russia.

Of the various scientific institutes that contribute and analyse environmental information, the Institute of Applied Ecology and the Federal Centre for Geoecological Systems, two of the main scientific support organisations for Minprirody, may emerge as key players. Several of their activities are related to the development of integrated information systems oriented towards the needs of decision makers at the territorial level and the design of tools in support of some territorial pilot programmes (e.g. model simulations). These institutes, however, will be heavily dependent on the scientific institutes of RosGidromet and sectoral institutes (forestry, fisheries, etc.).

Environmental programmes

Under the aegis of Minprirody, and co-ordinated with agencies such as the Ministry of Economy, a number of programmes were launched in 1994 to develop and test methods for future environmental management. Four are scientific programmes, the largest of which is Environmental Safety of Russia, a framework programme designed to "give a scientific basis to secure environmental safety in Russia under the conditions of developing a market economy and a Russian statehood". Some programmes include investments aimed at testing environmental management methods in pilot territories: the city of Bratsk, Irkutsk oblast, the Lake Baikal nature reserve and Tula oblast (Part II, section 1). Environmental programmes are also funded by the Ministry of Science and by sectoral ministries and committees. In most cases, the ambition of these programmes is greater than the level of funding.

Environmental Safety of Russia is supposed to develop generic methods in support of environmental policy and management. Close to 100 projects in the programme are related to environmental information systems, including more than ten projects on development of USSEM. Application of GIS in environment and health monitoring is another example of an important theme in the programme.

Co-ordination and co-operation

While data communication within agencies is relatively well co-ordinated, poor co-ordination among federal ministries and between the different levels of government is a major barrier to development of integrated environmental information systems in Russia.

In the present tight economic conditions, ministries and agencies need to make a fundamental choice: compete for scarce financial resources or co-operate to stretch the effectiveness of resources. Evidence from the review mission suggests that most federal ministries, state committees and agencies are operating in the competitive mode. A more co-operative arrangement could enhance cost-effectiveness by identifying overlaps, redundancies and important omissions of data and definitions, while at the same time highlighting opportunities for restructuring of institutional responsibilities and information flows to embrace a wider than sectoral perspective. Examples of such co-ordination and co-operation are more frequently found in the territories than at the federal level.

For the same reasons, improved vertical co-ordination between the federal and subnational levels, including oblast offices of federal ministries, could also increase cost-effectiveness.

A shift of some responsibilities between environmental and statistical agencies is likely in response to the new demands for environmental information. Statistical offices will continue to play an important role, however, especially in ensuring consistent use of internationally agreed definitions and terminology in domestic environmental information systems, and in helping to integrate the national environmental monitoring system with the national statistical system.

2.2 Environmental monitoring

Overview and main characteristics

Many organisations in the Russian Federation perform elements of what could cumulatively be termed environmental monitoring. Of at least 16 federal ministries, committees and agencies involved in monitoring, the most important are mentioned above in section 2.1. A fuller list of monitoring networks is provided in Annex IV. The most dynamic development in this area is currently found at the territorial and lower administrative levels (Part II section 1.2).

Only one federal organisation, RosGidromet, has monitoring as a main task. For the other federal organisations involved, monitoring is an adjunct to their resource management or regulatory responsibilities. Typically, these organisations are the users of their own monitoring information.

A major problem is that compilation of consistent overviews derived from different networks is very difficult because of the incompatibility and diverse quality of monitoring data from the various sectoral networks. USSEM has been proposed by the Government with the aim of overcoming this limitation (see below and Part II section 2).

The new demands for environmental information have interrelated implications for the existing monitoring network:

- Continuity of the network: increasingly stringent budget constraints are limiting the ability to continue time series monitoring over such a wide network. Raising the cost-effectiveness of the network and focusing it on the most relevant and needed information are inevitable in the tight economic situation.
- Location of monitoring stations: some are not well placed to support pollution control and enforcement activities. For example, air quality is not always measured in the area where stack plumes reach ground level, and the specific pollutant that would link pollution with specific sources may not be measured. Though some monitoring stations have been in operation for more than 50 years, the location of all stations should be examined in terms of their ability to deliver data appropriate to the new roles of environmental information systems.

- Number of parameters measured: generally, the parameters are too numerous. Consideration should be given to reducing the number so as to concentrate monitoring programmes on the most important parameters and improve cost-effectiveness. Some OECD countries, rather than monitor vast numbers of parameters, make extensive use of modelling and accumulated monitoring feedback information about emissions and distribution patterns (Part II section 2.3). Prioritising information needs is essential.

Self-monitoring by enterprises is undertaken to some extent, but measurements at or beyond the perimeter of a facility are usually still performed by Minprirody. It is unlikely that this situation will change significantly in the near future. In the medium term, self-monitoring should be increasingly promoted to reduce the cost burden on the ministry. Charges for monitoring could galvanise enterprises into taking on more monitoring responsibility, using in-house specialists or contracting out the task to accredited private institutes or consultants.

Integration and co-ordination

The Government has proposed the creation of USSEM as part of the Environmental Safety of Russia programme. The proposal, under preparation following a government decree of November 1993, is an attempt to improve co-ordination of the different monitoring systems while retaining the existing organisational structure.

The main objective of USSEM is to improve compatibility of measurements and avoid overlap by introducing principles for co-ordination of monitoring at the federal, territorial and local levels and within sectors. Another key task is to improve integration and analysis of data.

Minprirody has the primary responsibility for co-ordination of environmental monitoring. Leading this work is very difficult, given the sometimes considerable antagonism between ministries and agencies that each have a distinct history and culture (Part II section 2).

2.3 Data collection and treatment

Generally, data are processed and kept within the collecting organisation, and flow vertically from local units to the centre of the organisation. A striking feature is the contrast between the large volume of data collected, processed and used by ministries or committees, and the difficulty in accessing and using such data in support of decision making.

A distinction needs to be made between data on natural resources and on pollution. The four cadastres constitute an example of the former: these registers, which include comprehensive sectoral information, are kept by the Committee for Land Resources and Management (land), the Federal Agency for Forestry (forests), the Committee for Water Resources (water) and the Committee for Geology and Mineral Resources (ores and other geological formations).

The cadastres are supplied with data from assorted agencies. For example, the water cadastre receives monitoring data from RosGidromet (surface water), the Committee for Geology and Mineral Resources (groundwater), the Committee for Water Resources (water use) and Minprirody (waste water discharges). The cadastres are not physically integrated systems with single access facilities. Judging by a test enquiry on the water cadastre, accessing the data involves contacting each monitoring agency and going through various editions of their publications.

Data on pollutant emissions and discharges are collected mainly from enterprises. The collection of statistical data is rigorously co-ordinated by the State Committee for Statistics through its formal approval

of all questionnaires and maintenance of the enterprise register. This co-ordination mechanism should be maintained, but its operation could be streamlined through increased emphasis on co-ordination in substance and establishment of instruments such as registers and nomenclature, rather than a focus on statistical detail. It is important to ensure that there are no gaps in the coverage of the enterprise register; emission estimates based on it will be too low if, for example, new, "informal" enterprises are omitted. Data on environmental quality are mainly received from RosGidromet.

Several observations can be made here about data collection and treatment.

First, delays in obtaining measurement results should be reduced. Typical delays between sampling and result delivery are two days for air and seven for water. For pollution episode control, enforcement action and information dissemination to the general public, this time lag is too long. Most monitoring organisations have special arrangements for emergency situations. In the future, automatic on-line equipment may be installed for some routine monitoring and enforcement operations.

Second, consideration should be given to establishing an environmental baseline to provide a reference against which the environmental effects of the transition process can be assessed. Priority attention should be given to gathering information on sources and sinks of pollution and the state of resource stocks, and to the reproducibility of measurement techniques over time. Not all parameters of the baseline set need be permanently monitored; a comprehensive review could be undertaken at a set date.

Third, and not unique to the Russian Federation, is the problem of integrating heterogeneous data that cut across different administrative units. In particular, this concerns the difficulty of synthesising data for ecological units and river basins (Part II section 1.3). The present development of environmental co-operation between neighbouring territories is a very positive trend from this point of view.

Fourth, the use of GIS as a tool in environmental management is in its infancy in Russia. Practical experience will accumulate as users, typically oblast and raion (township) administrators, have greater access to and make more extensive use of such systems. The development of GIS application is now driven by the technology and scientists rather than by demand and possibilities for its practical use.

Finally, concerning the cadastres, it is vital for environmental data to be organised in readily accessible computerised databases and not, as at present, on paper in the form of tables, maps or reports, in very restricted number, or in databases intended for internal use only. Next to improved co-ordination, this appears to be the most significant priority for wider use of sectoral data. Improved databases are likely to be an important element of integrated environmental information systems at the local level and will enhance opportunities for feedback on the adequacy of monitoring systems.

2.4 Data quality

Data quality assurance has generally been given little attention in Russia, but is now brought up as an important component of the proposed USSEM. This OECD review does not independently investigate data quality. Specific issues have been identified, however. Waste data, for example, are uneven. At the one oblast environment committee that was visited, reliable information was reported to be available about waste stored and processed on enterprise premises, but waste shipments leaving a production facility could not be followed administratively to their destination and would therefore disappear from view. Data on emissions from individual enterprises, received from the statistical office, are viewed with scepticism by the environment committee, as the data follow too closely the former official objectives.

A sample territorial survey should be undertaken to compare the trends in air emission data with ambient quality (using available dispersion models) and with trends in proxy indicators of economic

activity, such as electricity use and traffic volume. For both environmental management and the design of an emission register, it would be instructive to know whether air emissions and waste water discharges have indeed changed as much as statistics would indicate.

Little practical integration of monitoring data from different sources and media has been carried out in Russia. In addition, there has been limited model verification between the data and information about emissions and discharges, or comparison of data with independent data or studies. The quality enhancement that such verification usually yields has yet to be realised. It should be underlined that these approaches towards enhancing data quality are relatively inexpensive.

2.5 Financing

It is generally difficult to identify the costs of monitoring because the sectoral ministries and committees involved, such as the Committee for Water Resources, do not differentiate costs for specific activities. (It is known, however, that environmental monitoring is a large scale exercise. The water committee, for example, employs about 10 000 people in this capacity.) RosGidromet appears to be the only organisation that records the costs of specific monitoring activities.

Thus, it is difficult for the managers of organisations to assess the cost-effectiveness of their monitoring efforts. Some simple cost-performance indicators should be introduced as part of the rationalisation of existing sectoral networks, the transition to USSEM and the establishment of future territorially based systems.

Environmental information systems have been and are still generally financed from the federal budget, but as federal budget allocations are becoming more and more scarce, environmental monitoring and information activities are under serious pressure. This has two consequences: activities are declining with sampling becoming less frequent and monitoring stations being suppressed; and the organisations involved are actively looking for funding from other sources. A serious effect of the former consequence is that the accumulated staff experience is starting to erode.

The present trend is that a proportion of the costs of gathering and analysing data is being funded by territorial budgets and by production facilities. The federal, territorial and local environmental funds are an additional source of financing. These funds are financed by environmental taxes and levies, with earmarked revenue split among the federal (10%), territorial (30%) and raion (60%) levels of government. The extent to which these funds support environmental information systems varies significantly by territory and raion. International assistance for environmental information systems is being prepared (e.g. by the US Government); a World Bank loan under preparation also contains significant information system components, concerning environmental epidemiology, air quality management, and water quality and resource management.

Charging for environmental information is a difficult issue. There should be a clear distinction between general, basic environmental information activities, which are financed by the public sector and which respond to national and international policy needs, and more applied, use-specific activities, which could be supplied by a transparent market in information. Discussion of the user pays principle and full or partial cost recovery may become more prominent as subnational administrations become increasingly responsible for funding more of the local part of environmental monitoring from their own budgets.

2.6 International co-operation and contacts

In terms of scientific and interagency contacts at the international level, the Russian Federation was less affected by the break-up of the Soviet Union than were neighbouring countries, primarily because many contacts were maintained by the Russian parts of former nationwide organisations.

The existing arrangements for international co-operation in environmental information provide a foundation for extension and strengthening of contacts. It is, for example, commendable that the 1993 state of the environment report for the Russian Federation was translated and published in English (Minprirody, 1994). To improve the situation, the following actions should be considered:

- Russia's reporting of domestic performance needs to be consolidated in terms of commitments under international environmental agreements to which it is a party, such as the Conventions on Climate Change and Biological Diversity. Furthermore, monitoring of performance against Agenda 21 goals, agreed at the UN Conference on Environment and Development, is likely to play an increasing role in the work of the Commission on Sustainable Development and in implementation of countries' national programmes for sustainable development. Strengthening domestic capabilities in, and co-ordination of, information collection, treatment and dissemination will thus be critical.
- A related action needed is to consolidate work on standardising definitions, classifications and monitoring protocols in Russian environmental information systems, to harmonise them with those adopted by the international environmental information community. Differences of definitions in areas such as land use classification and median times for ambient air monitoring are examples. A root cause appears to have been the adoption by the Council for Mutual Economic Assistance (CMEA) of definitions unique to its members. Harmonisation is not unknown; the CMEA countries participated in the work on classifications and definitions of the UN-ECE/Conference of European Statisticians. Today, the countries of central and eastern Europe and the former Soviet republics continue this co-operation, which has extended to the stage of tested draft classifications in some subject areas. The international community can further assist Russia's harmonisation efforts by avoiding use of ad hoc data standards and definitions in the context of, for example, one-off data collection exercises or bilateral assistance programmes.
- Russia can improve its contributions to and participation in environmental information systems managed by international organisations. Examples include UNEP (e.g. the Infoterra, GRID and GEMS programmes), the European Union's Eurostat, the European Environmental Agency, UN-ECE and the OECD (e.g. the State of the Environment Questionnaire jointly developed with Eurostat). The mutual benefits are likely to be considerable in terms of information exchange, comparative analysis, capacity building through institutional strengthening (e.g. exchange of personnel, twinning programmes) and participation in international meetings and workshops.

3. DISSEMINATION OF INFORMATION

Dissemination of environmental information has two elements in Russia: i) dissemination among agencies at federal and subnational government level; and, ii) dissemination from government to the public.

3.1 Dissemination among agencies

Government organisations are entitled to access to each other's data, except for military and national security information. With the exception of the military and the defence industry, no confidentiality appears to apply automatically concerning records for enterprises, as is common in OECD countries.

Two major barriers to information dissemination among agencies at all levels are the long distances involved and the poor telecommunications links. Coast-to-coast delivery of information packages such as maps, for example, can take months. Improvements in postal services and telecommunications equipment will reduce such delays.

In this context, the field performance of two projects involving environmental information dissemination should be mentioned. The first is called TVekoinform, a teletext-type system that uses free space on standard television channels and existing television satellites. TVekoinform and other similar "TVinforms" hire daily time slots to transfer data from central to territorial offices and other users. A future refinement may be night-time transfer from territories to the centre. A key issue will be to examine to what extent and how well local branches of federal ministries and agencies and local government use these data. Ultimately, TVekoinform is likely to be superseded by systems that provide more user flexibility and interaction. Telecommunications networks such as Glasnet, connected to the Internet, already play an important role in the distribution of environmental information (e.g. through the non-governmental environmental information agency Noofakt).

The second trial programme is part of a pilot project for integrated environmental management in Kurgan oblast (Part II section 1). Data obtained by satellite will be sent directly to a ground station in the territory where it is to be used, instead of to a central processing centre. This will improve the speed of data transfer to the territories.

3.2 Dissemination to the public

In the past, environmental information was screened by government organisations and selectively presented to the general public. Consequently, public awareness and understanding of environmental problems has been limited; nor is there any strong tradition of critical non-governmental organisations (NGOs).

Since 1990, several reports on environmental conditions in Russia have been published. Minprirody has now published four annual editions of a state of the environment report, and has established the Russian Ecological Federal Information Agency. The statistics agency has published two editions of a compendium on environmental statistics, RosGidromet publishes data reports, and the State Committee for Sanitary-Epidemiological Supervision publishes a monthly information bulletin on environment and health. These are major accomplishments and the experience thus gained should be extended.

One possibility for so doing is the development of sets of environmental indicators. Indicators are series selected or aggregated from a larger database and tailored to specific services. They provide information to assist in the dynamic process of environmental policy development, much as economic indicators inform economic policy makers. They also contribute to measurement of environmental performance concerning the level of, and changes in, environmental quality, and to efforts to integrate environmental concerns in sectoral policies; for instance, sectoral indicators can show environmental efficiency and the linkages between sectoral trends and environmental policies (OECD, 1994).

Availability and accessibility

According to Russian law, environmental information is supposed to be freely available to the public in the Russian Federation. However, availability needs to be distinguished from accessibility; the public has some difficulty obtaining environmental information. One reason is the dispersed nature of the information. Anyone seeking access to data in the natural resource cadastres (Part I section 2.3) is referred to the source of the data. Minprirody, for example, refers requests for a report on land quality back to the Committee for Land Resources and Management, even though the report is available in the ministry. The vast distances and other practical difficulties can make such referrals a trial of bureaucracy for the enquirer, thus stretching the definition of public access to information. The worsening economic situation of the federal ministries and agencies involved in monitoring makes data even more difficult to obtain.

In addition, some sectoral agencies are reluctant to make even official information accessible to the public, due partly to a long tradition of secrecy within the administration, but also to the worsening economic situation. The review mission received vague and evasive responses on this issue, as well as outright refusal in several interviews. Though most federal agencies engaged in monitoring issue annual and other publications, these are not readily available. RosGidromet, for example, no longer distributes its yearly reports as widely as it once did; such data frequently can be obtained only by agreement or purchase. It is unclear to what extent the scientific community also faces such barriers.

The production of meta-information ("data on the data", consolidating what information exists and making it accessible) is indispensable if better use of existing environmental information is to be made. The meta-information system developed by the Chamber of Commerce is an example intended for use primarily by the private sector. Other meta-information systems kept by state organisations seem to be outdated. Accessible meta-information systems should be a priority goal in the development of a more integrated and better co-ordinated monitoring system.

Another way to improve public access to environmental information is to designate a public access point in each territory when territorial environmental information systems are established. Such offices could channel requests directly to the appropriate source. This would necessitate good contacts with territorial offices of federal ministries, local authorities and NGOs.

The mass media still constitute an important tool for dissemination of environmental information, even if their and the public's interest in environmental issues has declined drastically since the peak of *perestroika* and *glasnost* at the end of the 1980s. Minprirody supports a federal environmental newspaper, "Zelenyi Mir", and a number of magazines and radio or television programmes deal with environmental issues. Amid the present drastic social and economic changes, however, environmental issues are not being focused on by the media, and it may be difficult to change this situation in the near future.

The above discussion reflects the view that accessible, widely available environmental information should be a goal in its own right. This goal can be achieved only by establishing a clear strategy to increase public awareness of, and education on, environmental issues. Such a strategy could include building partnerships with the emerging private sector, NGOs, trade unions, and scientific and professional bodies to enable them to better contribute to policy discussions. Different user needs could be met through targeted products: brochures, information kits, use of electronic and other media, newsletters, etc. It is also important to invest in future users of environmental information and the next generation of policy makers; the country's traditionally strong education system offers an important avenue for training in environmental science and resource management. Environmental education in schools also provides opportunities to reach parents.

PART II
BACKGROUND REPORTS ON SELECTED PRIORITY ISSUES

1. ENVIRONMENTAL INFORMATION SYSTEMS AT TERRITORIAL LEVEL

1.1 The territorial context

The situation at the territorial level mirrors that of the centre. There are however, enormous differences among the 78 territories of the Russian Federation. Many of these units are larger than most countries in Europe, in terms of both physical size and population. There is, in addition, a considerable variation in governing structures, political power and relations with the federal level, as well as in environmental, economic and social characteristics. Since real action will increasingly take place at the territorial and local levels, these should be the focus of attention.

The decentralisation of governance in the Russian Federation is having a significant impact on the overall functioning of its territories, in both positive and negative ways. While there is more flexibility and opportunity to deal with problems at the most appropriate scale, there is also a process of institutional destabilisation.

The previous system was designed around federal policy and institutions and a unified political-economic structure, organised in a complex system of economic exchanges, revenue generation and subsidies. In most cases, this arrangement has not yet been fully replaced; remnants of the old system persist, particularly in peripheral areas.

The status of territorial management responsibilities and the sites of political and economic power are uncertain, in part because of the absence of a new legislative basis and clear redefinition of institutional arrangements. Decentralisation is also bringing about a sharp reduction in policy direction, information flows, and financial support. While the situation in each area depends to a considerable extent on local circumstances, personalities and political connections, rather than on formal provisions, most territories are still struggling with the transition.

It is within this difficult institutional context that the current status and future prospects of environmental information systems supporting decision making at the territorial level must be considered. In spite of the apparent difficulties, environmental information systems are being developed in many regions. One very positive aspect is that the driving force for this process is the need of local administrations to improve the basis for their decision making.

1.2. Environmental decision making at subnational level

The subnational focus of environmental protection is defined in the overall Law on the Environment (primarily in Articles 7 and 9). Responsibility for action is deemed to be shared between the Federal Government and the subnational components of the Russian Federation, each administration acting at its own level; issues of national importance are decided case by case, by common agreement. In particular, subnational administrations are expected to be responsible, within their respective territories, for:

- definition of the main thrust of environmental protection and planning, organisation and approval of environmental programmes;

- financing and technical oversight of territorial environmental protection measures and programmes, and stimulation of territorial fund-raising for environmental measures;
- review and assessment of the state of the environment, natural resources, pollution and waste, and maintenance of territorial cadastres and information;
- co-ordination of environmental activities of local government bodies, co-ordination of territorial environmental services provided by enterprises and organisations, and provision of territorial environmental expertise;
- control and surveillance of activities with environmental implications, ensuring compliance with legislation and norms, and issuance of permits for the use of natural resources and for emissions and waste;
- establishment and management of waste collection services;
- establishment and management of protected areas;
- organisation of territorial environmental education, public awareness activities and public information.

The main problem most territories have in discharging these functions appears to be lack of clear definition of the new shared responsibilities between the federal and territorial levels, and inadequacy of the institutional structure and procedures, which are still geared to the old system of federal primacy.

Subnational institutional structures

Subnational institutional structures dealing with environmental matters are, for the most part, very cumbersome, with many layers of administration arranged according to different criteria and along territorial, administrative and substantive lines. The old structure, which persists almost intact, stressed vertical co-ordination among sectoral, territorial and federal bodies, to the detriment of cross-sectoral, horizontal co-ordination locally.

This structure results in overlap of responsibilities and duplication of work, as well as many grey areas and gaps, where no particular body takes responsibility; overall, there is a severe fragmentation of interests and action. Devolution of power to the territories is exacerbating problems by creating greater administrative and financial burdens, which they are not yet equipped to handle. This is leading to fierce competition among and within administrations and departments for power and for the limited support and funds available.

There is an urgent need to streamline and rationalise institutional structures and to create a system for horizontal co-ordination and co-operation at the territorial and local level, where administration takes place.

In addition to the bodies with environmental responsibilities described in Part I there are a number of territorial or local bodies of importance. Representative examples are described below:

- Territorial organisations of federal ministries and other agencies have the primary overall responsibility for sectoral areas at the subnational level; their function is to prepare long-term economic and social development plans for their jurisdictions, including for environmental protection. Within this framework, they are expected to carry out the functions prescribed in the Law on the Environment described above. The control function is well established, but the policy formulating role is fairly weak in many cases. The territorial organisations are formally independent financially and organisationally, but general funding for programmes, staff and equipment is often not adequate, although there are significant variations among areas. Increasingly, with the decline of federal direction and funding, territorial organisations have seemed more open to collaboration with local bodies than in the past.

The relationship between these organisations and the territorial administration varies by territory. The territorial Committees for Environmental Protection, subordinated to Minprirody, frequently collaborate closely with territorial administrations. Often, the Chairman of the oblast Committee for Environmental Protection is also appointed as Vice Head of the oblast administration. In other cases there is direct competition between the territorial administration's environment division and the territorial Committee for Environmental Protection.

- Municipalities and other local bodies also define environmental policy, formulate local regulations in the framework of federal laws and take measures to improve environmental conditions in co-operation with, and under the control of, federal bodies; expenditures are decided jointly. The environment sections of municipal governments for the most part have little or no influence on other departments whose activities have an environmental impact or that are concerned in some way with the environment. They must work with small budgets and limited staff whose members often lack real competence in environmental matters. For example, even the municipality of St. Petersburg, with 5 million inhabitants, has only 15 staff members working on environment. In real terms, municipalities have scant scope for policy making, priority setting or strategy development, and are limited to dealing with immediate day-to-day issues.
- Most urban centres also have subsidiary bodies responsible for various aspects of environmental protection. Nature Conservation Committees are responsible for environmental planning and management and for issuing permits for use of land and wildlife as well as for construction and pollution rights; the city-level departments are subordinated to territorial environmental committees. Sanitary Inspection Committees can impose fines on polluting enterprises or even close them down. Municipal Boards are sometimes responsible for water supply, though for the most part this function lies with federal bodies. Natural resource bodies concerned with stocks of resources (e.g. forests, fisheries) have inspectorate functions as well as management ones.
- A variety of other bodies not directly linked with government administrations also make decisions on, or have responsibilities for, the environment or use of natural resources. Industrial enterprises are often responsible for exploitation of natural resources. They are frequently more powerful than government agencies, especially those in strategic sectors such as energy and petrochemicals or in areas that they monopolise (e.g. Cherepovets for steel mills and fertiliser production, or Nyzhnyi Tagil for steel production and Novomoskovsk for chemicals). They provide information on their activities to local or territorial administrations. They must comply with regulations, and they pay federal bodies for the use of natural resources and local environmental funds for pollution rights. Scientific and research institutions generally provide data and the underlying basis for decisions in the field of environment; they are also involved in some aspects of environmental assessment, planning or management.

Attempts at greater institutional co-ordination appear to be slowly emerging. A positive example is the creation of inter-oblast environmental councils, to assist in co-operation and co-ordination of environmental management activities by various territorial governments.

Financing

Financing of environmental measures is principally through the oblast and municipal environmental funds, which are managed independently by local authorities (Part I section 2.5). In the past, a good deal of their revenue came from charges and fines on industrial enterprises; as restructuring proceeds, there is danger of destroying the economic base from which revenue originates. Because of the drop in revenue, and the drastic reductions in federal funds, innovative approaches to financing are being explored, including moves away from fines and towards fiscal incentives to encourage local investment in environmental protection. Despite a certain degree of progress on this front, financing is one of the weakest points in the entire system of territorial environmental management.

Environmental decision making process

The environmental decision making process at subnational level tends to be narrow, and there appears to be a limited understanding of the benefits of a well-informed, comprehensive approach to environmental management. This is particularly true in the emerging private sector, for industry, corporations and individuals alike. There are such severe pressures to deal with urgent issues and take emergency measures, that not much attention is given to defining long-term policies and strategies for sustainable use of environmental resources. Lobbying for sectoral interests and competition for access to resources and services also tend to distort decisions.

Priority setting at local level varies considerably, and is, for the most part, determined by the visibility, if not the importance, of the problem. Thus, a great deal of attention is being given to pollution. In many large urban centres, domestic and industrial waste is the most important concern, as well as surface and underground water pollution. Less apparent questions relating to management of natural resources that are essential for long-term development are being relegated to second-level consideration and are sometimes not addressed at all. Examples are the severe problems with rising water tables and salinisation in many predominantly agricultural areas; acute soil loss; and, increasingly, unregulated exploitation of forests, which is undermining their long-term viability.

Procedures for decision making and management are inadequate and slow, and often get bogged down for administrative and financial reasons. Procedures for approval of policy, management measures or projects are fairly complicated and involve the territorial and federal levels even if, in principle, the question is of purely local concern. Broader forms of review do not yet operate, as the act requiring environmental impact assessment (EIA) has only recently been passed. Reviews tend to be limited to ascertaining whether environmental sanitation standards are being met, and in many cases this is purely a formality. Norms are, for the most part, so strict as to be almost impossible to meet, given the frequent lack of expertise, funds and equipment. There is increasing unregulated activity, and not much administrations can do about it, given their limited capacity.

Public participation in local decisions is extremely limited, although it is in principle called for during EIA procedures for large projects. Citizens increasingly vocal in their opposition to contamination and are putting more pressure on local administrations to find solutions; nature protection is not yet seen as an important social or economic issue. There appear to have been few examples of co-operation between local government and citizens or the rapidly evolving private sector. While governments are, in principle, not against citizen involvement, increasingly there are cases of bureaucrats opposing this type of action for fear that it may damage their own interests. There are indications of corruption in circumvention of regulations and even policy directives. Tension between local governments and citizens seems to be on the increase.

The transition to a market economy is bringing new situations and management demands, which are of particular significance at subnational level. The main issue is the establishment of a legal system that

regulates property and the obligations and rights of the emerging private sector. This is not, for the most part, in the hands of territorial administrations, as the framework must be provided at federal level.

A major problem is the rising number of actors, with fewer constraints but less ability to act in an environmentally responsible manner. Privatisation and division of state enterprises have complicated management and funding and temporarily curtailed the ability to improve environmental performance and meet standards; liability procedures have not yet been worked out, so there is considerable confusion and lack of confidence. Many enterprises have had to wind down operations or even close, resulting in local unemployment and social problems. Land privatisation may result in new environmental problems, as users modify land use or change the local landscape, all without much supervision or concern, and without the technical knowledge or financial means to take remedial action.

1.3. Environmental information systems at subnational level

The current role of environmental information in territorial decision making is not easy to determine; there is evidence that it is only marginal. Most data are used not for proactive planning and management but for control: in the past, checking compliance with federal norms; now, determining payment of fees and fines.

While an impressive array of information is gathered, it is often not appropriate for making local decisions. In the past, most data were gathered with federal needs in mind, mainly to determine the national state of the environment and fulfil regulatory functions. Much of this information was narrowly scientific, complex or at a high level of generality. This approach was so embedded in the institutional structure that it persists to a great extent.

The collection and storage of information in the regions is done by the subnational bodies of federal agencies for their own management or research uses. This information is, in theory, accessible to local administrations, but access is made difficult by the dispersion of data among various sectoral or specialised bodies. Actual collection is done through local monitoring stations and manual collection and sampling; much of the information originates in self-reporting and is based on estimates, so it has limited credibility. The price of information is a major concern: most bodies will not share it freely, given their financial straits, though legislation requires them to do so (Part I section 3). In practice, much depends on specific agreements.

Consistency of data is a significant problem. Data are gathered in different areas for different sectors; for example, RosGidromet uses river basins as a reference but the Federal Agency for Forestry might use another type of area, neither of them necessarily coinciding with the legal administrative boundaries used by the local administration. Time frames for data collection also vary widely. Data collection methodologies vary by sector, and each body tends to create its own models, data banks and GIS. Hence horizontal flows of information at territorial and local level are limited; local officials cannot pool knowledge and information or integrate various types of data. An exception is made for emergency situations, which appear to be well co-ordinated.

Technical support for information is weak, especially in outlying territories. Telecommunications throughout the country are unreliable, sometimes even within the same locality or city; thus telephone, fax and e-mail communications are difficult, even in important cities such as Moscow and St. Petersburg.

The rapidly evolving situation has created new local needs for information, coexisting with a continuing mistrust of the reliability of information (which is seen as serving central rather than local interests). For example, in the housing market, it is useful to know where the environmentally "clean" areas are, for they command higher prices (up to 12 per cent higher in Moscow). The free market for private

gardening plots requires documentation on environmental status, which is mandatory for the local architectural and land committees. The new law on EIA will also create new local demands for information. Health impact monitoring, a growing concern of environmental policy, is of particular relevance at the local level.

Attempts are being made in the territories to better define information needs for local decision making; so far, however, these attempts seem not to have been very successful. The actual analysis on which decisions are based is often subcontracted to research organisations such as the Academy of Sciences; this may account for the lack of clarity about needs.

1.4. Territorial initiatives

An illustration of the evolving role played by information in subnational environmental decision making is the rapid development of territorial subsystems of the Unified State System for Environmental Monitoring (USSEM) (Part II, section 2).

Pilot territorial USSEMs are being established by Minprirody, initially focusing on formulation of common approaches and novel ways of financing, such as relying on industry rather than state budgets. Some territories have also experimented with non-governmental environmental monitoring systems that are integrated into the national USSEM; others have taken steps to prepare legal documents regulating the participation of monitoring bodies both inside and outside government structures.

To illustrate local trends, achievements and problems, a few territorial experiences are described below. Not enough information is available within the context of the present study to allow analysis of the long-term implications of these experiments; they are offered more as examples of the range of innovative work being carried out. Many appear to be yielding encouraging results, principally because greater flexibility is possible in adaptation to local conditions, but also because the information users (territorial administrations and territorial Committees for Environmental Protection) are leading the initiatives. Ultimately, however, change cannot come only from the territories, but must also be supported at the federal level.

Kaluga oblast

The experience in the Kaluga oblast seems promising, particularly if co-ordination can eliminate competition and duplication and the oblast succeeds in putting the accent on serving the decision making process rather than concentrating on information as an end in itself.

The oblast Committee on Ecology and Natural Resources took the initial steps to establish the territorial information system under the aegis of USSEM. The three-stage approach adopted allows for flexibility, optimal sharing of information and a possible expansion of the system. The first stage, already operational, sets up the basis for the system. A survey of existing databases has been carried out, followed by a review of environmental safety criteria, the creation of supportive databases as well as a system of procedures for access and exchange of information. The next stage will be the creation of integrated databases with common methodologies and compatible operating systems. The third phase will be devoted to strengthening and expanding the system, particularly in terms of analytical and modelling capabilities.

The Kaluga system is based on a Regional Information and Analytical Centre and a cadastre of territorial information on natural resources. The centre carries out environmental monitoring and aims to integrate and analyse data so as to develop a unified policy on environmental protection.

A special effort is being made to overcome the lack of institutional links and absence of a common methodology and technical support systems (software and hardware). To this end, care has been taken to co-ordinate activities at territorial level and obtain the support of the various territorial administrations. A broad range of institutions participate in the system, including international or federation-wide research bodies, territorial inspectorates of federal bodies, local research institutions and industrial enterprises. There is a move to improve the technical backup systems, with emphasis on communications and use of GIS technology, such as ARC-Info and FinGIS.

Kurgan oblast

Kurgan oblast is a mainly agricultural area that suffers from industrial pollution, including radioactive pollution, from the Urals. Health effects are of particular concern. Its experience is significant because of its accent on decision making and the inclusion of environmental, economic and social criteria. The use of indicators and models is also of interest because it emphasises analysis and projections while minimising the effort required for collection.

The monitoring and information system is being developed by the State Institute for Applied Ecology. The information system provides a series of mathematical models on transport of air pollution and on soil and watercourse contamination. The models have been verified and have proved sufficiently accurate. They operate through an original GIS and related software for remote image decoding, using PCs and the Russian language.

Perm oblast

The Perm region has broad-based natural resource and industrial sectors. Intensive development of the energy, machine tool and chemical industries has produced much pollution and waste. The experiment focuses on health impact monitoring to minimise health risks. Emphasis is put on solving methodological problems in environmental monitoring and interrelated environmental, social and economic factors; and on optimising the territorial monitoring system. This makes the experience of the Perm oblast useful to other territories that are trying to make the most of their resources and infrastructure.

Other experiences

There is too little information on all other initiatives to allow an evaluation of their exact nature or usefulness, but their number and variety indicate that many independent efforts are being made at local level. Some could evolve into useful models for greater territorial autonomy and relevance. The danger is that systems will diverge so widely that there may be difficulties integrating the information at the national level.

A Minprirody pilot programme in Tula oblast aims at developing guiding principles for environmental management at territorial level. It addresses environmental monitoring and related organisational, legislative and financial aspects. A system of co-ordinated monitoring enables verification of the performance of pollution abatement measures against changes in ambient quality. The programme draws on the work of various territorial branches of federal organisations, including RosGidromet, the sanitary-epidemiological committee and the water resources committee. In view of the difficulty in co-ordinating work at the federal level, the experience in Tula has been very positive.

In St. Petersburg, the Environmental Committee is setting up a centre for information analysis, and the city is developing territorial environmental legislation with the help of the Academy of Sciences.

In Leningrad oblast, action has been taken to establish a territorial cadastre of natural resources. It follows guidelines on integrated methodological, technological and organisational principles developed by

Minprirody. The system is based on vertical and horizontal integration of both existing data and newly compiled information for sectoral cadastres. The data generally is available only in the territory itself.

In the framework of USSEM, territorial centres for ecological monitoring and land surveying, have been established in various territories, including Astrakhan and Chita oblasts, Primorsky krai, the Republic of Mordovia and the autonomous region of Hanty-Mansysk. Other territories, including the republics of Tatarstan and Karelia, have taken steps in their legislations to establish similar centres.

Special projects exist in the following districts: Nizhni Novgorod, on computer systems and data integration; Lipetsk, on technical systems for data collection and transmission from RosGidromet monitoring stations; Irkutsk, where a system for ecological monitoring, with 16 subsystems has been established; Yakutsk, where a GIS has been established, models of distribution of pollution in air and water are being used and existing data integrated; Ekaterinburg, with a local committee and studies being carried out on ecological and economic valuation of agricultural lands and forest, using GIS; the Republic of Urdmurtiya, on systems for control of air quality; and the urban region of Cheliabinsk, which has introduced a system of air monitoring that includes identification of pollution sources and responsibilities.

In Tyumen oblast, a programme for geomonitoring has been developed, and agreements have been reached on the creation of a territorial Geoinformation Centre; in Ryazan, a project to evaluate the interphase between the environmental status of the territory and health conditions of the people has been started; Bashkortostan has a system of forecasting and valuation of atmospheric pollution; in the Caspian Sea area a database on environmental and economic aspects of water systems and hydrology has been established. The autonomous regions of Yamalo-Nenetsk and Chuvashiya and the Caucasian Mineralnye Vody area also have special initiatives on environmental information systems.

1.5. Options for future developments and recommendations

To improve the information basis for environmental decisions at subnational level, the options to be considered have to be put in the broader policy and institutional context. The changes in the last few years in the Russian Federation have been directed at the macroeconomic level; many subsidiary issues relating to the structure of government have not yet been properly dealt with.

First, the role of the federal government and its relationship with the subnational units must be clearly defined. One option is to have varying levels of central control and local autonomy. The federal Government should focus on providing the general policy framework, and on supporting and co-ordinating subnational activities. Territories should be given greater autonomy in developing policies and in implementing strategies and management approaches.

Institutional arrangements need to be streamlined to eliminate overlapping functions and complex operations. Co-ordination and co-operation as well as the normalisation of procedures at all levels should be improved. Choices range from a complete restructuring of functions to a more gradual process of merging institutions, particularly at territorial and local level. The latter, allowing for integrated and functional local structures, would be most efficient.

Greater integration and comprehensiveness in the generation, analysis and use of information at the subnational levels requires rationalisation of the system. Among the various approaches possible, the best choice would be to conform to international standards. The gathering of information per se could be reduced through wider use of modelling and forecasting methods in decision making.

Financing of local environmental management and, in particular, environmental information systems is a difficult issue. The options for territorial and local administrations are few, particularly in the short

term. A more efficient use of resources, including those from international sources, and multifunction information gathering is an initial possibility. Gradually, systems for providing information and payment for services, could be envisaged, but will be difficult as long as the economy is unstable.

Technical aspects of information systems can be considerably improved at local level, particularly for autonomous equipment, such as computers. The simpler the system, the better. Since decision makers generally tend to speak only Russian and are not familiar with the technology involved, imported systems need to be adapted if they are to be used effectively. For larger systems, such as telecommunications, local and even territorial administrations have few options for action; this is dealt with at the federal level.

The experiences of other federal countries from the OECD area such as Canada and Germany would also be useful: the first, because of the similarities in environment and size; the second, because of its experience with eastern Germany, which had many parallels with situation of the Russian Federation.

Immediate actions could include:

- establishing a continuing dialogue between the federal and territorial levels, to define common strategies; ongoing territorial initiatives and experiences from other federal countries could be used as a starting point for discussions and information exchange;
- developing a common framework for environmental policies, backed by the necessary legal framework; the main action should be taken at the federal level in consultation with the territories;
- agreeing on common approaches for setting up compatible information systems and using environmental information in decision making, and ;
- undertaking a critical assessment of territorial needs in terms of data, methodologies, technology and personnel, not only to evaluate information needs but also to ensure consistency of parameters and methods for data gathering, analysis and integration;
- developing a timed strategy for setting up local information systems based on needs assessment; skills development and training is an important element, not least for the Federal Government to develop and support, and external support could then be sought where necessary.

2. INTEGRATION AND CO-ORDINATION OF ENVIRONMENTAL MONITORING SYSTEMS

2.1 Background

Various kinds of environmental monitoring activities have been conducted in Russia under the authority of more than a dozen federal agencies (Part II section 2.4, and Annex IV), not to mention territorial and local authorities. Such complexity makes creation of a functional national integrated monitoring system a major challenge.

In a decree passed on 24 November 1993, the Government of the Russian Federation proposed the creation of a Unified State System of Environmental Monitoring, or USSEM. This action is a potentially important step in the evolution of environmental policy in Russia. The resolution places primary responsibility for co-ordination of environmental monitoring under the authority of Miniprirody. The approach is to unify current monitoring activities under one umbrella programme at the federal level, while looking for ways to streamline and improve the efficiency of the overall effort.

In response to the resolution, Minprirody created the Federal Centre of Geocological Systems which has been given prime responsibility for implementing USSEM. Since its creation in 1994, the centre has grown from a single staff member to more than 50.

USSEM is part of the Environmental Safety programme, whose monitoring objectives are:

- observation of natural environments, natural resources, flora and fauna and sources of anthropogenic effects, assessment of the condition of these objects of observation and prediction of their change;
- information support for environmental management and conservation of a favourable human habitat;
- timely, reliable identification of possible environmentally unsafe areas and presentation of this information to users, so that long-term and emergency measures can be worked out to ensure the environmental safety of Russia.

In this framework USSEM will monitor: i) natural environments and resources (atmosphere, surface waters, sea waters, land and soil cover, geological environment and mineral raw material resources, and flora and fauna); ii) anthropogenic effects and their sources; iii) ecological systems; and iv) human health effects.

In addition to the usual problems in establishing national monitoring programmes, and the country's economic, social and political situation, USSEM faces obstacles including lack of uniform laboratory standards, limited communications technology, rapid changes in land use practices and limitations on data availability due to proprietary rights claims concerning sales of data.

Considerable planning has gone into developing and co-ordinating the roles of monitoring agencies at all levels of USSEM (local, territorial, and federal); this is an area that will require continuing, constant, intense scrutiny if the programme is to be successful.

2.2 Links with decision making

The decision making process in any field is, or should be, dependent on good information. Lack of information, lack of understanding or lack of confidence in the information source can result in failure of decision makers to deal adequately with an environmental issue. Environmental monitoring activities offer the potential to generate valuable data; however, a distinction must be drawn between data and information. A monitoring programme such as USSEM, which does not yet have adequate means of converting its data into information that can be understood by decision makers (and the general public), risks failing to achieve its goal of promoting formulation of informed environmental decisions and policies. For monitoring activities to be effective at higher governmental levels, there must be co-ordination of these activities at local and territorial level. Such co-ordination includes standardising methods and reporting practices (scientific aspects), as well as development of an atmosphere of understanding and co-operation between environmental scientists and decision makers (administrative aspects).

Data management

Thus, managing the data generated by USSEM is of prime importance. It would be logical, as is being proposed, to establish a reporting centre to receive input from federal and subnational agencies, which should have their own "satellite" centres if possible, forming an information network. Such centres could be responsible for regular and timely preparation of policy-oriented reports and assessments based on the data received. This would help focus the system on gathering the data required for integrated reporting.

In many cases, these centres would generate products that would take slightly different forms depending on which was to receive them: environmental experts, decision makers, the general public or the international community. Feedback on the performance of the monitoring network could also be disseminated by the national reporting centre. It would probably need to be physically located in a federal ministry with strong links to subnational agencies and research institutes.

Interaction between environmental experts and decision makers

Environmental experts and decision makers need to have good lines of communication in order to assure mutual satisfaction. Decision makers need to know in advance the nature of the information they can expect (including its limitations), while scientists need to understand the needs and expectations of decision makers. In some cases, it could be necessary to modify the monitoring programme or the expectations of the decision makers. Especially at local level, it is important for the programme to be flexible enough to permit adjustment to local needs while preserving the integrity of the important components of a uniform national programme.

Decision makers clearly should play a role in setting priorities for environmental monitoring activities at all levels of government. This is suggested not to diminish the importance of input by environmental experts, but rather to emphasise the broader view offered by decision makers. For example, Russia's yet to be completed reforms in basic economic, legal and social institutions leave decision makers with limited options in dealing with environmental problems. Thus, they may find it necessary to assign low priority to certain types of monitoring work at a given time, simply because addressing the problem to which the monitoring relates is not possible for economic, legal or social reasons. Scientists need to be informed on such matters; they should also have the opportunity to make their case if they think such work should have high priority.

As Russia experiences the transition from a planned to a market economy, it is important for environmental policy to change in concert with the development of economic, legal and social institutions. Evolution of policy should reflect the changing technical capabilities in environmental monitoring, regulation and enforcement. It also calls for concerted efforts to re-evaluate priorities while taking advantage of opportunities to simplify environmental standards and improve efficiency.

Execution of a co-ordinated environmental monitoring programme in Russia is especially challenging because of the vastness of the country, the heterogeneity of environmental problems and local customs, and the economic situation. The USSEM demonstrates government recognition of the importance of such a programme. It is commendable that USSEM places considerable emphasis on co-ordination of local and territorial monitoring efforts, and targets government units at territorial level as centres of co-ordination and information management forming a network that links with the Federal Government. The dynamic development in the territories also gives hope for demand-driven development of monitoring efforts (Part II, section 1.4).

2.3 Technical aspects

Given the existing and anticipated near-term financial constraints, opportunities for increasing monitoring intensity or adding new technology will be limited. The goal should be a functional, integrated network that has the flexibility to accommodate specific local needs while satisfying needs of a broader territorial/federal programme, and to accommodate improved technology as resources permit. To meet technical requirements, points such as the following should be taken into consideration.

Levels of monitoring. Typically, national monitoring programmes involve both extensive and intensive monitoring. Extensive monitoring is characterised by a relatively few observations at many sites

nationwide. This lower-cost approach usually measures few variables and yields rather coarse results. It provides a snapshot of the environment that aids in identifying problems (such as hot spots) and trends that may need more careful attention. Intensive monitoring projects typically focus on a few sites, have high numbers of observations, use precise (expensive) methods and measure many parameters. At the federal level, USSEM should focus on extensive monitoring and offer support and guidance for intensive monitoring, as necessary, at local level.

Efficiency. A monitoring programme must also be effective, yielding reliable data that are needed to address its objectives. As the stated objectives of USSEM are broader than can be supported by existing resources, priorities must be set and articulated frequently at all levels of the programme so that decisions about the most efficient use of resources can be made on a logical and defensible basis. With the current cost constraints, USSEM plans call primarily for consolidating existing monitoring activities, as opposed to instituting major new activities. Careful planning may permit considerable recovery of funds as USSEM is implemented. For example, overlapping and redundant activities by different agencies can be combined; with the availability of current modelling techniques and better emission data, reductions in the numbers of field stations may be possible; relatively inexpensive technologies such as autosamplers can be cost-effective in some cases.

Equipment. New and replacement equipment needs have to be weighed against monitoring priorities and viewed from a cost-benefit perspective. Factored into these decisions should be concerns that go beyond initial cost: a decision to employ new equipment should be made with full knowledge of long-term funding obligations (maintenance, supplies, training, etc.). Furthermore, provisions should be made to meet such obligations at the time of purchase.

Modelling. Russian experts are known to excel in the use of mathematical techniques to predict environmental results. Application of this discipline to improve efficiency and quality of monitoring efforts should be planned at all levels. Other countries have demonstrated that modelling can be used to optimise monitoring activities. For example, in the Netherlands, mathematical modelling of pollution emissions has improved air quality predictions, making it possible to reduce the number of monitoring stations needed.

Bioindication. Use of bioindicators can be a very effective and relatively inexpensive tool, especially in extensive monitoring work. It should be especially useful in USSEM because scientists of the former USSR pioneered much of the bioindication work published to date. Examples are studies showing that lichens are bioindicators of sulphur deposition, and dendroecological studies demonstrating the relationship of tree growth to pollution stress.

Quality assurance. Poorly co-ordinated and often independent monitoring activities in Russia have given little attention to quality assurance. Instituting effective and manageable quality assurance is a major challenge in any programme. In Russia, this challenge is exacerbated by the economic situation and the vastness of the country. USSEM identifies quality assurance as an important component and assigns responsibility for establishment, operation and oversight of quality assurance to the federal centres that will co-ordinate monitoring activities. It identifies four principal quality assurance functions at the federal level:

- uniform (standardised) procedures and technologies;
- a unified system of external review of quality of analytical work;
- a certification programme for methods and technology; and
- methodological and organisational guidance at the territorial and local levels.

An effective quality assurance programme may be the greatest technical challenge in the entire USSEM project. Individual field stations or laboratories may find it impossible to follow established (and necessary) protocols because of supply, equipment or logistical considerations. Such problems may require major funding outlays to create conditions that permit generation of compatible data.

2.4 Institutional and financial set-up

Organisation

About 90 per cent of the responsibility for monitoring might be assigned to territorial governments while 10 per cent is retained at the federal level. Under USSEM the Federal Government establishes the framework for monitoring activities at territorial level and retains prime monitoring responsibility/oversight for special cases such as the nuclear power industry, major rivers, the Red Book, etc. Territorial authority focuses on such things as environmental review, control of environmental rules and economic regulations. All these responsibilities are now viewed as joint responsibilities and are being more precisely delineated.

The intent in establishing USSEM is to use the existing monitoring infrastructure to the fullest extent possible. The system is being established at three main institutional levels: federal, member territories of the Russian Federation, and local. USSEM functions at the federal level have been relatively well defined (though the means of execution are less clear). They are to:

- establish rules, procedures and standard methodologies for the development of USSEM;
- develop and administer a uniform quality assurance programme;
- provide for communication of information to central government decision makers;
- provide for communication of information to the citizenry and monitor public opinion,
- provide for operation of monitoring systems of national importance, including specialised systems that may not have local or territorial significance;
- provide for Russian participation in international and global monitoring programmes.

The territorial monitoring units are to form a monitoring network that is co-ordinated from the federal level. They are responsible for territorial-scale monitoring and for forming a network of local units within the boundaries of the territory. The territorial units are of key importance, not so much because of their specific monitoring functions but because of the link they form between the federal and local levels.

The local monitoring units, with support from the territorial and federal levels, are the principal components of USSEM. The same functional and specialised subsystem support applies as at the federal level. Local units may be organised by government agencies or local enterprises. They carry out monitoring for the basic federal network but may also engage in activities of local interest.

Lead institutions

Minprirody has been given lead responsibility for USSEM. Within Minprirody, prime responsibility for co-ordinating and implementing USSEM has been assigned to the State Institute for Applied Ecology and the Federal Centre of Geoecological Systems. At this level, the most difficult challenge involves developing functional co-operation among the numerous federal agencies that continue to have monitoring responsibility according to the decree creating USSEM. These agencies are divided into three subsystem components: functional monitoring subsystems, specialised monitoring subsystems and support subsystems. All three are expected to employ uniform methodologies and a common information base.

The functional monitoring subsystems are:

- surface and marine waters, soils, atmosphere and near-earth space, including ozone layer monitoring (RosGidromet);
- sources of anthropogenic effects (Minprirody);
- land (Committee for Land Resources and Management);
- geological environment (Committee for Geology and Mineral Resources);

- terrestrial flora and fauna, except forests (Minprirody);
- human health effects (State Committee for Sanitary-Epidemiological Supervision).

These executive authorities and their territorial branches co-ordinate the activities of sectoral, departmental and field monitoring services operating within the framework of the above subsystems. This includes responsibility for collecting and summarising data.

The specialised monitoring subsystems are:

- forests (Federal Agency for Forestry);
- water systems (Committee for Water Resources);
- fish, water animals and plants (Committee for Fisheries);
- enterprises and sites (sources of pollution that belong to the Ministry of Defence, the Ministry of Atomic Power Engineering, the State Committee for Machine Building, the State Committee for Defence Industries, the State Committee for Oil and Petrochemistry and the State Committee for Metallurgy);
- industrial safety, except for sites belonging to the Ministries of Defense and Atomic Power Engineering (State Committee for Mine Technical Supervision);
- underwater sources of environmental hazards in oceans and inland waters (Ministry for Emergency Situations).

The support subsystems, which may provide support for the other two sets of subsystems, are:

- cartographic and geodetic support;
- meteorological support;
- aerospace observation facilities and systems support;
- telecommunications systems support.

Management and operation

Minprirody, working through federal executive authorities of the subsystems, provides federal oversight of the establishment of USSEM and co-ordination of its operation. It also oversees monitoring at territorial and local level, especially in relation to establishing uniform monitoring methodologies, standards, specifications, etc., and establishing assessment criteria. Minprirody has a close association with the Russian System for Emergency Situations (RSES), to ensure that RSES receives all emergency information rapidly and in suitable form. In an emergency, USSEM may operate as a subsystem of RSES.

Financing

At this early stage, USSEM has only general plans for funding monitoring efforts. At local level, the proposal is for funding to come from the local and territorial budgets, extrabudgetary environmental funds and, for issues of federal importance, the federal budget. Funding of local monitoring may also come from enterprises. Federal funds will be more accessible for territorial monitoring, though it is expected that much of the funding will come from territorial budgets. Again, as regards matters of interest at the federal level, such as monitoring required to address transboundary issues, funding will have to become from the central Government.

As financing could prove the most serious obstacle to the development of USSEM, this issue would need more attention at this stage than apparently it is receiving. It would also be appropriate early on to develop guidelines for budget allocations to the organisations involved at different levels so that these allocations can be used as instruments to ensure co-ordination and standardisation of methodologies. To

establish principles of cost-efficiency, funds should be explicitly allocated within the budget of each contributing organisation and used in accordance with the joint monitoring programme agreed by the parties.

Recognising that government funding for monitoring will be insufficient, it is important to evaluate new sources of funding. These might include donor countries, UN organisations, private foundations and the World Bank. Regardless of the source or size of funding, it is vital to ensure the effective and efficient use of funds if continuing support is to be expected.

2.5 Recommendations

An analysis of the USSEM project raises a number of general comments:

- goals may need to be sharpened and focused, based on a clearly articulated set of priorities;
- the ability to provide integrated information to support policy development, especially to sectoral ministries, may need to be strengthened;
- building up adequate coverage of pressures on the environment (e.g. resulting from emissions, resource use and waste generation) and responses (e.g. pollution abatement expenditure, reforestation rates and pricing of natural resources) will take time and effort;
- a balance between general and specific goals for future nationwide environmental information systems will need to be found.

In this regard, the following suggestions are made:

- USSEM should concentrate on establishing a framework for co-ordinated environmental monitoring across the federal and territorial levels of government. Consistent with stated goals and priorities, a core programme including the most important environmental parameters should be set up. As much as possible, the focus should be on a systems approach. A lean programme would be both more manageable and more affordable. Territorial programmes and budgets should be closely linked to the system; this would provide an "ownership" incentive to territorial and local administrations, helping ensure that the system has relevance to their information needs. Federal activities must focus on support for development in the territories: training, development of compatible methodologies and basic regulations, supply of hardware and software, etc.
- Considering that the approach in the establishment of USSEM is to integrate existing networks and organisations, serious efforts to establish a co-operative mode on the part of organisations will be crucial. In the short term, this is much more important than rushing to apply solutions that not all organisations are happy with. At this stage, the establishment of a dynamic process is more important than finding the ultimate solutions.
- A core element of USSEM should be an easily accessible meta-information system (Part I, section 3.2). This would improve considerably the possibilities of better using data from existing monitoring systems.
- The ability to transfer information between federal, territorial and local monitoring units is important. This requires an effective, affordable and uniform medium, preferably in digital

form. The practice of free and open sharing of all monitoring information should, as is proposed, be a basic premise of USSEM.

- Data about emissions and use of natural resources should be integral and strong components of USSEM. From a policy viewpoint, such information is important in quantifying outputs from sectoral activities, and to enable future environmental management to act on the sources of environmental stress. A strong factual information base will be invaluable in setting priorities. In addition, information on the quality of environmental media will increasingly be based on emission data, or possibly activity statistics, rather than conventional physical-chemical-biological measurement. Improved mathematical models and increased pressure for cost-efficiency are driving forces in this development.
- Long-term monitoring of trends should be a separate function. Not every measurement series needs to be continued indefinitely; monitoring of background pollution, for example, can be selective. Time-series monitoring is an investment in future knowledge and should be supported as part of a federal core programme. In contrast, monitoring in support of specific pollution abatement programmes or for enforcement purposes should be incorporated within territorial or local extensions of USSEM.
- As public support is vital to the success of an environmental monitoring programme, it would be helpful to develop a plan to promote good public relations. This should include provisions for involving a broad range of representation in planning (government agencies, the Academy of Sciences, universities, industries, enterprises, NGOs). Also included should be a means of communicating to the public the nature of the programme, its goals and priorities, why it is important and how it will make a difference. This also affords an opportunity to report successes and to establish a mechanism for receiving public input.

PART III

SELECTED ENVIRONMENTAL DATA

This part of the report comes within the scope of a broader work programme on environmental data and indicators carried out under the auspices of the OECD Group on the State of the Environment. It is designed to provide selected environmental data for the Russian Federation. Environmental data and indicators have already been published for OECD countries as well as for the Partner in Transition Countries (the former Czech and Slovak Federal Republic, Hungary and Poland) and for Belarus in the framework of OECD reviews of environmental information systems.****

This is the first time that environmental data have been collected for the Russian Federation. In the framework of the OECD assessment of the environmental information systems of the Russian Federation, the Institute of Global Climate and Ecology in Moscow, filled in the 1994 OECD State of the Environment questionnaire. The data have been treated and analysed by the OECD Secretariat.

The following pages are based on the replies to the OECD questionnaire and have been complemented with data from other OECD and international sources, as well as from selected national reports and yearbooks. Data available up to 30 June 1995 were taken into account.

When using the data presented here, consideration should be given to the following:

- ▶ Where possible, values for the Russian Federation are presented alongside values for Bulgaria, the Czech Republic, Hungary, Poland, the Slovak Republic and OECD averages. Data referring to the period prior to the separation of the Czech and the Slovak Federal Republic are presented for the entire former CSFR and supplemented by separate information on the two Republics whenever available. Most of the data presented express environmental pressures on a per capita basis, by relating the absolute values of selected environmental variables to the size of the population. The absence of sufficiently reliable and internationally comparable data on national accounts does not allow comparisons using GDP as a denominator.
- ▶ Some important environmental issues are not covered here, since related data are not available or could not be made available to OECD. Examples are: population served by waste water treatment plants, threatened species, generation of industrial and hazardous waste.
- ▶ Data quality assurance has generally been given little attention in Russia, but is an important component of environmental information systems. Data generally stem from dispersed and often independent monitoring activities and do not yet benefit from external reviews or critical analysis. Data on emissions from individual enterprises for example, are viewed with scepticism by the environment inspectorate, as they follow too closely the former official objectives.
- ▶ When using these data in an international context, the reader should be aware that strict comparisons with data of OECD countries are not valid since classifications, definitions and measurement methods may be different. Furthermore, the quality, accuracy, coverage and historical record of data in the different countries is highly variable. Inter-country comparisons should therefore be subject to great caution.

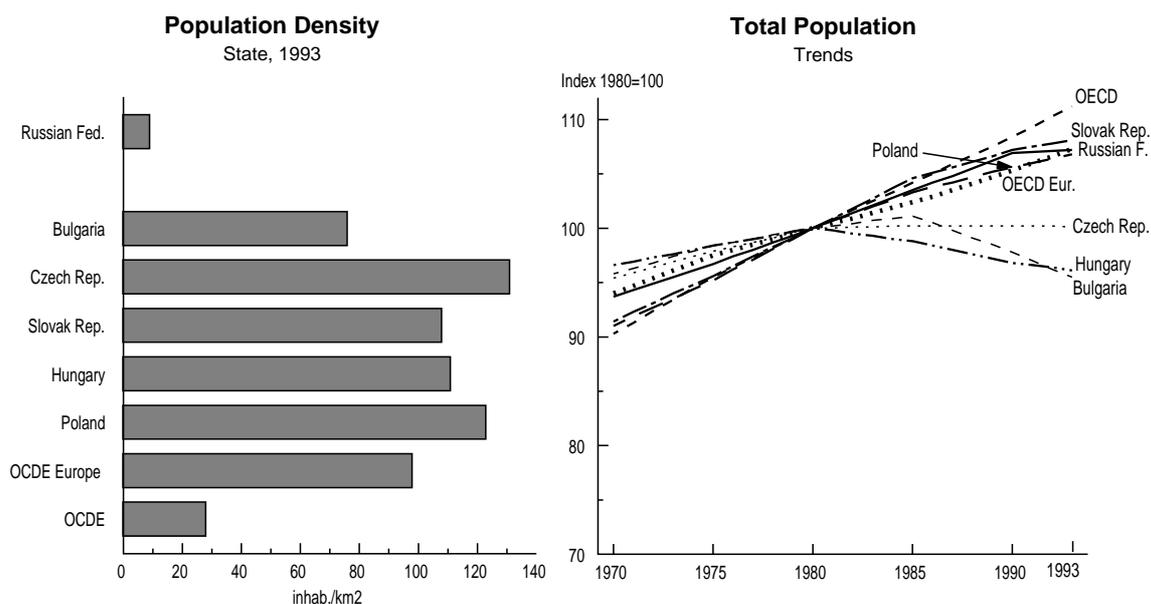
**** See, OECD (1995), *OECD Environmental Data: Compendium 1995*; OECD (1994), *Environmental Indicators: OECD Core Set*; OECD (1993), *Environmental Information Systems and Indicators: A Review of Selected Central and Eastern European Countries*; and OECD (1994), *Environmental Information Systems in Belarus: An OECD Assessment*.

POPULATION

Population is a major determinant of environmental conditions and trends. It influences production and consumption patterns and thus bears on the sustainability of development: population density implies density of human activity and is often correlated with pollution and with resource use. Population also affects the environment through its structural elements (age classes, active population, size of households), which influence consumption patterns and waste generation. Overall 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 indicators below present trends in national resident population over the last two decades as well as population density for the most recent year. It provides background information on the countries' demographic situation and thus helps in interpreting environmental indicators in the appropriate context.



	Population					Population density		1993
	1 000 inhabitants (a)					% Change		
	1970	1980	1985	1990	1993	1970-1980	1980-1993	
Russian Federation	130 079	138 765	143 585	148 292	148 700	6.7	7.2	9
Bulgaria	8 490	8 862	8 961	8 669	8 460	4.4	-4.5	76
former CSFR	14 334	15 260	15 445	15 562	15 609	6.5	2.3	122
Czech Republic	9 805	10 284	10 305	10 305	10 296	4.9	-0.1	131
Slovak Republic	4 529	4 976	5 140	5 256	5 313	9.9	6.8	108
Hungary	10 338	10 707	10 579	10 365	10 293	3.6	-3.9	111
Poland	32 526	35 574	37 203	38 119	38 460	9.4	8.1	123
OECD Europe	386 262	410 715	420 419	432 361	440 761	6.3	7.3	98
OECD	783 144	867 359	903 388	940 174	964 439	10.8	11.2	28

Notes:

- a) Population is defined as all nationals present in or temporarily absent from a country and aliens permanently settled in the country.
 b) Population density is calculated using the value of total area which includes inland waters (e.g. rivers, lakes, artificial waters, impoundments, coastal lagoons) but excludes 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 AND STRUCTURE

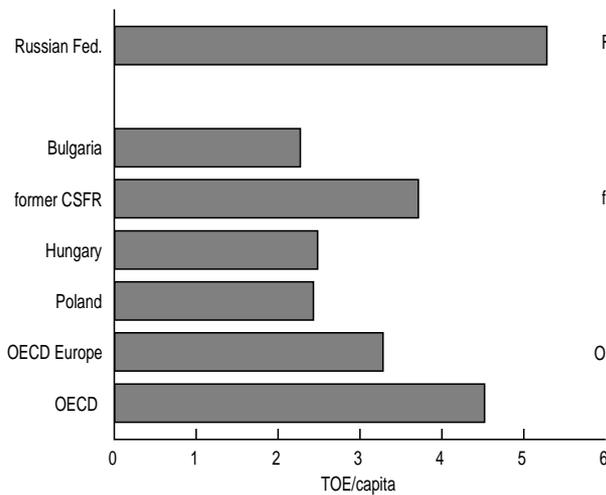
Energy production and use generate many environmental impacts, which differ greatly from one source of energy to another:

- traditional atmospheric pollution at local and regional levels (urban smog, acid precipitations) from the combustion of fossil fuels;
- risks relating to the various stages of the nuclear fuel cycle and problems connected with the disposal of high-level radioactive wastes;
- risks relating to the extraction, transport and use of fossil fuels, risks to coal miners, oil spills, etc.;
- global atmospheric problems relating to greenhouse gases such as CO₂ from fossil fuel use, and their potential impact.

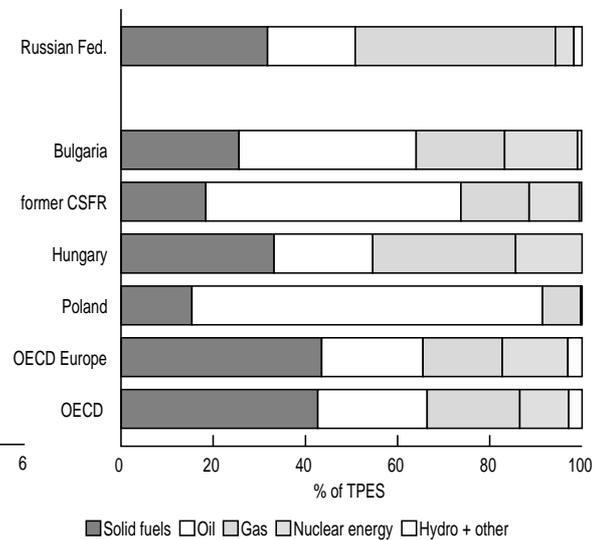
In this context, the structure of a country's energy supply and its changes over time have a major influence on its environmental performance and sustainability of development. The supply structure, which may vary considerably among countries, is dependent on final demand by industry, transport and the household sector, and is influenced by national energy policies and price structures on national and international energy markets.

The indicators below present total primary energy supply (TPES) in million tonnes of oil equivalent (MTOE) and energy intensity (i.e. energy supply per capita) for the most recent year, as well as the structure of energy supply by primary energy source (as a percentage of total primary energy supply).

Energy intensity per capita, 1992



Structure of energy supply, 1992



	Energy supply (a), 1992		Energy supply by source (b), 1992				
	Total (MTOE)	per capita (TOE/cap.)	Oil (%)	Solid fuels (%)	Natural gas (%)	Nuclear (%)	Hydro etc. (%)
Russian Federation *	785	5.28	31.8	19.0	43.4	4.0	1.8
Bulgaria	19	2.27	25.6	38.4	19.2	15.8	0.9
former CSFR	58	3.71	18.4	55.3	14.8	10.9	0.5
Hungary	26	2.48	33.2	21.4	31.0	14.4	-
Poland	93	2.43	15.4	76.0	8.3	-	0.3
OECD Europe	1 438	3.28	43.5	22.0	17.2	14.2	3.1
OECD	4 317	4.52	42.7	23.7	20.1	10.6	3.0

Notes:

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

b) Percentages are based on totals excluding trade in electricity.

RUS) Data refer to 1991.

Source: IEA-OECD.

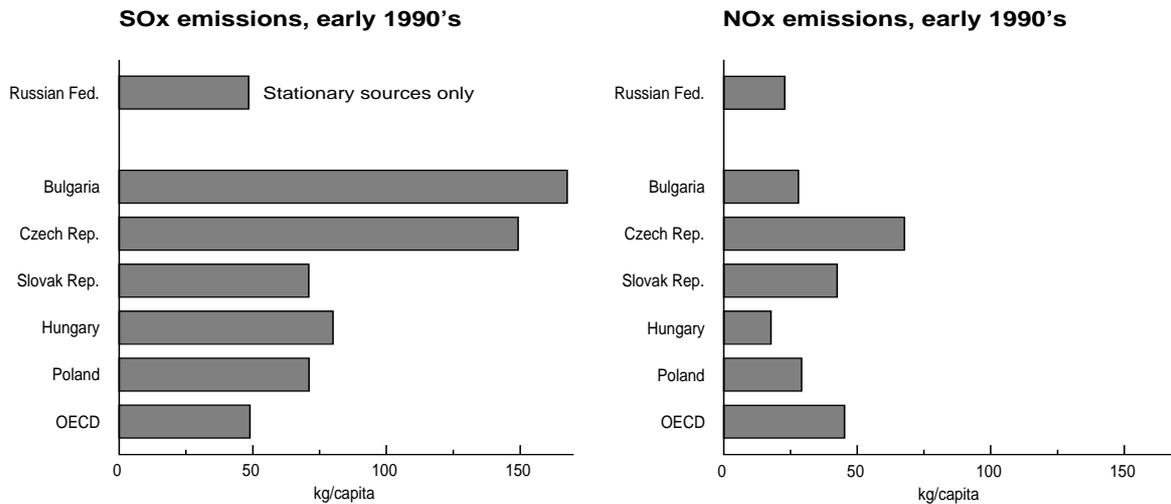
AIR POLLUTANT EMISSIONS [1]

Sulphur and nitrogen compounds are both at the source of environmental acidification and have negative effects on human health and on ecosystems. They contribute to local and urban pollution as well as to large scale air pollution problems through long distance transport in the atmosphere.

Man-made sulphur oxides are predominantly emitted by energy production plants, followed by industrial combustion and industrial processes. Man-made nitrogen oxides are predominantly emitted by transport sources, as well as by other energy uses and industrial processes. Another source of nitrogen is nitrogenous fertilizers when used in excessive quantities in agriculture.

International efforts to abate SO_x and NO_x emissions are reflected in two protocols to the Convention on Long Range Transboundary Air Pollution: the Helsinki Protocol to reduce sulphur emissions (entered into force in 1987) and the Sofia Protocol on the reduction of nitrogen emissions (entered into force in 1991).

The indicators below present trends in SO_x and NO_x emissions and their change since 1985, as well as emission intensities expressed as quantities emitted per capita. The lack of reliable and internationally comparable data on GDP makes it impossible to calculate another useful indicator of emission intensity: SO_x and NO_x per unit of GDP.



Total man-made SO _x emissions				Change from 1985 (%)	per capita (kg/capita) 1993 (a)	
1 000 tonnes	1980	1985	1993 (a)			
Russian Federation	*	12 123	11 945	7 197	-40	48.4
Bulgaria	*	2 050	2 314	1 422	-39	168.1
Czech Republic		2 257	2 277	1 538	-32	149.2
Slovak Republic		843	622	374	-40	70.6
Hungary		1 633	1 404	827	-41	80.0
Poland		4 100	4 300	2 725	-37	71.0
OECD	*	58 200	48 100	42 000	-13	43.9

Total man-made NO _x emissions				Change from 1985 (%)	per capita (kg/capita) 1993 (a)	
1 000 tonnes	1980	1985	1993 (a)			
Russian Federation		3 379	3 378	3 401	1	22.9
Bulgaria	*	416	416	238	-43	28.0
Czech Republic		937	831	698	-16	67.7
Slovak Republic	*	..	197	224	14	42.3
Hungary		273	263	183	-30	17.7
Poland		..	1 500	1 120	-25	29.2
OECD	*	41 300	36 500	39 500	8	41.3

Notes:

a) Or the most recent year.

RUS) SO_x: stationary sources only.

BUL) SO_x: 1985 data are estimates. NO_x: 1980 data are estimates. 1985 data refer to 1987.

SLO) NO_x: 1985 data are Secretariat estimates.

OECD) Rounded figures, including Secretariat estimates. Data exclude Mexico.

Source: OECD, national reports.

AIR POLLUTANT EMISSIONS [2]

Man-made particulate matter (PM) emissions arise mainly from the combustion of fuels (e.g. coal burning in industry and the domestic sector, use of diesel vehicles). It contributes significantly to visibility reduction and, as a carrier of toxic metals and other toxic substances, exerts pressures on human health.

Man-made carbon monoxide (CO) is emitted from incomplete combustion of fossil fuels - a majority of it (up to 90 per cent in OECD countries) by road traffic and by industry. It can cause adverse health effects, in particular because it interferes with the absorption of oxygen by red blood cells.

The tables below show man-made emissions of particulate matter and carbon monoxide, their change since 1985 and emission intensities expressed as quantities emitted per capita. The lack of reliable and internationally comparable data on GDP makes it impossible to calculate another useful indicator of emission intensity: particulate matter and carbon monoxide emissions per unit of GDP.

		Total particulates emissions				
		1 000 tonnes			Change from 1985 (%)	per capita (kg/capita) 1993 (a)
		1980	1985	1993 (a)		
Russian Federation	*	9 651	9 165	4 709	-49	31.7
Bulgaria		..	..	428	..	50.4
Czech Republic		..	1 015	501	-51	48.6
Slovak Republic		..	358	226	-37	42.6
Hungary		577	492	160	-67	15.5
Poland		..	2 425	1 517	-37	39.4

Notes:

a) Or the most recent year.

RUS) Data refer to stationary sources only.

Source: OECD, national reports.

		Total carbon monoxide emissions				
		1 000 tonnes			Change from 1985 (%)	per capita (kg/capita) 1993 (a)
		1980	1985	1993 (a)		
Russian Federation		22 781	23 411	20 566	-12	138.3
Bulgaria	*	..	997	775	-22	91.6
Czech Republic		..	899	1 045	16	101.4
Slovak Republic	*	..	339	313	-8	59.0
Hungary	*	1 328	931	836	-10	81.0
Poland	*	3 403	2 545	2 109	-17	54.8

Notes:

a) Or the most recent year.

BUL) 1985: 1987 data.

SLO) 1993 data are Secretariat estimates for 1991.

HUN) 1980-1985 data are Secretariat estimates.

POL) Stationary sources included in total refer to principal emission sources only.

Source: OECD, national reports.

URBAN AIR QUALITY [1]

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. outdoors, 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 SO₂, particulates, NO₂, oxidants, CO, volatile organic compounds and heavy metals.

Urban air pollution in cities is of primary interest because most man-made sources of pollution concentrate there (e.g. industry and traffic) and because it affects the quality of air breathed by city-dwellers.

Urban air quality can be partly expressed through annual average concentrations of SO₂, particulate matter and NO₂ at monitoring sites located in cities. This indicator can however conceal important seasonal differences within the same city. Methods of measurement, number and location of measuring sites vary from one city to another.

City or area		Cat. (a)	No Sites	1985 base year (µg/m ³)	1980	1985	Index			
							1990	1991	1992	1993
CONCENTRATION OF SO₂										
Russian Federation *	MOSCOW	A	19	20.0	350	100	10	15	5	..
	ST.PETERSBURG	A	12	30.0	300	100	17	20	17	33
	OMSK	B	11	40.0	325	100	25	25	13	25
	NOVOSIBIRSK	B	11	10.0	100	100	80	80	60	50
Bulgaria	SOFIA	A	..	33.0 (1986)	..	100	106	91	127	106
	PLOVDIV	B	..	372.0 (1986)	..	100	46	33	23	19
Czech Republic	PRAGUE	A	29	86.0	86	100	52	73	..	..
Slovak Republic	BRATISLAVA	A	7	44.0	86	100	48	48	..	..
Hungary	BUDAPEST	A	36	12.0 (1992)	..	..	..	..	100	174
	MISKOLC	B	14	11.4 (1992)	..	..	..	..	100	245
Poland *	WARSAW	A	8	54.0	87	100	35	37	28	37
	CHORZOW	B	1	104.0	77	100	60	62	99	95
CONCENTRATION OF NO₂										
Russian Federation *	MOSCOW	A	19	60.0	117	100	133	133	133	..
	ST.PETERSBURG	A	12	40.0	125	100	150	175	175	200
	OMSK	B	11	50.0	80	100	40	60	40	60
	NOVOSIBIRSK	B	11	30.0	100	100	167	133	133	167
Bulgaria	SOFIA	A	..	45.0 (1986)	..	100	118	87	111	127
	PLOVDIV	B	..	35.0 (1986)	..	100	131	100	137	143
Czech Republic	PRAGUE	A	19	77.0	..	100	96	81	..	..
Slovak Republic	BRATISLAVA	A	7	25.0	72	100	116	108	..	..
Hungary	BUDAPEST	A	36	48.2 (1992)	..	..	..	..	100	107
	MISKOLC	B	14	20.2 (1992)	..	..	..	..	100	159
Poland *	WARSAW	A	1-3	67.0	78	100	97	78	73	84
	CHORZOW	B	6-1	138.0	46	100	92	67	80	49
CONCENTRATION OF PARTICULATES										
Russian Federation *	MOSCOW	A	19	150.0	133	100	67	73	67	..
	ST.PETERSBURG	A	12	100.0	200	100	160	180	100	100
	OMSK	B	11	140.0	214	100	93	121	71	71
	NOVOSIBIRSK	B	11	300.0	133	100	60	73	67	67
Bulgaria	SOFIA	A	2	337.0 (1986)	..	100	84	70	66	52
	PLOVDIV	B	..	336.0 (1986)	..	100	61	71	66	58
Czech Republic	PRAGUE	A	12	137.0	130	100	50	58	..	..
Slovak Republic	BRATISLAVA	A	7	53.0	170	100	175	125	..	..
Hungary	BUDAPEST	A	1	234.6 (1992)	..	..	..	..	100	107
	MISKOLC	B	4	377.2 (1992)	..	..	..	..	100	50
Poland *	WARSAW	C	8	75.0	64	100	67	67	57	51
	CHORZOW	B	1	287.0	113	100	83	76	70	57

Notes:

a) Categories: A - city where a notable portion(5-10%) of the national population is concentrated; B - city in which a significant number of inhabitants is considered to be exposed to the highest level of pollutants in 1980; C - city with residential and service functions and with intermediate level of pollutants.

RUS) 1980: 1981 data. SO₂: Change in measurement method in 1986.

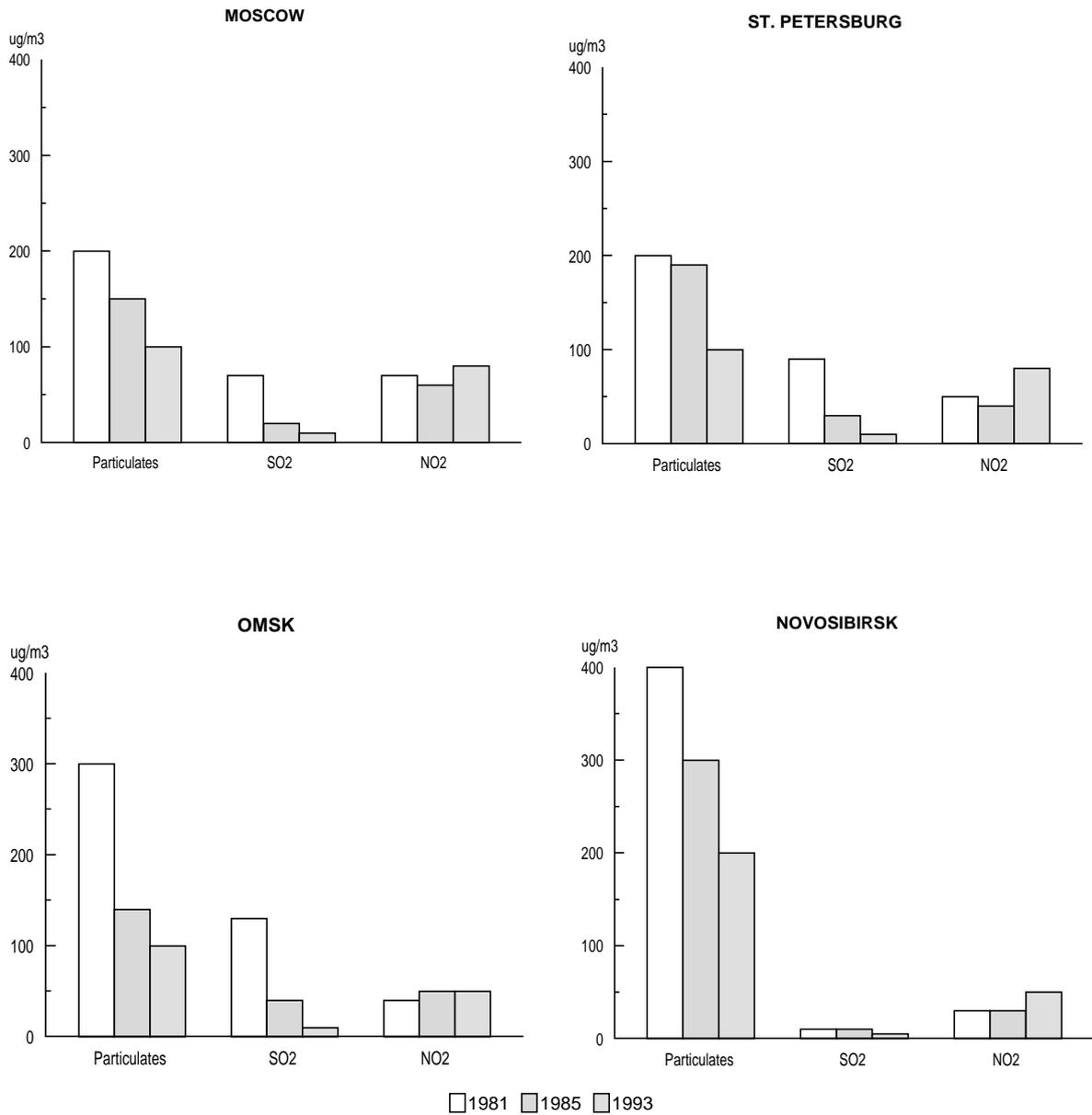
SLO) NO₂: 1980 data for Bratislava refer to 1982.

POL) Chorzow 1980: 1981 data. NO₂ Warsaw 1980: 1983 data. Particulates: particulates smaller than 10 µg. Chorzow: total suspended particulates.

Source: OECD, national reports.

URBAN AIR QUALITY [2]

Annual concentrations of selected air pollutants



Source: OECD, national reports.

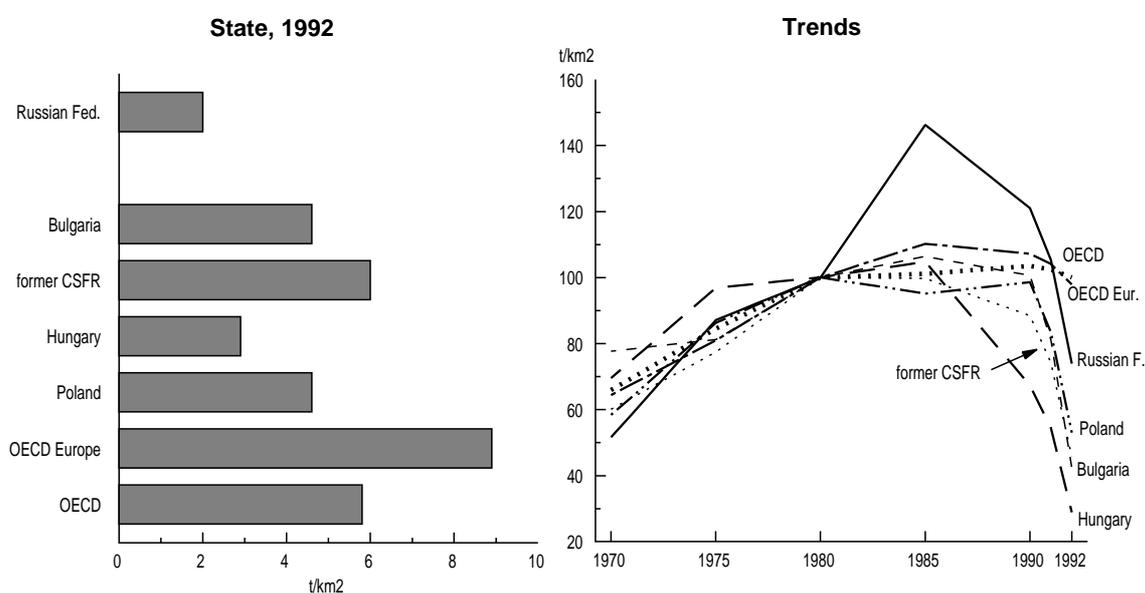
USE OF NITROGENOUS FERTILIZERS

Nitrogen is one of the major plant nutrients. Together with phosphorous, it plays a major role in eutrophication and related impacts on aquatic life and water quality in rivers, lakes and coastal waters. It stems from various point and non-point sources such as domestic waste water discharges, runoffs from forestry and agriculture, and atmospheric deposits. Agricultural runoff due to the excessive use of nitrogenous fertilizers and intensive stock farming is the major diffuse source of nitrogen. Nitrates can also have negative effects on human health.

The indicator below presents the intensity of use of nitrogenous fertilizers in agriculture - expressed as the amount of commercial nitrogenous fertilizers per km² of arable and permanent cropland and

their change since 1970. This 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. The actual environmental impact will also depend on soil and on plant types as well as meteorological conditions.

Trends analysis shows that since the late 1980s the use of nitrogenous fertilizers has been decreasing. In central and eastern European countries this decrease mainly reflects economic recession, reduction in subsidies for agricultural production and chemicals and privatisation of agricultural land.



	Use of nitrogenous fertilizers (a)						
	per km ² of arable and permanent crop land (tonnes/km ²)				Change (%)	Change (%)	
	1970	1980	1985	1992			
Russian Federation	1.4	2.7	3.9	2.0	93.8	-26.1	
Bulgaria	8.4	10.8	11.5	4.6	28.8	-57.7	
former CSFR	7.8	13.1	13.0	6.0	66.4	-54.3	
Hungary	7.0	10.1	10.5	2.9	43.9	-71.1	
Poland	5.1	8.8	8.3	4.6	71.3	-47.0	
OECD Europe	5.9	9.1	10.0	8.9	55.3	-2.1	
OECD	3.8	5.8	5.8	5.8	51.8	-	

Notes:

a) Data refer to the apparent consumption of nitrogenous fertilizers during the fertilizer year (1 July to 30 June).

CSFR) Fertilizer year: calendar year.

HUN) Fertilizer year: calendar year.

POL) Fertilizer year: calendar year.

Source: FAO, IFA

RIVER WATER QUALITY

Water quality is of economic, ecological and social importance given the many uses of water resources, and it interacts with water quantity issues.

Rivers receive and carry to the sea significant loads of sewage, both treated and untreated, wastes and soiled storm waters. Water quality problems include pollution by organic matter, nutrients and an array of toxic substances. The degradation of water quality can become an obstacle to the sustainability of the use of water for human activities (agriculture, industry, recreation) and for the provision of drinking water.

The table below presents selected water quality parameters i.e. the concentration of dissolved oxygen, nitrates and ammonium in river waters. These parameters give an indication of the degree of eutrophication. Data are shown for representative sites, at the mouth or downstream frontier of the selected rivers, and give a summary view of the pollution load and clean-up efforts on the upstream watershed. Such measurements are mainly of national importance, but may have an international dimension for rivers crossing borders or reaching the sea close to frontiers.

Water quality of selected rivers (a)													
		Dissolved Oxygen (DO) (b) (mg/liter)				Nitrates (b) (mgN/liter)				Ammonium (b) (mg/liter)			
		1980	1985	1990	1993	1980	1985	1990	1993	1980	1985	1990	1993
Rivers													
Russian Federation	* Amur	9.20	11.40	8.73	..	0.01	0.01	0.01	..	0.61	0.35	0.48	..
	Enisey	11.20	10.80	10.80	..	-	-	-	..	0.21	0.22	0.11	..
	Lena	10.30	9.94	8.94	..	..	..	..	..	..	..	0.03	..
	Ob	10.10	9.90	9.55	..	0.03	0.02	0.01	..	0.65	0.53	0.22	..
	Severnaya	7.55	9.08	8.85	..	0.01	0.03	0.01	..	0.20	0.39	0.10	..
	Volga	9.76	9.58	10.10	..	0.03	0.02	0.01	..	0.48	0.40	0.27	..
Bulgaria	* Jantra	10.30	5.40	8.20	8.10	17.80	3.80	6.80	1.96	1.40	2.10	0.90	0.85
	Osam	7.50	8.00	7.50	9.80	9.10	8.20	4.40	2.20	0.48	2.00	4.40	0.68
	Arda	9.40	9.60	9.90	7.80	2.30	2.30	2.10	0.71	0.20	0.12	0.30	0.06
Czech Republic	Labe	8.20	7.80	7.70	..	4.29	4.74	5.24	..	1.87	2.26	1.95	..
	Odra	8.60	8.30	6.40	..	4.52	4.29	3.07	..	4.20	5.06	5.72	..
	Morava	10.90	10.00	10.00	..	5.87	4.74	3.67	..	0.62	0.47	1.28	..
Slovak Republic	Vah	..	..	9.20	..	..	..	10.20	..	..	..	0.50	..
	Hornád	..	..	7.60	..	..	..	10.50	..	..	..	3.10	..
Hungary	Danube	10.56	10.57	9.84	9.70	2.10	2.17	2.34	2.08	0.40	0.47	0.21	0.19
	Drava	10.61	9.99	10.29	10.90	0.97	1.19	1.23	1.24	0.23	0.23	0.22	0.19
	Tisza	11.28	12.03	11.61	12.40	0.95	1.26	1.03	1.14	0.30	0.59	0.21	0.19
Poland	Wisla	9.50	11.40	10.20	10.70	0.77	1.69	1.42	1.55	0.88	1.09	0.67	0.49
	Odra	9.80	9.00	10.20	11.10	2.03	2.64	1.74	2.16	0.89	1.04	0.43	0.35
	Nysa	10.00	9.00	9.50	9.30	1.17	3.07	2.45	3.23	0.58	0.82	0.57	0.74

Notes:

a) Measured at the mouth or downstream frontier of river.

b) Data refer to total annual mean concentrations unless otherwise specified.

RUS) Nitrates: data refer to concentrations of nitrites (mg NO₂/l). Ammonium: 1985 data for Volga and Severnaya Dvina refer to 1984; 1990 data for Lena refer to 1989. Water quality data should be interpreted with caution since the location of sampling points and the measurement methods may differ from OECD definitions.

BUL) 1980 data refer to 1981.

Source: OECD.

MUNICIPAL WASTE

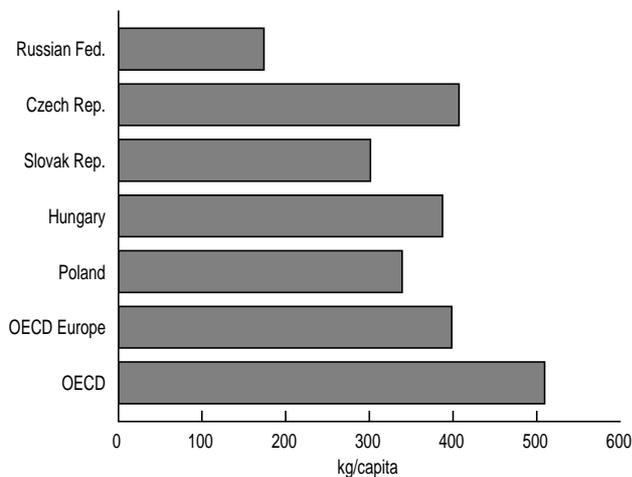
Municipal waste, which is collected and treated by or for municipalities, includes household waste and bulky waste, as well as similar waste from small enterprises, as well as market and garden residues. The amounts of municipal waste generated in each country are related to the rate of urbanisation, the types and patterns of consumption, the level of household revenues and lifestyles, and to existing waste management policies.

Disposal 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. Disposal of municipal wastes in Russia, and more generally, in central and eastern Europe

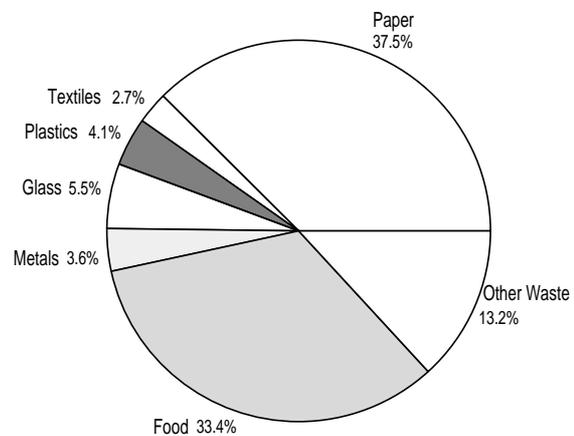
is mostly in landfills, more rarely by incineration or other methods (e.g. composting).

The indicators below show municipal waste generation for the latest available year as well as generation trends 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). The data 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
latest year available



Composition of Municipal Waste
Russian Federation, 1992



		Municipal waste generated (a)				Change from 1985 (%) 1985-early 1990s
		Total (1 000 tonnes) early 1990s (b)	Amounts per capita (kg / cap.)			
			1980	1985	early	
Russian Federation		26 000	160	173	174	1
Bulgaria	*	8 065	671	756	951	26
Czech Republic	*	4 200	..	251	407	62
Slovak Republic	*	1 600	..	364	301	-17
Hungary	*	4 000	..	425	387	-9
Poland		13 000	267	287	339	18
OECD Europe	*	174 000	330	340	400	16
OECD	*	474 000	430	450	500	7

Notes:

- a) Municipal waste is collected by municipalities or on their order. They include waste originating from households, commercial activities, office buildings, institutions such as schools and government buildings, and small businesses that dispose of waste at the same facilities used for municipally collected waste.
- b) 1992 or latest available year.
- BUL) Definitions may be different from those of other countries; data probably include construction and demolition waste, sewage sludge and agricultural waste.
- CZE) 1985 data refer to 1987.
- SLO) 1985 data refer to 1987.
- HUN) Municipal w.: w. from households, offices, firms and services.
- OECD-EUR) Rounded figures, including Secretariat estimates. 1980 and 1985 data exclude eastern Germany.
- OECD) Rounded figures, including Secretariat estimates. 1980 and 1985 data exclude eastern Germany and Mexico.

Source: OECD.

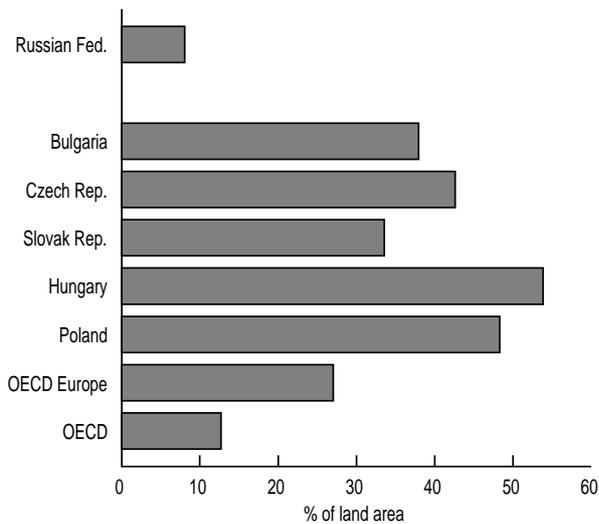
LAND USE CHANGES

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 diversity, landscapes and the quality of air and water over large areas. Unsustainable land use, including farming and grazing as well construction and mining activities, is an important factor in erosion and desertification, and may pose a threat to ecosystems and lead to natural habitat loss and landscape changes. The prevention of soil degradation and related problems is significantly dependent on sustainable land management.

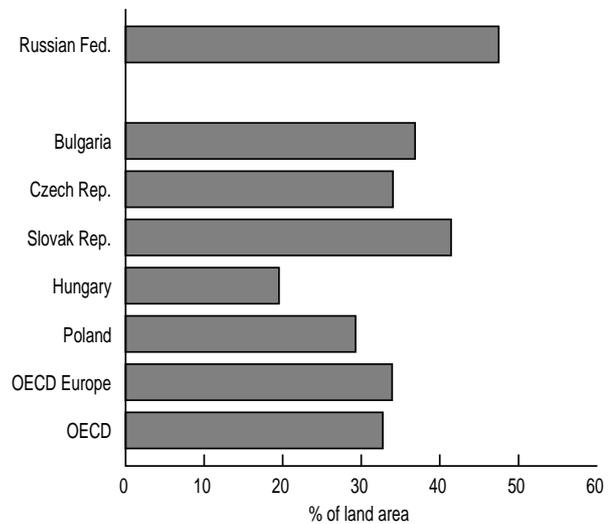
The data below presents land use changes over the last decade. Changes in arable and permanent cropland and wooded areas provide important information about countries' endowment in agricultural and forest resources, whether these resources are seen in an economic or environmental perspective.

The data should also be read in relation to other issues e.g. protected areas and forest resources.

Arable and Cropland, 1992



Wooded Areas, 1992



	Land Area		Arable and Crop Land (a)		Permanent grassland (a)			Wooded Areas (a)		
	(1 000 km ²)	1992	Area % of land area		Area (1 000 km ²)	% of land area		Area (1 000 km ²)	% of land area	
			1992	Change 1980-92 (%)		1992	Change 1980-92 (%)		1992	Change 1980-92 (%)
Russian Federation	16 392 384	1 322 830	8.1	-2.4	780 200	4.8	-6.9	8 658 000	52.8	9.7
Bulgaria	109 441	41 524	37.9	-0.6	18 024	16.5	-0.5	38 740	35.4	0.8
former CSFR	125 360	49 060	39.1	-5.1	17 080	13.6	1.5	46 200	36.9	0.9
Czech Republic	77 280	32 930	42.6	..	8 730	11.3	..	26 290	34.0	..
Slovak Republic	48 080	16 130	33.5	..	8 350	17.4	..	19 910	41.4	..
Hungary	92 340	49 720	53.8	-6.8	11 640	12.6	-10.1	18 033	19.5	3.1
Poland	304 420	146 990	48.3	-1.8	40 440	13.3	-	89 056	29.3	1.7
OECD Europe	4 344 403	1 174 671	27.0	-2.9	692 110	15.9	-6.4	1 472 963	33.9	1.9
OECD	33 373 013	4 235 267	12.7	-0.4	8 421 841	25.2	-4.4	10 922 343	32.7	-1.9

Notes:

a) Following FAO classification:

- 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 grassland refers to meadows and pasture land used permanently for herbaceous forage crops, either cultivated or growing wild.
- wooded areas refer to land under coniferous, non-coniferous, or mixed forest, as well as other wooded land.

National classifications may differ.

Source: OECD, FAO.

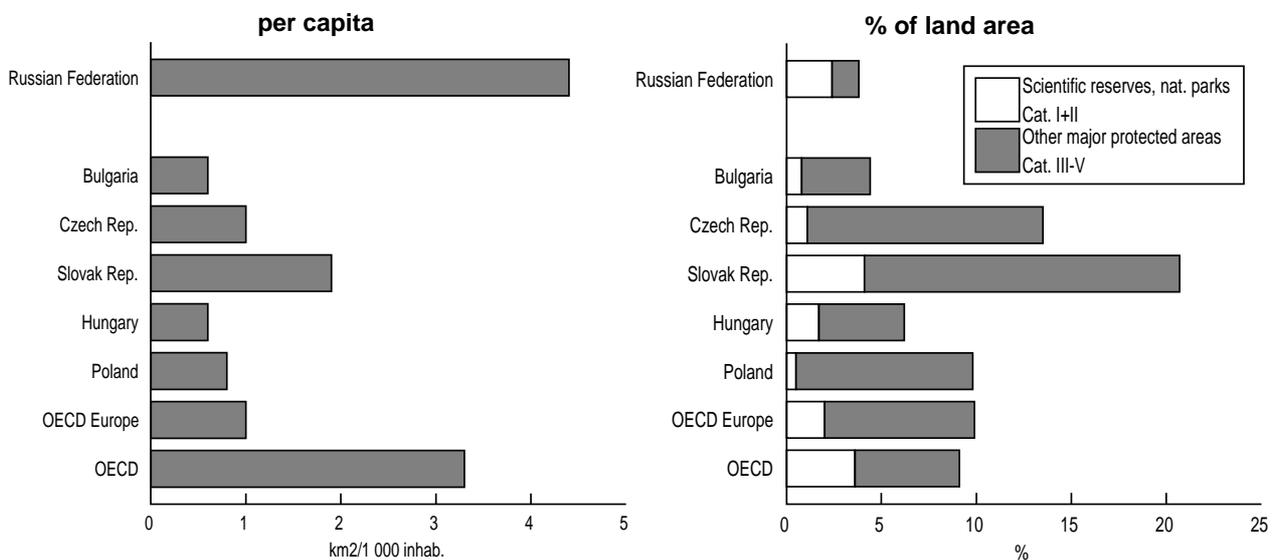
PROTECTED AREAS

The protection of biodiversity and landscapes 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.

Protected areas change over time: new areas are created, boundaries of existing areas are revised and some sites may be destroyed through industrial development, shifting agriculture or natural disasters. Actual protection levels and related trends are difficult to evaluate as they are not only a matter of the number and

area of protected sites but also a question on the effectiveness of management and of the achievement of protection objectives.

The indicators below refer 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. 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). Management categories I and II (Scientific Reserves and National Parks) reflect the highest protection level.



	Major protected areas (a) 1993			Scientific reserves and national parks (b) 1993	
	km ²	% of territory	per capita (km ² / 1 000 inhab.)	(km ²)	% of major protected areas
Russian Federation	655 368	3.8	4.4	421 949	64.4
Bulgaria	4 896	4.4	0.6	839	17.1
Czech Rep.	10 668	13.5	1.0	877	8.2
Slovak Rep.	10 155	20.7	1.9	2 009	19.8
Hungary	5 740	6.2	0.6	1 591	27.7
Poland	*	30 636	9.8	1 499	4.9
OECD Europe	*	445 031	9.9	88 254	19.8
OECD	*	3 156 850	9.1	1 250 321	39.6

Notes:

a) IUCN management categories I-V. National classification may differ. Each area, unless is an island, is greater than 10 km².

b) IUCN categories I and II.

POL) IUCN data do not cover some of the areas protected by law under the Polish classification.

OECD) Data for OECD totals refer to 1990.

Source: OECD, IUCN.

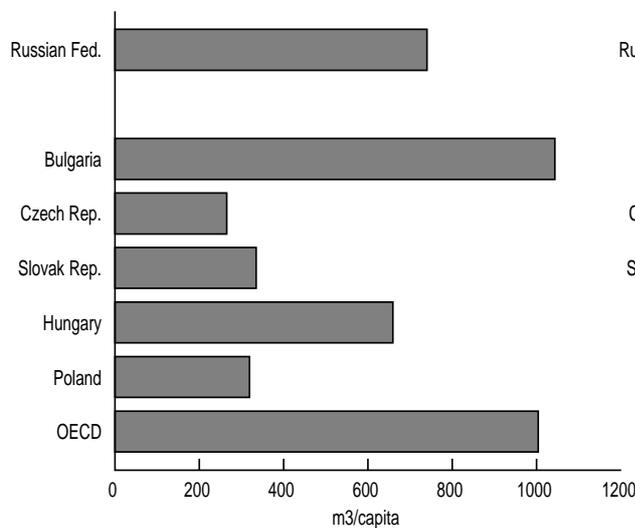
USE OF WATER RESOURCES

Freshwater resources are of major environmental and biological importance because water is a basic support element for human life and ecosystems.

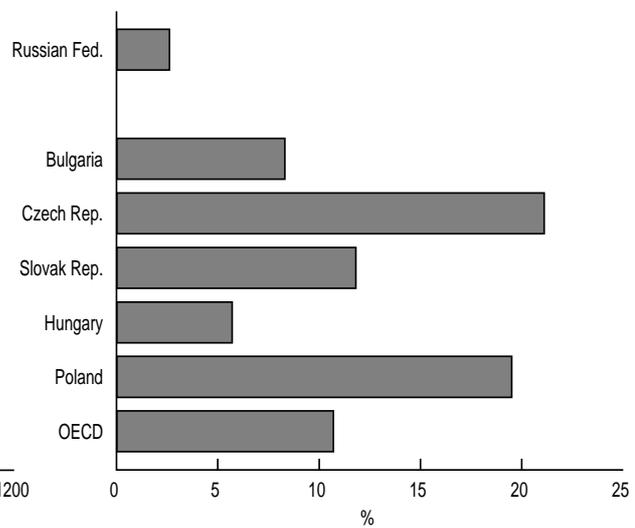
Water withdrawal is a major pressure on freshwater resources. In the more arid regions and during periods of drought, water resources may at times be limited to an extent where the demand for public water supply, agricultural purposes or industrial processes can be met only by going beyond a sustainable use of the resource in terms of quantity and possibly of quality. A necessary condition for the sustainable use of water resources is that the withdrawal of water does not exceed the renewal of the stocks over an extended period.

The indicators below are based on water accounting and presents the intensity of use of water resources: water withdrawal (demand) as a percentage of gross annual availability of water (supply). The latter aggregates net quantities of water received during an average year from precipitation in the country and from inflowing rivers from neighbouring countries. Gross withdrawal accounts for total water withdrawal without deducting water that is reinserted into the natural environment after use. It introduces a qualitative component: even if water is reinserted into the natural environment, it tends to be of inferior quality after use. It must be kept in mind, however, that major differences in regional water use in a given country, may not be adequately reflected here.

per capita abstraction



abstraction as a % of gross annual availability



	Intensity of Water Use			Total Water Abstraction	
	Water Abstraction as % of Gross Annual Availability			(million m ³)	(m ³ per capita)
	1980	1985	1993 (a)	1993 (a)	
Russian Federation	..	2.5	2.6	110 000	740
Bulgaria	..	..	3.2	3 409	403
Czech Republic	35.4	35.1	22.0	2 740	265
Slovak Republic	13.3	13.3	11.8	1 776	335
Hungary	4.0	5.2	5.7	6 813	659
Poland	22.5	24.5	19.5	12 278	319
OECD	*	10.4	11.1	960 300	1 010

Notes:

a) Or the most recent year.

OECD) Rounded figures; include Secretariat estimates. 1980 and 1985: data include w. Germany only.

Source: OECD, national reports.

USE OF FOREST RESOURCES

Forests are among the most diverse and widespread ecosystems on the earth, and have many functions:

- they provide timber;
- they provide ecosystem services including regulation of soil, air and water quality;
- they provide recreation benefits;
- they are a reservoir for biodiversity; and
- they act as a carbon sink.

Today the human impact on forest health and on the natural processes of forest growth and regeneration raises general concern.

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 exports. One of the aims of forest management methods is to ensure that timber removal does not offset resource regeneration. Excessive use of forest resources may result in a reduction of the

long-term productive and regenerative capacity of the land base. At the same time, harvest rates that are too low (particularly where age classes are unbalanced) may also result in a reduction of the productive capacity of forests. To be sustainable, forest management will have to strive for optimal harvest rates.

The table below presents data on annual growth and harvest of forest resources, as well as an indicator of timber resource use derived from forest resource accounting: it relates annual productive capacity (on the supply side) to actual harvest (on the demand side). Annual productive capacity can be either a calculated value such as annual allowable cut or an estimate of annual growth for the existing stock of trees. The appropriate choice depends on forest characteristics and the availability of information. Generally, it must be kept in mind that a measure based on a national average may conceal variations among forests.

		Growing stock			Productive capacity			Annual harvest			Resource use (total harvest / productive capacity)		
		(million m ³)			(million m ³)			(million m ³)					
		1992	1980	1985	1992	1980	1985	1992	1980	1985	1992		
Russian Federation	*	80 676	..	..	830.0	..	..	227.5	..	..	0.28
Bulgaria	*	405	8.2	9.4	11.2	6.0	5.6	4.2	0.73	0.60	0.38		
Czech Republic		618	17.1	17.1	17.0	13.6	13.9	9.4	0.85	0.81	0.58		
Hungary	*	298	10.8	11.1	11.0	6.1	6.7	5.9	0.56	0.60	0.53		
Poland		1 496	39.5	38.6	45.1	15.1	11.5	20.6	0.38	0.30	0.46		

Notes:

RUS) Harvest: data refer to final cutting. Annual allowable cut in 1992 was 542.5 million m³.

BUL) Growing stock: data refer to 1990

HUN) Productive capacity and harvest data for 1992 refer to 1990.

Source: OECD, national reports.

List of Abbreviations used for Data Sources

FAO: Food and Agriculture Organization of the United Nations

IEA: International Energy Agency

IFA: International Fertilizer Industry Association

IUCN: International Union for the Conservation of Nature

REFERENCES

MINPRIRODY (Ministry for Environment Protection and Natural Resources of the Russian Federation), (1994), State of the Environment of the Russian Federation, 1993: National Report, Moscow.

OECD (1991), Environmental Indicators: A Preliminary Set, Paris.

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OECD (1994), Environmental Information Systems in Belarus: An OECD Assessment, Paris.

OECD (1994), Environmental Indicators: OECD Core Set, Paris.

OECD (1995), OECD Environmental Data: Compendium 1995, Paris.

OECD (1995), Economic Survey: The Russian Federation, Paris.

The World Bank and OECD (1995), Foreign Direct Investment and Environment in Central and Eastern Europe, Washington.

Annex I

List of Officials Consulted and Organisations Visited

The Ministry for Environmental Protection and Natural Resources of the Russian Federation (Minprirody)

Averchenkov, A.A., Deputy Minister

Sokolovskii, V.G., Advisor to the Minister

Goudyma, A.M., Deputy Head, Department for International Co-operation

Novoselova, O.A., Head, Division of Ecology Monitoring

Samotesov, E.D., Deputy Head, Department for Co-operation with State Administration and NGOs, and Personnel

Shevchuk, A.V., Head, Economy of Environmental Protection and Natural Resources Department

Itkin, B.A., Head of Division, Economy of Environmental Protection and Natural Resources Department

The Federal Agency of Russia for Hydrometeorology and Environmental Monitoring (RosGidromet)

Mokrousova, Z.I., Deputy Head, Main Department for Ecological Programmes and Environmental Pollution Monitoring

Rochev, A.A., Head, Division of Information Technologies and State Data Fund

Severinov, V.I., Principal Specialist, Division of Information Technologies and State Data Fund

Bezruel, L.E., Specialist, Main Radiometeorological Centre

Blinov, V.G., Head, Department for Scientific Programmes and Research

Zubov, V.N., Deputy Head, Department for International Co-operation

The State Committee of the Russian Federation for Statistics (Goskomstat)

Remenets, O.V., Deputy Head of Department for Quality of Life Statistics

Kopytin, V.I. Head of Division for Ecology, Health and Culture

Agapova, M.V., Leading Economist, Division for Ecology, Health and Culture

The Ministry of Economy of the Russian Federation (Minekonomiki)

Shopkhoev, E.S., Department of Environmental Management and Ecological Programmes

The Committee of the Russian Federation for Land Resources and Management (RosKomZem)

Saltanov, V.F., Head, Cadastre Division

Overchuk, A.L., Senior Expert, Foreign Relations Department

The Committee of the Russian Federation for Geology and Mineral Resources, Main Research Computer Centre (RosKomNedra)

Karpov, R.V., Deputy Director

Korotkov, A.V., Head of Laboratory

The State Committee of the Russian Federation for Sanitary-Epidemiological Supervision (GosKomSanEpidNadzor)

Khorosyavinna, G.I., Deputy Chairman

Yakhno, K.V., Head, Department for External Relations

The Federal Agency of Russia for Forestry, All-Russian Scientific Research and Information Centre for Forest Resources (VNIITSlesresource)

Strakhov, V.V., Director

Syssouev, V.V., Deputy Director

The Committee of the Russian Federation for Water Resources (RosKomVodKhoz)

Mikheev, N.N., Chairman
Bogomolov, A.M., Head of Directorate for Economic Relations
Zybin, E.S., Head of Foreign and Interrepublican Relations Department
Ostrovskii, G., Head of Monitoring Department

The State Duma, Committee for Ecology

Dorogin, A.A., Head of Secretariat
Volkova, I., Assistant to Chairman of the Committee

The Oblast Committee for Environment, Tula oblast

Kuvarin, Yu.N., Chairman
Zhukov, V.P., Deputy Chairman

Centre for International Projects (CIP)

Tikhonov, S.E., Director
Rezepov, V.A., Deputy Director, Human Health and the Environment
Shekhovtsov, A.A., Deputy Director, Informational, Analytical and Consulting Branch
Butylina, T.P., Head of the Department for Programme Co-ordination
Rabei, L.A., Project Co-ordinator

Institute of Scientific and Technical Information (VINITI)

Sarkissian, D.B., Head of Division
Potapov, I.I., Head of Sector

The State Institute for Applied Ecology (GIPE)

Dmitriev, E.S., Director
Egorov, V.M., Deputy Director
Zuev, A., Head of Department, Hardware and Telecommunication Systems

Institute of Geography of the Academy of Sciences, Centre for GIS Research

Kazantsev, N.N., Head
Kochurov, B.I., Project Manager

Moscow State University, Faculty of Geography, Department of Environmental Management

Kapitsa, A.P., Head of Department
Kravtsova, V.I., Leading Research Assistant
Denisov, N.B.
Lourie, I.K., Senior Research Assistant, airspace methods laboratory
Krasnushkin, A.V., Research Scientist, aquatic system monitoring laboratory

All-Russian Association of Nature Protection

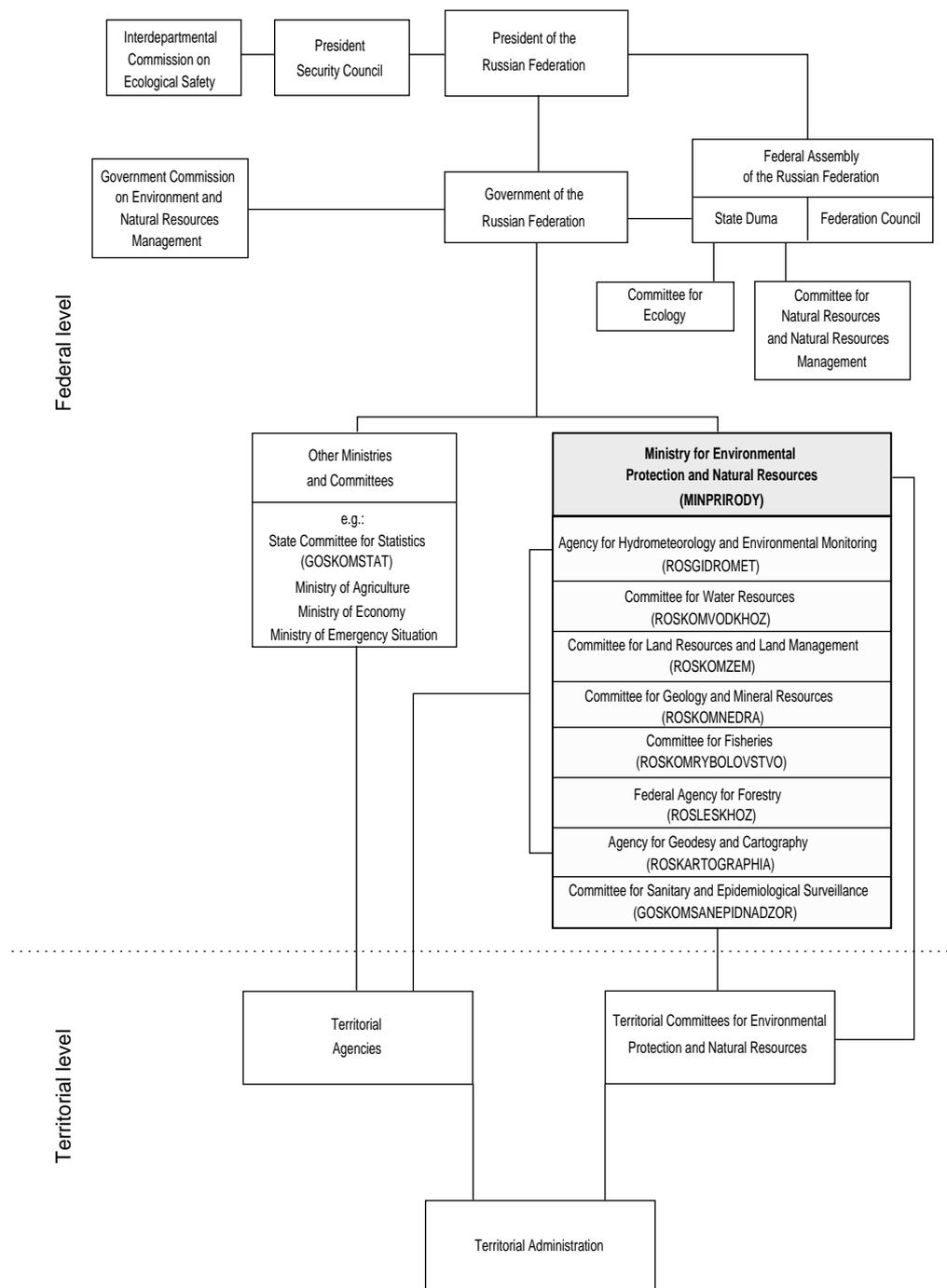
Barishpol, I.F., Chairman
Gan, G.G., Deputy Chairman

Russian Chamber of Commerce and Industry of the Russian Federation, Committee on Environment (TPP RF)

Piskulov, Yu.V.
Grakovich, V.F., responsible for information, Executive Director of International Association of Scientists Ecology and World

Annex II

Administrative Structure for Environmental Protection in the Russian Federation



a) Shaded box corresponds to the government sector dealing more directly with environmental issues and natural resources.

Annex III

Map of the Russian Federation



With an area of 17 075 400 km², the Russian Federation is the largest country in the world, its territory is about twice that of Canada and almost half of the whole OECD area (11.4% of the total surface area of the world). Stretching from the Arctic to northeastern Europe and northern Asia, Russia shares its borders with 14 countries: Norway, Finland, Estonia, Latvia, Lithuania, Poland, Belarus, Ukraine, Georgia, Azerbaijan, Kazakhstan, Mongolia, China and North Korea. It has shores on three oceans (Atlantic, Arctic and Pacific) and on the Baltic, Black and Caspian Seas. Due to its size, Russia has a great variety of landscapes, soils, climate and wildlife. The main latitudinal natural zones are the Arctic, tundra, taiga (forest) and steppes. The Arctic zone is under permanent ice or snow cover; the tundra is characterized by forests, mosses, lichens and marshes; the vegetation of the taiga zone is mainly composed of coniferous forests (spruce, pine, larch) and mixed forests; the steppe zone is almost treeless with herbaceous vegetation. The country is also distinguished by vast mountain ranges including the Urals, which extend north to south for about 2 000 km², separating Europe from Asia, the Caucasus and the mountain areas of Siberia.

The climate is highly diverse. Winter average temperatures range from -51°C in northeast Siberia to 0°C in the western European part of the country. Summer temperatures exceed 30°C in the southern part. Annual average

Source: World Bank, national reports.

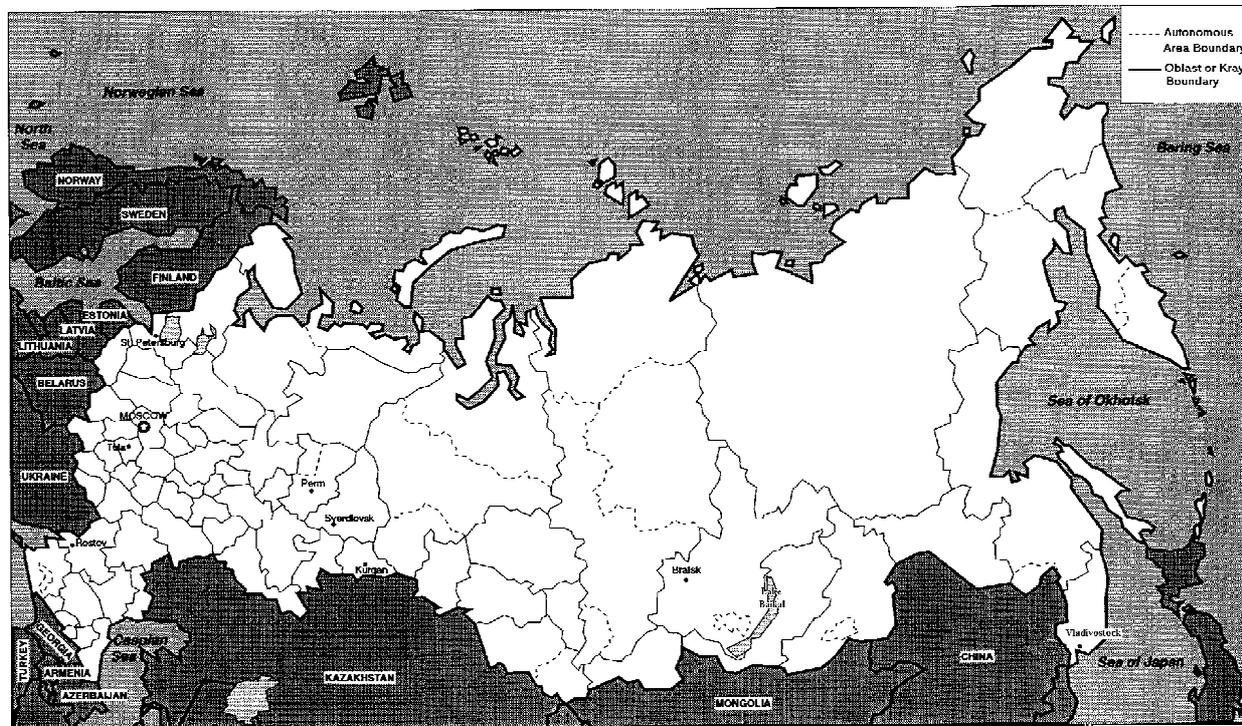
precipitation amounts to 500 mm but can range from 250 mm in the Caspian Lowlands to 1 000 mm in Southeast Siberia and in the Far east region. The country is crossed by more than 120 000 rivers, with a total length of 2.3 billion km². Its water resources, including the Volga and Ob rivers and the Lake Baikal, are among the most important in the world.

The Russian Federation is extremely rich in mineral resources: it is the world's largest producer of natural gas and the world's third largest producer of oil and coal. Furthermore, it has large reserves of iron, gold, platinum, diamonds, silver, copper, uranium and other metallic and non-metallic minerals. The most prominent industry is metallurgy. Other important sectors are the military, chemicals and timber.

The population of the Russian Federation is 148.7 million (1993 data), nearly one third the population of OECD Europe. However, population density is unevenly distributed and the majority of the population is concentrated west of the Urals. This region is also characterized by a great concentration of industry and natural resources. Very low population densities are recorded in the Asiatic and in the northern European part of the country. Urbanization has risen steadily during the last fifty years. At present, more than 70% of the population lives in cities.

Annex III (continued)

Administrative map of the Russian Federation



BASIC STATISTICS OF THE RUSSIAN FEDERATION, 1994

THE PEOPLE

Population, 1993 (millions)	148.7
<i>of which</i>	
Urban (percentage of total)	73
Rural (percentage of total)	27
Population of major cities (millions)	
Moscow	8.6
St. Petersburg	4.8
Employment (millions, end-year)	69.7
Employment rate (percent., end-year)	92.9
Private farms (thousands)	280.0
Employment by sector (percentage)	
Material branches	
Industry	27.7
Agriculture	14.9
Construction	10.2
Transport and communication	7.6
Non-material branches	
Retail trade and public catering	9.3
Other	30.3

THE PARLIAMENT

State Duma (lower house)	450 seats
Federation Council (upper house)	198 seats
Number of political parties in State Duma (election of December 1993)	14

PRODUCTION

GDP (trillion roubles, current prices)	630
GDP per capita (US\$, official exchange rate)	1 926
Consumption (private, percentage of GDP)	41
Gross investment (percentage of GDP)	29

THE CURRENCY

Monetary unit: Rouble	Currency unit per US\$:	
	1994, average	2 203
	May, 1995, average	5 057

Source: OECD Economic Surveys: Russian Federation, 1995

Annex IV

List of Environmental Monitoring Systems

- Monitoring of surface waters, marine environment, soils, air and near-Earth space including the ozone layer (RosGidromet).
- Monitoring of the sources of anthropogenic effects (Minprirody).
- Monitoring of land use (RosKomZem).
- Monitoring of groundwater and the geological environment (RosKomNedra).
- Monitoring of the terrestrial flora and fauna (not in forests) (Minprirody).
- Monitoring of the effects of habitat factors on human health (GosKomSanEpidNadzor).
- Monitoring of forests (RosLesKhoz).
- Monitoring of water systems (RosKomVodKhoz).
- Monitoring of fish, aquatic fauna and flora (RosKomRybolovstvo).
- Monitoring of agricultural soils and game wildlife (The Ministry of Agriculture).
- Monitoring of environmental pollution from enterprises and sites subordinated to the respective ministries and state committees (the Ministry of Defence, Ministry of Atomic Power Engineering, State Committee for Machine Building, State Committee for Defence Industries, State Committee for Oil and Petrochemistry, State Committee for Metallurgy).
- Monitoring of underwater sources of environmental hazards at sea and in inland waters (Ministry for Emergency Situations and Liquidation of Consequences of Natural Catastrophes)