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Task Force for the Implementation of the Environmental Action Programme in Central and Eastern Europe (EAP)

ASSESSING ENVIRONMENTAL HEALTH PROBLEMS IN CENTRAL AND EASTERN EUROPE AND THE NIS: THE ROLE OF DATA AND INDICATORS

**Proceedings of the OECD/WHO Workshop on Environmental and Environmental Health Information to Support NEAPs and NEHAPs
Budapest, 22 and 23 May 1997**

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FOREWORD

Since the 1993 Lucerne *Environment for Europe* Ministerial Conference, OECD, through its Centre for Co-operation with Non-Members (formerly the Centre for Co-operation with Economies in Transition), has acted as secretariat of the Task Force for the Environmental Action Programme for Central and Eastern Europe. One of the main work programmes of the Task Force has been to assist the countries of this region to develop and implement National Environmental Action Programmes (NEAPs). In parallel, European countries have been preparing National Environmental Health Action Plans (NEHAPs) under the Environmental Health Action Plan for Europe, adopted by the 1994 European Ministerial Conference on Environment and Health in Helsinki. The World Health Organization's Regional Office for Europe has supported the development of NEHAPs. Reliable environment and health data and information are needed for the preparation of both NEAPs and NEHAPs, in order to set clear priorities for action within these policy programmes, and also for their implementation, in order to track and learn from their results.

In May 1997, OECD and WHO's European Centre for Environment and Health (ECEH, Bilthoven, Netherlands) organised a Workshop on Environmental and Environmental Health Information to Support NEAPs and NEHAPs: Using Data and Indicators. The Government of Hungary hosted this meeting, and the Arendal Centre of the UN Environment Programme's Global Resource Information Database (UNEP/GRID) also assisted its preparations. The meeting brought together environment and health experts from ministries and agencies in Central and Eastern European Countries (CEECs) and the New Independent States of the former Soviet Union (NIS). It resulted in strengthened co-operation between health and environment policy-makers and between officials on information systems and those working on policy development.

After a report on the workshop's key conclusions and recommendations from its chair and rapporteur, this document presents the key papers discussed at the workshop. The papers presented follow the four main themes of the workshop: using information to set NEAP and NEHAP priorities; using indicators to monitor NEAP and NEHAP progress; using economic data and valuation techniques; and improving environmental and environmental health information systems.

The report is published on the responsibility of the Secretary-General of the OECD. The opinions expressed in the papers are those of the authors themselves, and do not necessarily reflect the views of their institutions, the OECD or its Member countries.

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Part I

Conclusions

**OECD/WHO-ECEH Workshop on Environmental and Environmental Health Information
to Support NEAPs and NEHAPS: Using Data and Indicators**

Budapest, 22 and 23 May 1997

Report by the Chairman and the Rapporteur

Opening and Introduction

1. The workshop was hosted by the Hungarian Ministry for Environment and Regional Planning, the Ministry of Welfare, the Institute for Environmental Management, and the National Institute of Public Health. It was organised in co-operation with UNEP/GRID (Arendal).
2. More than 90 experts took part. They included representatives from 25 countries, 10 international agencies and financial institutions, 2 NGOs, independent experts and consultants. The participants were welcomed by Mr. Pál Bozó (Hungarian Ministry of Environmental Regional Planning) and by Dr. Alán Pinter, on behalf of the Johan Belá National Institute for Public Health; by Dr. Alexander Kuchuk of WHO-ECEH and by Mr. Brendan Gillespie of OECD.
3. Mr. Gillespie introduced the Workshop and set out its objectives as:
 - To improve the use of data for priority setting in NEAPs and NEHAPs;
 - To assist and promote the development of indicators to help monitor NEAPs and NEHAPs;
 - To consider key areas for improving environmental and environmental health information.
4. For the benefit of those who had not been present, a short account was given of the Chairman's draft conclusions from the OECD Seminar on Environmental Indicators in Central and Eastern European Countries, which had taken place the previous day (21 May).
5. The participants elected Prof. S. Tarkowski as the overall Chairman and Dr. Norman J. King as Rapporteur of the Workshop.

Structure of the Workshop

6. As well as the opening and concluding sessions, there were plenary sessions covering four related themes. Each of these sessions was introduced by an overview paper followed by accounts by representatives of countries with experience of each theme.
7. The four plenary themes were:
 - (i) "Information for setting NEAP and NEHAP priorities" which covered the types of information needed and the extent to which these were available in countries in transition.
 - (ii) "Indicators to monitor NEAP and NEHAP progress" which covered how countries could use environmental and environmental health indicators to help monitor the implementation of NEAPs and NEHAPs.

(iii) "Using economic data and indicators" which covered methods for estimating the economic costs of health effects and how these can be used in setting priorities for NEAPs and NEHAPs.

(iv) "Improving environmental and environmental health information systems" which covered the objectives and principles for improving such information systems.

8. Each plenary session included periods of free discussion to exchange information and experience and to discuss and debate points made in the formal presentations. In addition, for one session, the participants formed two working groups for more detailed discussions. The results of all these discussions are presented in the "Conclusions" and "Recommendations" sections of this Report.

9. In the concluding session of the workshop the Rapporteur presented his draft Conclusions and Recommendations for consideration by the participants. Comments and suggestions for amendments and additions have, where possible, been included in this Report. On the proposal of the overall Chairman, it was agreed that the Rapporteur's revised report would be submitted to and cleared by the overall Chairman as the Chairman's Report of the Workshop.

CONCLUSIONS

General

10. Implementation of NEHAPs will be largely at the local level. Successful implementation of NEAPs will also depend on actions taken at the local level. To increase the effectiveness of implementation, integration of the NEAP and NEHAP processes at this level is advisable. In many cases, those responsible for implementing NEAPs and NEHAPs at the local level will wish to operate a single programme which incorporates the relevant actions from both plans. In such cases, local integration of the NEAP and NEHAP processes will be inevitable.

11. In developing NEAPs and NEHAPs several countries have been developing indicators to measure progress and such work should continue. In particular, targets and indicators may have to be developed which reflect local circumstances and needs. As yet, few countries have considered how this will be done, how local targets and indicators will relate to national ones and the extent to which national co-ordination of indicators relevant to the local level will be necessary.

In Relation to Information

12. Information on environmental factors with a known relationship to human health is more valuable in the context of NEAPs and NEHAPs, than information on factors with an hypothetical relationship. This is an important consideration in priority setting for NEAPs and NEHAPs. In addition, health risks are a powerful argument when seeking the resources needed to initiate action. In CCEE/NIS countries, air quality and water quality were generally the environmental issues of greatest concern in terms of health impacts.

13. National information systems exist and have generally improved in these countries, despite severe economic constraints. They are usually good enough for initial decision-making on national priorities.

14. Centrally collected and aggregated information is not generally sensitive enough for setting priorities for local action. However, such information is often based on data collected at the local level which may therefore be available. Alternative sources of disaggregated data and of more detailed information (e.g. in academic institutions) should also be investigated, as well as data from similar situations elsewhere in the country or extrapolation of data from other countries may assist in setting local priorities.

15. In many countries there are still problems in sharing information between agencies, and greater dialogue between data collectors and those using the data (e.g. for decision-making) is needed to ensure the continuing relevance of the data collected.

16. Data quality is a common but difficult issue. In general, the starting point must be what already exists. Even if the quality of the existing data is considered inadequate for research purposes, it may still be good enough for initial priority setting. Nevertheless, environmental and health authorities need to ensure that their data is of good quality as basing policy decisions on poor data can be both dangerous and costly and can lead to loss of credibility and public confidence.

17. When considering data relating to exposure, there is usually a hierarchy of value. In decreasing relevance this is:

- measurements of internal dose in man (or other target);
- measurements of individual exposure (personal exposure);
- ambient concentrations in the environmental medium concerned;
- emission data.

18. Determining pathways of exposure can:

- help determine the relative importance of different sources;
- pinpoint populations or targets most at risk;
- better focus data collection;
- show where control actions will be feasible and effective.

19. Children may be at particular risk because of their sensitivity to environmental hazards and because morbidity arising from exposure in childhood can have long-term consequences. Therefore, information relating to exposure of children could be particularly important in decision making and priority setting.

20. Geographic Information Systems have great potential as tools for manipulating large amounts of data and for using it in spatial analysis. It can also have an important role in presenting the results and conclusions drawn from such analyses in ways which are attractive and easily understood by the public and other stakeholders. However, in seeking simplicity and attractiveness, care is needed to ensure that bias is not introduced and that important aspects of the information are not diluted or obscured.

Indicators to Monitor NEAP and NEHAP Progress

21. The OECD core set of indicators is a reasonable starting point for many of the issues likely to be addressed in NEAPs and NEHAPs. Where other indicators need to be developed, the OECD model of pressure/state/response provides a useful framework.
22. Indicators should reflect policy needs, be based on the best available science and be consistent with the level at which action is proposed (international, national, local). Scientific rigour in the choice of indicators is particularly important if a consistent approach to monitoring progress is to be maintained in circumstances where political commitment is liable to change. However, programmes change and scientific understanding improves. Hence there is a need for flexibility to modify indicators so that they remain soundly based and relevant to policy needs.
23. Where possible, numerical indicators should be used, but some issues are not readily quantifiable. This is a particular problem where the health impact of environmental factors has not been rigorously established.
24. While all the presentations recognised the difficulties in developing indicators for monitoring progress towards environmental health objectives, the consensus was that some indicators of this kind were possible. A few countries have proposed some, particularly in relation to air quality and the microbiological quality of drinking water.
25. Mortality has limited value as an end-point for environmental health indicators. Countries want to make more use of morbidity data but there are difficulties in doing this. Thus the data is often of poor quality because of difficulties and imperfections in its collection. In addition, it is often difficult to relate such data to environmental exposure because of confounding socio-economic factors. Prolonging a good quality of life to later ages rather than extending the life-span of their citizens is the realistic goal in most OECD countries. However, in many central and eastern European countries, life expectancy remains significantly lower than in OECD countries; here, extending life expectancy remains an important policy goal.
26. International harmonisation of indicators used for monitoring progress would facilitate the sharing of experience and the comparison of the progress between countries. It may also increase public confidence in the indicators and the results which they produce. The OECD Core Set provides a basis for harmonising national environmental indicators but more work is needed to develop international consensus on a comprehensive set of environmental health indicators. Each country will determine its own priority issues and actions to deal with them so complete harmonisation of national indicators will not be possible.

Communicating Information to the Public and Other Stakeholders

27. While national governments are responsible for developing NEAPs and NEHAPs, the process involves identifying and reaching a consensus on priorities and ensuring that problems are tackled in the most cost-effective way by those best placed to deal with them. There must be a strong political input but the process also requires information dissemination and consensus-building among a range of stakeholders if all these are to contribute to policy development and decision making. Information needs to be tailored to suit the needs of the different stakeholders who will have different degrees of knowledge and experience and most of whom will be interested in specific parts of the NEAP or NEHAP. This introduces the danger of selective provision of information leading to bias and manipulation.

Incorporating clear targets and well-chosen indicators for monitoring progress will help understanding and reduce such dangers.

28. Information dissemination to the public and other stakeholders is not well developed in all countries. To overcome this problem some countries may have to change existing administrative structures while others will have to devote more resources to dissemination.

29. Public perceptions of issues and relative priorities do not always reflect science. The quality, quantity and relevance of information available to the public on a specific issue are important factors in determining the public's perception of that issue. Hence public perception should be an important consideration when designing public information campaigns.

Economic Analysis and Economic Indicators

30. Tools now exist for the effective economic analysis of some environmental and environmental health issues where adequate data exist. Such analysis can be valuable:

- in comparing options for action;
- as a contribution to priority setting;
- as a contribution to decision making;
- in designing least-cost risk reduction and risk prevention programmes;
- in indicating where there are gaps in knowledge;

RECOMMENDATIONS

It is recommended that countries:

31. Review the effectiveness of their environmental and health-related information systems for:
- priority-setting;
 - developing targets;
 - developing indicators for monitoring progress in implementing their NEAPs and NEHAPs and for achieving sustainable development;
 - determining pathways of exposure and populations most at risk (children, the elderly etc.);
 - economic analysis.
32. Encourage at the national and local levels, moves towards improved data quality and more integrated information systems to handle NEAP and NEHAP needs and all priority sustainable development issues in a co-ordinated, unified manner.

33. Seek opportunities to integrate the implementation of NEAPs and NEHAPs at the national and local level; address the information and co-ordination needs of local programmes for implementing NEAPs and NEHAPs.
34. While recognising the difficulties, develop indicators (and methodologies for measuring them) which bridge environment and health issues and share their experience with other countries.
35. Work with their neighbours in developing common indicators and in measuring programmes for shared problems.
36. Develop, as an integral part of their implementation strategy for NEAPs and NEHAPs, information on current public perceptions of the issues identified in these plans. Develop public information campaigns to improve the information available to the public and develop indicators which measure changes in public perceptions. Experience exists in some existing international programmes and in some countries of these issues which countries can draw on.

It is recommended that OECD, WHO, UNEP and other relevant international agencies and funding institutions:

37. Strengthen their joint efforts in support of countries in improving their environment and health information systems, including financial and technical assistance and capacity building at the national, regional and local levels. First steps might be to organise joint workshops to review the effectiveness of specific national systems in meeting the demands of the NEAP and NEHAP processes and to determine how international action can help improve data quality.
38. Facilitate the sharing of experience of those countries currently developing indicators which bridge environmental and health issues as part of their implementations strategies for NEAPs and NEHAPs. In the first instance this might take the form of a joint workshop.
39. Consider a joint initiative to explore with countries the scope for harmonising indicators for priority setting and for monitoring progress in implementing NEAPs and NEHAPs.
40. Consider jointly how they can work with Governments to facilitate local implementation of NEAPs and NEHAPs and the sharing of experience between countries.
41. Promote the application of economic analysis to environmental and environmental health problems. In particular, facilitate the dissemination of case studies where economic analysis has been applied successfully to environmental and environmental health problems. Consider using such studies to help train professionals in relevant techniques so that these are applied to a wider range of problems in more countries.

Séminaire OCDE/ECEH-OMS sur les informations relatives à l'environnement et l'hygiène de l'environnement nécessaires pour étayer les PNAE et les PANHE : l'utilisation de données et d'indicateurs

Budapest, les 22 et 23 mai 1997

Rapport du Président et du Rapporteur

A. Ouverture et introduction

1. Le séminaire est accueilli par le Ministère hongrois de l'environnement et de la planification régionale, le Ministère des affaires sociales, l'Institut de gestion de l'environnement et l'Institut national de santé publique. Il est organisé en coopération avec le PNUE/GRID (Arendal).

2. Il réunit plus de 90 experts représentant 25 pays, 10 agences et institutions financières internationales et 2 ONG, ainsi que des experts et des consultants indépendants. Les participants sont accueillis par M. Pál Bozó (Ministère hongrois de l'environnement et de la planification régionale) et par M. Alán Pinter, au nom de l'Institut national de santé public Johan Belà, par M. Alexander Kuchuk de l'ECEH/OMS et par M. Brendan Gillespie de l'OCDE.

3. M. Gillespie ouvre le séminaire et énonce ses objectifs, à savoir :

- mieux utiliser les données pour l'établissement des priorités dans les PNAE et les PANHE ;
- contribuer au développement et promouvoir l'utilisation d'indicateurs pour faciliter le suivi des PNAE et PANHE ;
- étudier les principaux domaines dans lesquels l'information sur l'environnement et l'hygiène de l'environnement doit être améliorée.

4. Pour les personnes qui étaient absentes, les conclusions préliminaires du Président du Séminaire de l'OCDE sur les indicateurs environnementaux dans les pays d'Europe centrale et orientale, qui s'est tenu la veille (21 mai), sont présentées.

5. Les participants élisent M. S. Tarkowski comme Président général du séminaire et M. Norman J. King comme Rapporteur.

B. Structure du séminaire

6. Outre les séances d'ouverture et de clôture, des séances plénières sont prévues sur quatre thèmes voisins. Chacune commence par un exposé général suivi de rapports des représentants des pays connaissant plus particulièrement les thèmes traités.

7. Les quatre séances plénières ont pour thème :

- i) “Informations utiles pour l’établissement des priorités des PNAE et des PANHE”, c’est à dire quels types d’informations sont nécessaires et dans quelle mesure elles sont disponibles dans les pays en transition.
- ii) “Les indicateurs nécessaires pour suivre la progression des PNAE et des PANHE”, c’est à dire comment les pays peuvent utiliser des indicateurs de l’état de l’environnement ou de l’hygiène de l’environnement pour mieux suivre la mise en oeuvre des PNAE et PANHE.
- iii) “L’utilisation de données et indicateurs économiques”, c’est à dire les méthodes d’estimation des coûts économiques des effets sur la santé et comment ces indicateurs peuvent être utilisés dans l’établissement des priorités des PNAE et PANHE.
- iv) “Améliorer les systèmes d’information sur l’environnement et l’hygiène de l’environnement”, c’est à dire définir les objectifs et principes qui pourraient permettre d’améliorer ces systèmes d’information.

8. Des périodes de dialogue sont prévues dans chaque séance plénière pour permettre le libre échange d’informations et d’expériences et pour examiner et débattre les points évoqués dans les exposés officiels. En outre, dans le cas d’une séance, les participants se répartissent en deux groupes de travail pour examiner certains aspects plus précis. Les résultats de tous ces débats sont présentés dans les sections “Conclusions” et “Recommandations” du présent rapport

9. Lors de la séance de clôture du séminaire, le rapporteur présente son projet de conclusions et recommandations aux participants, pour examen. Les commentaires ainsi que les amendements et ajouts proposés ont été, dans toute la mesure du possible, intégrés dans le présent rapport. Sur la proposition du Président général, il est convenu que le rapport révisé du Rapporteur serait soumis au Président général qui l’approuverait en tant que rapport du Président du Séminaire.

C. Conclusions

Généralités

10. La mise en oeuvre des PANHE intervient principalement au niveau local. La réussite des PNAE dépendra également des mesures prises localement. Pour gagner en efficacité, il est conseillé d’intégrer les procédures des PNAE et des PANHE. Bien souvent, les responsables de la mise en oeuvre de ces deux types de programmes au niveau local souhaiteront travailler sur un seul projet qui intégrera les mesures applicables de l’un et de l’autre. Dans ces cas, l’intégration locale des procédures des PNAE et PANHE sera inévitable.

11. En élaborant leurs PNAE et PANHE, plusieurs pays ont mis au point des indicateurs pour évaluer les progrès accomplis et ce travail doit être poursuivi. En particulier, des objectifs et indicateurs pourraient être établis en fonction des conditions et besoins locaux. Pour le moment, peu de pays ont encore étudié comment procéder, comment les objectifs et indicateurs locaux s’articuleront aux objectifs nationaux et dans quelle mesure il sera nécessaire de coordonner au niveau national les indicateurs applicables au niveau local.

Informations utiles

12. Les informations relatives aux facteurs environnementaux qui ont une incidence connue sur la santé humaine sont plus utiles dans le contexte des PNAE et PANHE que les informations sur les facteurs pour lesquels la corrélation est hypothétique. Il importera d'en tenir compte dans l'établissement des priorités pour les PNAE et PANHE. De plus, les risques pour la santé constituent un argument puissant pour trouver les ressources nécessaires pour engager une action. Dans les PECO et les NEI, la qualité de l'air et la qualité de l'eau apparaissent généralement comme les paramètres environnementaux les plus importants du point de vue sanitaire.

13. Ces pays sont généralement dotés de systèmes d'information nationaux qu'ils ont souvent améliorés en dépit d'importantes restrictions économiques. Ces systèmes sont généralement d'une qualité suffisante pour établir, de façon préliminaire, les priorités nationales.

14. Les informations recueillies et agrégées au niveau central ne sont généralement pas assez sensibles pour établir des priorités pour l'action locale. Toutefois, ces informations reposent souvent sur des données recueillies au niveau local et qui peuvent donc être exploitées. Il importe d'étudier également les autres sources possibles de données plus précises et détaillées (par exemple les instituts universitaires) ainsi que les données concernant des situations analogues ailleurs dans le pays ; des extrapolations à partir de données d'autres pays pourraient également être utilisées pour l'établissement des priorités au plan local.

15. Dans bien des pays, il existe toujours des problèmes de circulation des informations entre agences et il importe de développer le dialogue entre les collecteurs de données et ceux qui les utilisent (pour la prise de décision, par exemple) afin que les données recueillies conservent toute leur utilité.

16. La qualité des données est un problème très fréquent mais difficile à résoudre. En général, le mieux est de s'appuyer sur ce qui existe déjà. Même si la qualité des données existantes est insuffisante pour mener des recherches, elle peut tout de même permettre de fixer les premières priorités. Toutefois, les autorités environnementales et sanitaires doivent garantir la qualité de leurs données, sachant que des décisions reposant sur des données précaires peuvent être à la fois dangereuses et coûteuses et entraîner une perte de crédibilité et de confiance du public.

17. S'agissant des données sur l'exposition, il existe une hiérarchie des valeurs. On trouve, par ordre d'importance :

- les mesures de la dose interne chez l'humain (ou une autre cible) ;
- les mesures de l'exposition individuelle ;
- les concentrations ambiantes dans le milieu considéré ;
- les données sur les émissions.

18. En déterminant les voies d'exposition, on peut :

- mieux évaluer l'importance relative des différentes sources ;
- identifier les populations ou les cibles les plus exposées au risque ;

- mieux cibler la collecte de données ;
- montrer où des mesures antipollution seront possibles et efficaces.

19. Les enfants peuvent être particulièrement exposés dans la mesure où ils sont plus sensibles aux risques environnementaux et parce que la morbidité imputable à l'exposition dans l'enfance peut avoir des conséquences à long terme. En conséquence, les informations relatives à l'exposition des enfants peuvent être particulièrement importantes pour la prise de décisions et l'établissement des priorités.

20. Les systèmes d'information géographiques offrent des perspectives intéressantes pour manipuler de grandes quantités de données et les utiliser dans des analyses géographiques. Ils peuvent aussi se révéler très utiles pour présenter les résultats et les conclusions tirées de ces analyses de façon attrayante et facilement compréhensible pour le public et les autres parties intéressées. Toutefois, il importe de veiller à ce que, par souci de simplicité ou de présentation, les données ne se trouvent pas biaisées et que les aspects importants de l'information ne soient pas dilués, ni obscurcis.

Indicateurs de l'état d'avancement des PNAE et des PANHE

21. Le corps central d'indicateurs de l'OCDE peut raisonnablement servir de point de départ pour de nombreux aspects susceptibles d'être traités dans les PNAE et les PANHE. Le modèle pression-état-réaction de l'OCDE offre par ailleurs un cadre utile lorsque de nouveaux indicateurs doivent être développés.

22. Les indicateurs doivent tenir compte des besoins des pouvoirs publics, s'appuyer sur les meilleures données scientifiques disponibles et correspondre au niveau d'action proposé (international, national, local). Il importera de choisir les indicateurs avec la plus grande rigueur scientifique si l'on veut maintenir une approche cohérente et suivre les progrès accomplis dans des situations où les engagements politiques risquent de changer. Toutefois, les programmes et les connaissances scientifiques évoluent. Il importe donc de conserver une certaine souplesse pour pouvoir modifier les indicateurs de façon à ce qu'ils restent bien fondés et continuent de répondre aux besoins des pouvoirs publics.

23. Lorsque cela est possible, on utilisera des indicateurs chiffrés, mais certains aspects ne sont pas directement quantifiables. Cela pose un vrai problème lorsque l'impact sanitaire des facteurs environnementaux n'a pas été rigoureusement établi.

24. Bien que tous les intervenants reconnaissent les difficultés que pose la mise au point d'indicateurs pour suivre les progrès accomplis dans la réalisation des objectifs sanitaires, ils s'accordent tous à penser qu'un certain nombre d'indicateurs de ce type sont possibles. Quelques pays ont proposé des indicateurs concernant notamment la qualité de l'air et la qualité microbiologique de l'eau de boisson.

25. La mortalité n'a qu'un intérêt limité comme paramètre utilisé dans les indicateurs d'hygiène de l'environnement. Les pays veulent utiliser plus largement les données sur la morbidité, mais cela pose des problèmes. Les données sont souvent de qualité médiocre du fait de problèmes et d'imperfections au niveau de leur collecte. De plus il est souvent difficile d'établir une relation entre ces données et l'exposition de l'environnement en raison de l'interférence de facteurs socio-économiques. Beaucoup de pays de l'OCDE visent l'objectif réaliste de maintenir une bonne qualité de vie pour les personnes très âgées, plutôt que de prolonger la durée de vie de leurs citoyens. Or dans de nombreux pays d'Europe centrale et orientale, l'espérance de vie reste bien inférieure à celle des pays de l'OCDE ; partant, accroître l'espérance de vie reste dans ces pays un objectif important de l'action des pouvoirs publics.

26. L'harmonisation internationale des indicateurs utilisés pour suivre les progrès accomplis faciliterait l'échange d'expériences et la comparaison des progrès entre les pays. Elle permettrait en outre de renforcer la confiance du public dans les indicateurs et les résultats qu'ils produisent. Le Corps central de l'OCDE peut servir de point de départ pour harmoniser les indicateurs nationaux de qualité de l'environnement mais des efforts restent à faire pour parvenir à un consensus international concernant un ensemble complet d'indicateurs d'hygiène de l'environnement. Chaque pays déterminera ses propres priorités et les mesures à prendre en conséquence, c'est pourquoi il ne sera pas possible d'harmoniser complètement les indicateurs nationaux.

Diffusion des informations au public et aux autres parties intéressées

27. Si l'établissement des PNAE et PANHE revient aux gouvernements nationaux, le processus exige aussi d'identifier et de définir en commun les priorités et d'assurer que les problèmes sont traités au meilleur coût par les personnes les mieux placées pour s'en occuper. Les choix politiques occuperont une place importante dans ce processus qui exigera en outre de diffuser l'information et de rechercher un consensus entre les différentes parties prenantes si celles-ci sont appelées à participer à l'élaboration des politiques et à la prise de décisions. L'information doit être adaptée aux besoins des différentes parties intéressées qui n'auront pas toutes le même niveau de connaissances ni d'expérience et qui s'intéresseront pour la plupart à certains aspects spécifiques des PNAE ou PANHE. C'est ici qu'intervient le danger d'une fourniture sélective d'informations, qui entraînerait des distorsions et une manipulation. La définition d'objectifs clairs et d'indicateurs bien choisis pour suivre les progrès devrait permettre de comprendre et de réduire ce type de danger.

28. La diffusion de l'information au public et aux autres parties intéressées n'est pas bien développée dans tous les pays. Face à ce problème, certains pays pourraient être amenés à modifier les structures administratives existantes alors que d'autres devront consacrer davantage de ressources à la diffusion.

29. La façon dont le public perçoit les problèmes et les priorités relatives ne correspond pas toujours à une vision scientifique. La qualité, la quantité et la valeur des informations dont le public dispose sur l'un ou l'autre problème jouent un rôle important dans la perception du problème en question. Partant, la perception du public est un point important à prendre en compte au moment de la conception des campagnes d'information du public

Analyse économique et indicateurs économiques

30. On dispose actuellement d'outils permettant d'effectuer une analyse économique efficace de certains problèmes environnementaux et d'hygiène de l'environnement, lorsqu'il existe des données adéquates. Ces analyses peuvent être utiles pour :

- comparer les actions envisageables ;
- faciliter l'établissement des priorités ;
- faciliter la prise de décisions ;
- élaborer des programmes de réduction et de prévention des risques au meilleur coût ;
- repérer les lacunes dans les connaissances.

D. Recommandations

Il est recommandé que les pays :

31. Examinent l'efficacité de leurs systèmes d'information sur l'environnement et l'hygiène de l'environnement pour :

- l'établissement des priorités ;
- la définition des objectifs ;
- le développement d'indicateurs pour suivre les progrès de la mise en oeuvre de leurs PNAE et PANHE et pour promouvoir un développement durable ;
- déterminer les voies d'exposition et les populations les plus exposées (enfants, personnes âgées, etc.) ;
- l'analyse économique.

32. Encouragent, au plan national et local, les efforts pour améliorer la qualité des données et l'intégration des systèmes d'information pour prendre en charge les besoins des PNAE et PANHE et tous les aspects prioritaires du développement durable de façon coordonnée et unifiée.

33. Cherchent les moyens d'intégrer la mise en oeuvre des PNAE et des PANHE au plan national et local ; répondent aux besoins d'information et de coordination des programmes locaux pour la mise en oeuvre des PNAE et PANHE.

34. Malgré les difficultés que cela présente, mettent au point des indicateurs (et méthodologies pour les mesurer) couvrant les aspects environnementaux et sanitaires et mettent en commun leurs expériences avec les autres pays.

35. Travaillent de concert avec les pays voisins pour développer des indicateurs communs et évaluer les programmes visant des problèmes communs.

36. Développent, dans le cadre de leur stratégie de mise en oeuvre des PNAE et PANHE, une information sur la façon dont le public perçoit les aspects identifiés dans ces plans. Préparent des campagnes d'information pour améliorer l'information du public et mettent au point des indicateurs pour suivre l'évolution des perceptions du public. Des enseignements peuvent déjà être tirés des programmes internationaux existant et de l'expérience de certains pays et les pays pourraient en tirer profit.

Il est recommandé que l'OCDE, l'OMS, le PNUE et les autres agences et institutions financières internationales compétentes :

37. Intensifient conjointement leurs efforts en faveur des pays, pour améliorer leurs systèmes d'information sur l'environnement et la santé, notamment au niveau de l'aide financière, de l'assistance technique et de la mise en place de moyens d'action au plan régional et local. Dans un premier temps, il pourrait s'agir d'organiser des ateliers conjoints pour examiner avec quelle efficacité le système national de pays donnés répond aux besoins des PNAE et PANHE et déterminer ce qu'il conviendrait de faire, au plan international, pour améliorer la qualité des données;

38. Favorisent l'échange d'expériences entre les pays qui mettent actuellement au point des indicateurs couvrant les aspects environnementaux et sanitaires, dans le cadre de leurs stratégies de mise en oeuvre des PNAE et PANHE. Une réunion conjointe pourrait être organisée dans un premier temps.

39. Envisagent une action commune pour étudier, avec les pays, dans quelle mesure il convient d'harmoniser les indicateurs pour l'établissement des priorités et le suivi des progrès de la mise en oeuvre des PNAE et PANHE.

40. Examinent de concert comment travailler avec les gouvernements pour faciliter la mise en oeuvre, au plan local, des PNAE et PANHE et la mise en commun de l'expérience des pays.

41. Promouvoir l'application d'analyses économiques aux problèmes d'environnement et d'hygiène de l'environnement. Notamment, faciliter la diffusion d'études de cas comportant des analyses économiques réussies de ce type de problèmes. Envisager d'utiliser ces études pour former des spécialistes des techniques considérées afin qu'elles puissent être appliquées à une plus large gamme de problèmes dans un plus grand nombre de pays.

Семинар ОЭСР/ВОЗ-ЕЦГОС

Информация по Окружающей Среде и Гигиене Окружающей Среды в Поддержку НПДООС и НПДГОС: Применение данных и индикаторов

Будапешт, 22 и 23 мая 1997 г.

Отчет Председателя и Докладчика

Открытие и введение

1. Семинар принимали Министерство Охраны Окружающей Среды и Регионального Планирования Венгрии, Министерство Социального Обеспечения, Институт Управления Охраной Окружающей Среды и Национальный Институт Здравоохранения. Семинар был организован при сотрудничестве с ЮНЕП/ГРИД (Арендал).

2. В семинаре принимало участие более 90 экспертов. В их число входили представители 25 стран, 10 международных агентств и финансовых институтов, 2 неправительственных организаций, независимые эксперты и консультанты. Участников приветствовали г-н Пал Божо (Венгерское Министерство Охраны Окружающей Среды и Регионального Планирования), Др. Алан Пинтер (от имени Национального Института Здравоохранения им. Йохана Бела), Др. Александер Кучук (ЕЦГОС - Европейский Центр Гигиены Окружающей Среды ВОЗ) и г-н Брендан Гиллеспи (ОЭСР).

3. Во вступительном слове Г-н Гиллеспи сформулировал основные задачи семинара:

- Улучшить применение данных при установлении приоритетов для НПДООС и НПДГОС;
- Содействовать разработке индикаторов для мониторинга НПДООС и НПДГОС;

Определить ключевые направления для улучшения экологической информации и информации по гигиене окружающей среды.

4. Участникам было представлено краткое изложение проекта выводов Председателя Семинара ОЭСР по Экологическим Индикаторам в Странах Центральной и Восточной Европы, проходившего 21 мая, на день раньше (для тех, кто на нем не присутствовал).

5. Участники избрали Проф. С. Тарковского главным председателем семинара, а Д-ра Нормана Дж. Кинга - основным докладчиком.

Структура семинара

6. Вступительная и последующие сессии по четырем взаимосвязанным темам проводились в форме пленарных заседаний. Введение в каждую сессию начиналось с обзорного документа, за которым следовали сообщения представителей тех стран, у которых имелся соответствующий опыт по каждой теме.

7. На четырех пленарных заседаниях обсуждались следующие темы:

(i) "Информация для установления приоритетов НПДООС и НПДГОС". Эта тема охватывала виды необходимой информации и степень их доступности в странах с переходной экономикой.

(ii) "Индикаторы для контроля за осуществлением НПДООС и НПДГОС". Эта тема охватывала вопросы использования отдельными странами экологических индикаторов и индикаторов гигиены окружающей среды для облегчения контроля за внедрением НПДООС и НПДГОС.

(iii) "Использование экономических данных и индикаторов". Эта тема охватывала методы определения экономической стоимости воздействия на здоровье людей и то, как можно использовать эти величины для установления приоритетов НПДООС и НПДГОС.

(iv) "Улучшение информационных систем в области охраны окружающей среды и гигиены окружающей среды". Эта тема охватывала цели и принципы усовершенствования этих информационных систем.

8. Во время каждой пленарной сессии отводилось время для свободной дискуссии, чтобы обменяться информацией и опытом, и для обсуждения положений официальных докладов. Кроме того, на одной сессии участники образовали две рабочие группы для проведения более подробного обсуждения. Результаты всех этих дискуссий приведены в разделах "Выводы" и "Рекомендации" данного доклада.

9. На заключительной сессии семинара основной докладчик, которому поручили сформулировать резюме дискуссии, представил на рассмотрение участников свой проект Выводов и Рекомендаций. Замечания и предложения по дополнениям и изменениям были, по возможности, включены в данный доклад. По предложению председателя было решено, что пересмотренный доклад докладчика будет передан председателю и представлен им как доклад председателя семинара.

ВЫВОДЫ

Общие

10. Внедрение НПДГОС будет осуществляться главным образом на местном уровне. Успешное внедрение НПДООС также будет зависеть от деятельности, проходящей на местном уровне. Для повышения эффективности внедрения было бы целесообразно интегрировать процессы НПДООС и НПДГОС этого уровня. Во многих случаях лицам, ответственным за внедрение НПДООС и НПДГОС будет желательно действовать на местном уровне в рамках единой программы, которая бы охватывала соответствующую деятельность, предусматриваемую двумя этими планами. В таких случаях интеграция НПДООС и НПДГОС местного уровня станет неизбежной.

11. При разработке НПДООС и НПДГОС некоторые страны стали разрабатывать индикаторы для измерения достигнутого прогресса. Эти работы следует продолжать. В частности, может оказаться необходимым разработать такие целевые показатели и индикаторы, которые отражали бы местные особенности и потребности. До сих пор лишь немногие страны рассматривали вопросы о том, как это можно сделать, как увязать местные и национальные целевые показатели и индикаторы и до какой степени будет необходима национальная координация индикаторов, относящихся к местному уровню.

По отношению к информации

12. В контексте НПДООС и НПДГОС более полезна информация о факторах окружающей среды, для которых установлено воздействие на здоровье людей, чем информация о факторах, для которых такое воздействие остается гипотетическим. Это важно учитывать при установлении приоритетов для НПДООС и НПДГОС. Помимо этого, риск для здоровья - это мощный аргумент при поиске необходимых ресурсов для того, чтобы приступить к той или иной акции. В странах ЦВЕ/ННГ, качество воздуха и качество воды, как правило, вызывают наибольшую обеспокоенность в связи с их воздействием на здоровье людей.

13. В этих странах существуют национальные информационные системы и они, как правило, улучшились, несмотря на серьезные экономические ограничения. В основном, они достаточно хороши для целей принятия первоначальных решений по национальным приоритетам.

14. Информация, которая собирается и обобщается централизованно, обычно недостаточно чувствительна для установления приоритетов деятельности на местном уровне. За основу, однако, эта информация часто берет данные, которые собирались на местном уровне и, следовательно, эти данные могут оказаться доступными. Следует рассматривать также и альтернативные источники исходных данных и более подробной информации (например, в академических институтах). В установлении местных приоритетов может помочь также изучение данных о подобных ситуациях в других местах данной страны или экстраполяция данных других стран

15. Во многих странах по-прежнему имеются проблемы, связанные с распространением информации между различными агентствами, и остается необходимость в углублении диалога между теми лицами, которые собирают данные и теми, кто пользуется этой информацией (например, для принятия решений) для обеспечения последовательности и актуальности собираемых данных.

16. Качество данных - это общая, но трудная проблема. В общем, за отправную точку следует брать то, что уже имеется в наличии. Даже если качество существующих данных считается неадекватным для исследовательских целей, они все же могут быть достаточно хороши для первоначального установления приоритетов. Тем не менее, природоохранным органам и органам здравоохранения необходимо обеспечить хорошее качество своих данных, которые становятся основой для обоснования политических решений, поскольку принятие решений на основе некачественных данных может быть как опасным, так и дорогостоящим, может привести к потере репутации и общественного доверия.

17. При рассмотрении данных, связанных с экспозицией, обычно используется иерархия их ценности. По степени снижения важности они приведены ниже:

- измерения поглощенной дозы для человека (или иного целевого объекта);
- измерения индивидуальной экспозиции (персональная экспозиция);
- концентрации в рассматриваемых средах;
- данные о выбросах.

18. Определение маршрутов экспозиции может:

- помочь определить относительное значение различных источников;
- указать на наиболее подверженные риску группы населения или объекты;
- улучшить избирательность сбора данных;
- указать на экономически приемлемую и эффективную деятельность по контролю.

19. Особому риску могут подвергаться дети из-за своей чувствительности к опасным факторам окружающей среды и в связи с тем, что заболевания, вызванные экспозицией в детстве, могут иметь долгосрочные последствия. Следовательно, информация, связанная с экспозицией для детей, может быть особенно важной при принятии решений и установлении приоритетов.

20. Географические Информационные Системы обладают значительным потенциалом в качестве инструмента обработки больших массивов информации и использования их для анализа пространственного распределения. Они могут также сыграть важную роль в представлении результатов и выводов анализа в таком виде, который будет привлекательным и легкодоступным для общественности и других заинтересованных лиц. Однако, стремясь добиться простоты и привлекательности, необходимо соблюдать осторожность, чтобы избежать предвзятости или утери важных аспектов этой информации.

Индикаторы для контроля за осуществлением НПДООС и НПДГОС

21. Для многих вопросов, которые скорее всего будут рассматриваться в НПДООС и НПДГОС, разумной отправной точкой может стать Основной Набор Индикаторов ОЭСР. В тех случаях, когда возникнет необходимость разработки новых индикаторов, полезной структурной основой станет модель "Давление/Состояние/Ответ" ОЭСР.

22. Индикаторы должны отражать политические потребности, основываться на лучших имеющихся достижениях науки и соответствовать уровню предполагаемой деятельности (международный, национальный, местный). Научная строгость выбора индикаторов особенно важна, если необходимо поддерживать последовательный подход к контролю за осуществлением в условиях, когда политические пристрастия могут легко меняться. Но программы изменяются, а уровень научного знания улучшается. Таким образом, необходима некоторая гибкость для усовершенствования индикаторов, чтобы они оставались надежно обоснованными и увязанными с политическими потребностями.

23. Если возможно, то следует использовать количественные индикаторы, но некоторые проблемы довольно сложно описать в количественном выражении. Это является особо проблематичным тогда, когда воздействие факторов окружающей среды на здоровье строго не установлено.

24. Хотя все выступающие отмечали трудности, связанные с разработкой индикаторов для контроля прогресса, достигнутого в достижении целевых показателей гигиены окружающей среды, все же имеется общее согласие, что некоторые индикаторы такого рода возможны. Несколько стран предложили некоторые индикаторы, связанные, в частности, с качеством воздуха и микробиологическим качеством воды.

25. Использование в качестве конечного индикатора гигиены окружающей среды величины смертности имеет ограниченную ценность. Отдельные страны хотели бы в большей степени использовать величину заболеваемости, но это связано с определенными трудностями. Эти величины часто отличаются плохим качеством из-за трудностей и несовершенства сбора таких данных. Помимо этого, часто трудно увязать эти данные и экспозицию по факторам окружающей среды из-за накладывающихся социально-экономических факторов. Для большинства стран ОЭСР реалистичным целевым показателем было бы продление хорошего качества жизни в старости, а не увеличение продолжительности жизни своих граждан. Во многих странах центральной и восточной Европы, однако, ожидаемая продолжительность жизни остается значительно ниже, чем в странах ОЭСР, так что в этих странах увеличение ожидаемой продолжительности жизни остается важной политической целью.

26. Международная унификация индикаторов, используемых для контроля достигнутого прогресса, способствовала бы обмену опытом и сравнению прогресса, достигнутого различными странами. Это может также повысить доверие общественности к индикаторам и к тем результатам, которые получают на их основе. Основной Набор ОЭСР обеспечивает базу для унификации национальных экологических индикаторов, но для достижения международного консенсуса по всестороннему набору индикаторов гигиены окружающей среды понадобятся дополнительные усилия. Каждая страна сама будет определять свои собственные приоритетные проблемы и пути их разрешения, так что полная унификация национальных индикаторов будет невозможной.

Информирование общественности и других заинтересованных лиц

27. Хотя за разработку НПООС и НПОГОС несут ответственность национальные правительства, в этот процесс входит достижение консенсуса по устанавливаемым приоритетам и обеспечение того, что проблемы разрешаются наиболее экономически эффективным образом и теми сторонами, которые обладают наилучшими возможностями для их разрешения. Мощный политический вклад необходим, но для этого процесса требуется также распространение информации и достижение консенсуса различными заинтересованными лицами, если все они должны внести свой вклад в разработку политики и принятие решений. Информационные потребности следует адаптировать с учетом требований различных заинтересованных лиц, обладающих разным уровнем знаний и опыта и которые скорее всего будут интересоваться определенными разделами НПООС и НПОГОС. При этом возникает опасность избирательного предоставления информации, что влечет предвзятость и манипуляцию информацией. Для улучшения понимания и снижения подобного риска следует ввести ясные целевые показатели и тщательно подобранные индикаторы для мониторинга достигнутых результатов.

28. Распространение информации среди общественности и других заинтересованных лиц не во всех странах достаточно развито. Для преодоления этой проблемы некоторым странам, вероятно, будет необходимо изменить существующие административные структуры, а другим странам - выделить на распространение информации больше ресурсов.

29. Общественное восприятие проблем и их относительной приоритетности не всегда научно обосновано. Качество, количество и актуальность доступной для общественности информации по той или иной конкретной проблеме являются важными факторами для восприятия этой проблемы общественностью. Таким образом, важно учитывать общественное восприятие при разработке кампаний информирования общественности.

Экономический анализ и экономические индикаторы

30. В настоящее время имеются инструменты для эффективного экономического анализа некоторых экологических проблем и проблем гигиены окружающей среды, для которых есть адекватные данные. Такой анализ может быть полезен:

- при сравнении вариантов для деятельности;
- как вклад в установление приоритетов;
- как вклад в принятие решений;
- при разработке наиболее низкзатратных программ сокращения и предотвращения риска;
- при определении информационных пробелов;

РЕКОМЕНДАЦИИ

Странам рекомендуется:

31. Рассмотреть, насколько эффективны их системы информации по экологическим вопросам и вопросам гигиены окружающей среды для:

- установления приоритетов;
- разработки целевых показателей;
- разработки индикаторов для контроля достигнутого прогресса во внедрении НПДООС и НПДГОС, в достижении устойчивого развития;
- определении маршрутов экспозиции и групп наибольшего риска (дети, престарелые и т.д.);
- экономического анализа.

32. Поощрять как на национальном, так и на местном уровнях инициативы по улучшению качества данных, большую интеграцию информационных систем для обслуживания потребностей НПДООС и НПДГОС и всех приоритетных вопросов устойчивого развития. Это следует делать координированным и унифицированным образом.

33. Искать возможности для интеграции внедрения НПДООС и НПДГОС на национальном и на местном уровнях; учитывать потребности в информации и координации местных программ внедрения НПДООС и НПДГОС.

34. Учитывая соответствующие трудности, разрабатывать индикаторы (и методы их измерения), которые увязывают медицинские и экологические вопросы и делиться своим опытом с другими странами.

35. Работать с соседними странами над разработкой общих индикаторов и в оценке программ для решения общих проблем.

36. Собирать и обрабатывать (в качестве интегральной части своей стратегии внедрения НПДООС и НПДГОС) информацию о современном общественном мнении по поводу проблем, рассматриваемых в этих планах. Готовить программы информирования общественности для улучшения доступной для общественности информации и разрабатывать индикаторы, которые бы позволяли оценивать изменения в общественном мнении. Для этого отдельные страны могут воспользоваться уже имеющимся опытом действующих международных программ и некоторых стран.

Рекомендуется, чтобы ОЭСР, ВОЗ, ЮНЕП и другие соответствующие международные агентства и финансовые институты:

37. Укрепляли свои совместные усилия по поддержке тех стран, которые совершенствуют свои информационные системы в области охраны и гигиены окружающей среды, включая финансовую и техническую помощь, а также создание соответствующего потенциала на национальном, региональном и местном уровнях. Первым шагом в этом направлении может стать организация совместных семинаров для рассмотрения эффективности отдельных национальных систем в удовлетворении потребностей процесса НПДООС/НПДГОС и для выяснения того, каким образом международные действия могут помочь в улучшении качества данных.

38. Содействовали распространению опыта тех стран, которые разрабатывают в настоящее время индикаторы, увязывающие экологические и медицинские вопросы в качестве составной части своих стратегий внедрения НПДООС и НПДГОС. Вначале это можно осуществить в форме совместного семинара.

39. Рассмотрели вопрос об инициативе совместного с отдельными странами изучения масштаба унификации индикаторов, используемых для установления приоритетов и для контроля за прогрессом, достигнутым во внедрении НПДООС и НПДГОС.

40. Рассмотрели совместно, как они могут работать с правительствами для поддержки внедрения НПДООС и НПДГОС местного уровня и усиления обмена опытом между странами.

41. Содействовали применению экономического анализа для проблем охраны и гигиены окружающей среды и содействовали, в частности, распространению ситуационных исследований, в которых экономический анализ успешно применялся для проблем охраны и гигиены окружающей среды. Следует рассмотреть вопрос об использовании таких исследований как вспомогательного материала для обучения профессионалов использованию этих методов, с тем, чтобы они применялись к более широкому кругу проблем и в большем числе стран.

Part II

Information for Setting NEAP and NEHAP Priorities

Using Data to Set Priorities: Lessons for National Environmental Action Programmes and National Environmental Health Action Plans in Central and Eastern Europe

by Clyde Hertzman

Between 1989 and 1993, the process that led to the preparation of the Environmental Action Programme for Central and Eastern Europe (EAP) identified important environmental health issues in the region and helped set priorities for environmental clean-up. Along the way, several lessons were learned which proved useful in subsequent work in other parts of the world. This paper provides an overview of these lessons, which still bear consideration in the region, in particular in the development of National Environmental Action Programmes (NEAPs) and National Environmental Health Action Plans (NEHAPs).

1. Measurement of variables with a known relationship to human health is more valuable than measurement of factors with an hypothetical relationship.

At the outset of the EAP process, it was entirely unclear whether or not any generalisations about pollution and health would be tenable. It was possible that each place would have had entirely different problems due to special conditions of exposure. It was also conceivable that these problems would have been related to highly specific chemical exposures that would only be recognisable following sophisticated analysis of environmental samples. Instead, the EAP process identified a wide range of locations where, within the limitations of the available evidence, certain *common* environmental exposures were of disproportionate public health significance.¹

The process focused in particular on the countries of Central Europe, not including the New Independent States of the former USSR (NIS); nonetheless, most conclusions reached have been shown to be valid also for the NIS.

These were lead in air and soil; airborne dust, SO₂ and other gases; and nitrates in water. These findings *simplified* the task of identifying priorities for environmental action. Until their public health significance were drastically reduced, the priorities would be dust, sulfur dioxide, lead, and nitrates in rural water supplies, and not an infinity of other things.

CEE is a region where the effects of environmental pollution on human health are strong enough to be epidemiologically detectable. Yet other investigators, using different evaluation techniques, argued that risks, which were too small to be epidemiologically detectable, could nevertheless be priorities if population exposure were widespread. In other words, a theoretical risk to a large population (for instance, from chlorinated compounds in drinking water) could be as important as a measurable risk to a smaller population. There is no principled way to resolve this difference. In the end, it was decided that the epidemiologically detectable risks, which put CEE outside the experience of the rest of Europe and North America, would be of first priority, and tiny risks spread over large populations ought to be addressed later.

¹ The process focused in particular on the countries of Central Europe, not including the New Independent States of the former Soviet Union (NIS); nonetheless, most conclusions reached have been shown to be valid also for the NIS.

2. It is important to recognise the difference between local, special problems of pollution and larger-scale, regional environmental health problems.

At the outset of our investigations in Central and Eastern Europe it seemed as though environmental health problems were concentrated in large areas of ecological disaster, which we called, somewhat loosely, "hot spots". Both the Katowice region of Poland and the mining districts of Northern Bohemia fitted this profile (see Box 1).

Box 1: A Regional Hot Spot

In the mining districts of Northern Bohemia, life expectancy from the early 1960s to the end of the Soviet period lagged behind the rest of the country. The physical and chemical environment of Northern Bohemia was uniquely hostile. The incremental effects of decades of open-pit mining, and effluents from a variety of polluting industries with old technology and poor environmental controls, combined with emissions from home heating during temperature inversions, high ambient concentrations of sulfur dioxide and dust, commonly occurred. Concentrations of greater than 1 000 micrograms per cubic meter of sulfur dioxide were sustained, on average, for 24 hours at a time or longer. Rain water and dust in the area contained complex mixtures of metals, organics, and polycyclic aromatic hydrocarbons.

Human health had been severely affected by this combination of high and low stack emissions. For example:

- Mortality from respiratory causes among newborns 1-12 months old was five to eight times higher in the areas of highest ambient dust and sulfur dioxide levels compared with places where air quality met standards. The proportion of low birth weight infants was also increased.
- Allergies and respiratory diseases are more prevalent among school children than in the rest of the Czech Republic.
- Children temporarily removed from the area to attend "nature school" in an unpolluted area showed evidence of improved physiologic function, which reversed when they returned home.
- All-cause mortality and mortality from lung cancer was higher among both men and women compared with the Czech Republic as a whole.

From the standpoint of environmental action the most important characteristic of these large areas was the fact that air quality problems were not localised or easily attributable to a small number of polluting plants. Instead, the air shed was being influenced, more or less uniformly throughout the region, by hundreds of point sources (energy, metallurgical, and domestic) in the area and upwind. Thus, any effective strategy for improving regional air quality would have to tackle several sectors of the economy of the affected region.

As investigations proceeded through the rest of Central and Eastern Europe it turned out that the "hot spot" model was not applicable to other places. Instead, we found many smaller, "rust belt" areas.

These are old industrial areas where the nearby population is exposed to emissions from a confluence of point sources whose effects on air and water can largely be distinguished from one another (see Box 2). In rust belt areas, action plans, which target specific point sources, will have some chance of improving both environmental quality and human health.

Box 2: A Town at the Confluence of Point Sources of Pollution

Copsa Mica, Romania was home to several poorly maintained industrial facilities, among which two of the region's most notorious lead smelters. Health problems of particular interest in the community included respiratory problems from exposure to dusts and gases and neuro-behavioural problems (including IQ losses) due to lead exposure. One study examining lung function in Copsa Mica children aged 7-11 showed that the normal development of their lung function had been impaired by the pollution conditions in the town. Lead exposures caused a large percentage of children to do poorly on psychometric tests; 73% tested out below normal range on the IQ test, 58% on the concentration test, 52% on the learning test, and 60% on the memory test.

Finally, some of the most dramatic environmental health problems have emerged in locations where "bad town planning" has augmented the impact of emission from a single point source (see Box 3). "Bad town planning" simply means that housing or farms have been put right next door to an offending plant with no "cordon sanitaire" to protect them. In such cases, an effective environmental action strategy may be to close the plant, eliminate the emissions, or abandon the housing/farms.

Box 3: Bad Town Planning

In Dimitrovgrad, Bulgaria thick, acrid effluent containing hydrogen fluoride and hydrogen sulfide came from a single smoke stack at a fertilizer plant. High-rise apartments and other settlements were located at the plant gate, and their occupants were exposed to high levels of these emissions. Studies showed that the physical development and lung function of children from Dimitrovgrad had been adversely affected by these emissions.

In general, the geographic analysis revealed that low stack emissions and local effects were significantly more important than believed at the outset of the evaluation. This insight helped increase the priority of residential and transport emissions as candidates for environmental investment and remedialness.

3. In order to create an effective environmental health information system in Central and Eastern Europe, many different sources of data, ministerial and non-ministerial, need to be solicited.

In order to get an accurate picture of the impact of pollution on health, it is necessary to iterate between public health information sources and environmental sources. Data from both environment and public health authorities, as well as from academic sources, need to be considered together wherever possible, and evidence from one should be used to stimulate inquiry into the other. Ministries usually have routinely collected data from a wide variety of locations. But these data tend to be "thin", in the sense that it provides a superficial evaluation of the public health significance of the environmental exposure in question. Other sources may have detailed, or "thick" data, but on highly circumscribed populations. Both types of data can be useful. In general, data available from environmental authorities deal with emissions from large sources, and not ambient air or water quality in specific communities at risk. It was also true that, when common health problems such as lead over-exposures and childhood respiratory problems tend to be found in places where environmental ministries do not routinely collect data.

Because of these circumstances, it is necessary to establish a free and open flow of information among a wide variety of agencies, institutions, and individuals, which have knowledge of significant environmental exposures and health outcomes. In the Philippines, this outcome was achieved with a problem-oriented approach, based upon the concept of "Environmental Exposure Pathways".

When transmission pathways associated with common environmental health conditions are traced, they tend to fall into broad groups. This observation led to the notion of "*Principal Environmental Exposure Pathways*" (PEEPs). PEEPs extend the concept of a causal pathway backwards from environmental health outcome to the origins of the environmental pollution which gave rise to the exposure in the first place. The PEEP methodology starts by constructing environmental exposure pathways; beginning with human health outcomes related to environmental pollution and working backwards to their source (in order to identify the critical steps in the environmental transmission pathway by which the exposures that cause disease unfold), and then forwards again to characterise the processes and problems that lead to human exposure.

Detailed characterisation of PEEPs involves pinpointing the populations at risk, which is necessary to estimate the burden of morbidity and mortality related to each PEEP; the health outcomes experienced by those exposed along each pathway (based upon direct epidemiologic evidence) or could be expected to experience (based upon epidemiologic studies of similarly exposed populations elsewhere); where there is and is not adequate health outcome information; where exposure sources can and cannot be adequately identified; where there are significant gaps in agency responsibilities; where new data flows (and accompanying equipment and skills) are needed; and wherever improvement of inter-agency co-operation is possible.

Characterising PEEPs, which is the most relevant, creates an overview of agency responsibilities along each pathway, making it easier to identify what could be ameliorated merely by improving inter-agency co-operation and where there are significant gaps in agency responsibilities (see Box 4).

Box 4. Using Principal Environmental Exposure Pathways

In the Philippines, the "Urban Air Pollution Pathway" begins with the importation and production of motor vehicles; combines with industrial point sources in urban communities to affect air quality, deposition of particulates on soil, and in housedust. It incorporates the issue of indoor air pollution from home cooking fires and cigarette smoke. The final "at risk" groups are those who live and work "on the street", transportation workers, and the general urban population. Along the way, the following agencies have regulatory authority which, depending upon how it was exercised, could lead to reduction of exposure to the "at risk" populations: the Department of Energy; the Department of Trade and Industry; the Department of Transportation and Communication; the Department of Finance; the Department of Public Works and Highways; the Department of Interior and Local Government; the Department of Environment and Natural Resources; the Department of Health; and the Department of Labour and Employment. Inter-agency co-operation in this regard has already begun and, if each agency in sequence could take actions to reduce emissions by a modest 10%, total emissions would decline by 60 -- 90%.

4. Certain effects of environmental pollution on health are exacerbated by socio-economic deprivation, such that simultaneous collection of socioeconomic data is often needed to adequately evaluate pollution-related effects.

The best example of this is lead exposures among children. The central concern with lead is its effect upon cognitive development in children, which can be measured using various neuro-behavioural scales, including IQ. The best estimate of dose-response in wealthy countries is an IQ decrement of 4.4 -- 5.3 points as blood lead levels rise from 10 to 30 mg/dl. However, based upon data from Hungary and Poland, an estimate of 10 IQ points decrement per 20 mg/dl blood lead increase was produced. This higher estimate may be as a result of lower nutrition and less opportunities for stimulation of children in socio-economically deprived environments. These factors, acting alone, have the capacity to influence child cognitive development in the same way as lead and might, therefore, exaggerate the effects of lead on cognitive development when they are present together. Lead is not the only example where the effects of environmental pollution are exacerbated by factors in the socio-economic environment. The effects of borderline nutrition on the immune system may increase vulnerability to complicate and prolong respiratory conditions caused by air pollution.

5. Children can serve as "canaries", because of their sensitivity to the environment and because their problems are of disproportionate importance in the long term.

In Central and Eastern Europe environmental health problems among children have come to the fore partly because greater attention is paid to the problems of children than those of adults.

With respect to some toxic pollutants, such as lead, significant toxicity occurs at much lower levels of exposure among children than among adults. In other cases, such as respiratory disease due to dust exposure, children not only experience the symptoms and diseases that adults do, but also experience threats to the normal development of the respiratory system itself.

We know that early childhood deprivation with regard to cognitive stimulation and nutrition has latent effects which will result in health problems during middle age. The limited evidence available to us suggests that the same pattern occurs where pollution-related exposures are involved. More than anything else, it is the vulnerability of young children during sensitive periods in their development, and the potential for negative long-term impacts on their health, competence, and well-being, which make their environmental health problems disproportionately important.

In heavily polluted communities, the impacts upon children can be astonishingly widespread. Between 1989 and 1993, we documented communities in Central and Eastern Europe where, by age 14, the average lung capacity of children was nearly one litre less than expected; others where more than half the children had neuro-behavioural dysfunction consistent with lead overexposure; and still others where the prevalence of low birth weight was 20% greater than elsewhere, or where only 18% of the children were completely normal on a clinical developmental screen. The protection of children during a period of political and economic transformation, and in a context of widespread environmental pollution, ought to be given high priority.

6. At the policy level, it is important to pay attention to measurement issues.

There are four principal measurement issues to be considered:

- A major obstacle to making an accurate assessment of the impact of environmental pollution on human health is the quality of evidence available to support claims of causation. Because of problems with the quality of evidence, a distinction has to be made between locations where an exposure is associated with a human health problem in a manner consistent with the results of well-designed epidemiologic studies conducted elsewhere in the world, and other locations in which the observed association had been caused by air pollution, which had not been well documented elsewhere). In Practice, it is difficult to validate this latter form of claim.
- This next point follows from the one above. Measurements which can answer "compared to what?" questions are of special importance. There are two principal types of such questions:
 - a. Are there known effects of a pollutant at given levels of exposure from studies elsewhere?
 - b. Can international comparisons be made? (*i.e.* are there data for international comparison which have been normed and validated?)
- Quality control in laboratories is a continuing problem in Central and Eastern Europe. The issues include hard currency costs of equipment, reagents, and maintenance, and assistance in becoming involved in quality control exercises.
- When all else is equal, environmental samples are superior to biological samples, because they are easier to obtain, and easier to use in evaluating population level exposures. There are, however, exceptions. One example is lead, which is measured with greatest validity in blood.

7. How can data be used, once generated and analysed, to set policy priorities?

Once generated and analysed, there are four legitimate roles for environmental health data in setting policy priorities. First, exposure data can be used, in conjunction with population and dose-effect information, to estimate the burden of morbidity and/or mortality associated with the exposure of interest. From a public health point of view, policy ought to give priority to those problems associated with the greatest burden of morbidity/mortality. In practice, there is usually a compromise between this factor and the feasibility of remedying the exposure. This leads to the second role of environmental health information, which is to serve as an important input into long-range economic and community planning. For instance, the problem of environmental lead underlines the importance of moving to unleaded gasoline, which is likely to occur sooner or later, but which the environmental health information makes more urgent.

Third, environmental health data should serve as a stimulus to inter-agency co-operation and priority-setting. Using the PEEP perspective, data organised and analysed along exposure pathways will show where the strengths and weaknesses of regulation and control are, and will therefore point to the agencies which need to collaborate in order to solve the problem. Finally, existing environmental health data can provide a guide to the forms of data which need to be routinely collected over time in order to determine whether identified problems are being solved and targets are being met.

8. What can be done when data is scarce?

There are two dangers which arise when decision-makers attempt to set environmental health policy in the absence of adequate data. The first danger is of devoting disproportionate resources to problems which, were they better evaluated, would prove to be unimportant. The second danger is that, in the absence of adequate data, nothing will be done at all. Of these, the latter is more insidious. In a context where there are numerous potential environmental health priorities, there is a need for an approach which helps minimise the risk of misapplying resources.

The approach begins with the old maxim “do not let the best be the enemy of the good”. Data which is not high enough quality for research purposes or for assigning causation *in toto* may well be good enough to determine, in a simple yes/no fashion, whether an environmental exposure is of public health significance. This is particularly true where the exposure in question has been adequately evaluated elsewhere. Under these conditions it is usually safe to assume that what has happened elsewhere is occurred the same way in the local context. There is no need to re-invent the wheel. For example, good dose-response information already exists relating respirable dust particles to various forms of respiratory morbidity. It is therefore possible, using a few justifiable simplifying assumptions, to use locally collected data on total suspended particulates to make estimates of the burden of respiratory morbidity and mortality, which is good enough for policy purposes.

When it comes to standards, guidelines, best practices, etc., it is best to borrow from jurisdictions that have already addressed the issue in question. In jurisdictions with limited resources, there is no justification for reinventing standards which have already been set elsewhere. To reset a standard means to make it more or less stringent. Best available technology will likely be geared to meet the standards already set elsewhere, thus trying to meet a more stringent standard will not be feasible in many cases. On the other hand, falling short of standards of neighbouring countries may lead to trade sanctions, or the perception that the country in question is open to dumping of outmoded technologies.

Finally, when there is doubt, the emphasis should be placed on environmental exposures which, if addressed, will meet more than one policy objective. Actions which both protect human health and lead to positive economic change are one example of this; actions which protect human health and safeguard species diversity are another.

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Using Data For The Hungarian National Environmental Health Action Programme

by Alán Pintér,
Johan Bela National Institute of Public Health, Budapest, Hungary

Following the recommendation of the 1994 Helsinki Ministerial Conference on Environment and Health in Europe, Hungary started to elaborate the Hungarian Environmental Health Action Programme (HEHAP). The process was facilitated by the "pilot project", in which six countries participated with the aim to develop the programme as soon as possible and to facilitate the effort of other countries if needed.

An expert committee was convened to review the situation on the most important fields of environmental health, which comprised air, water, noise, soil and wastes, the work environment, chemical safety, road traffic accidents, radiation safety, food safety, and the urban environment. Instruments to be used for planning and implementing the programme were also reviewed, including environmental health information systems, the role of local authorities and non-governmental associations, as well as the institutions involved in environmental health. The need for research, education and training was also emphasized in the programme.

It was clear from the beginning that the evaluation and start of the programme should be based on existing data. Hungary has a long history of collecting data on the quality of the environment and human health. However, data collection is distributed in different agencies, and responsibility is divided between authorities. This review gave an excellent opportunity to pinpoint and address the most crucial problems in the field of data collection and evaluation. Nevertheless, further improvement should be done on systematic data collection, ensuring data quality and general availability.

Health data

Demographic information, including mortality, is available at the Central Office of Statistics in the health statistics division. A more detailed analysis of mortality was made possible with the release of individual mortality data, which also served to cluster the analysis of the most important environmental-related mortality.

The most relevant health data for assessing the effect of the environment, namely data on morbidity, is unfortunately either not available or the quality of these data is questionable. In order to improve the assessment of environmental health, a core set of morbidity indicators has to be established.

Air quality

Emission data are collected yearly and the evaluation is based on voluntary admission, actual measurement data, and calculations that are based on used raw material. These data are difficult to obtain as the quality is questionable and hardly useful for the purpose of the HEHAP. However, measurements of *ambient concentrations* render more useful data: 388 samplers for analytical measurements are available nation-wide, and 31 real-time monitors provide data for air quality evaluation in the country. A priority list, based on the harmonized evaluation, has been established for ranking settlements and areas for air pollution. The tendencies include: a decrease of SO₂; a slow increase of No_x; and suspended particulates and ozone in several areas of the country.

Drinking water quality

Providing *safe drinking water* is the water works' responsibility. The quality is controlled periodically by the health authorities - about 110 000 samples are checked for chemical and biological quality. This database, along with data of water works, give a fairly good basis for an estimation of drinking water quality. An example of the rejection rate of drinking water is shown in table 1. Generally, the quality of drinking water from health hazard has improved. Disturbing factors are the increasing use of abandoned domestic wells, due to the high price of piped water. Surface waters are being sampled on 150 spots - the responsibility is shared between health, environment and water authorities. Databases are shared between the authorities and the same is valid for ground water quality. There are, however, many other areas needing further research in relation to human health.

Noise

Nuisances from noise are increasing in importance, especially traffic-related noise. The HEHAP will therefore concentrate on this matter, and in the Action Programme, a high priority will be to establish overall measurements of traffic-related noise since they do not already exist. It is scheduled that a nationwide survey will be launched to map the most important noise spots for remedy.

Soil quality and wastes

This area is highly relevant to human health with regard to long-term consequences. The Hungarian government started a programme to assess the highly contaminated areas, which might also be hazardous to human health. An inventory of highly contaminated areas has been prepared and further attempts are being made for assessing other waste dumping sites. The available data are useful for assessing the situation; however, more specific indicators should be developed for monitoring improvement.

Chemical safety

Chemical safety issues became highly relevant especially after the Rio Conference, where clear evidence showed the health effects of relaxed control on chemical substances. Increasing pollution of the environment with intentional and unintentional contamination raises questions of responsibility. Although chemical safety exceeds the framework of HEHAP, a good collaboration is being established between different areas working on chemical safety. Following the recommendation of the International Programme on Chemical Safety, a National Profile on Chemical Safety of Hungary was established. This document serves the goals of risk reduction within the field of chemical safety.

Road traffic safety

Although the Ministry of Transport, Communication and Water launched a National Programme, the number of accidents and casualties from road traffic make road traffic safety a high priority. Indeed, due to the dimension of the problem, concerted actions are being developed to cut down the number of road traffic accidents. Data, which are available from national records and police actions, clearly show a positive correlation between police intervention and the decrease of the number of accidents (Fig. 1). These indicators are useful for monitoring action as well as possible improvement.

Food safety

In Hungary, data on chemical and microbiological contamination of food show that food contamination is a real problem which deserves attention. Microbiological contamination, especially Salmonellosis (similar to many European countries) is increasing in number and severity. Chemical contamination is still a minor problem; however, an increase in imported food from questionable origins, raises the risk of contamination. Data are available from the agricultural sector, the quality of which is satisfactory.

Radiation safety

In Hungary, radiation safety is one of the best controlled areas among environmental hazards. The National Radiation Control Network (OKSER) is effective in analysing the level of ionising radiation in the environment. Furthermore, an effective system of monitoring medical exposure, which is in operation, is incorporated in an international network. Recent development of cytogenetic monitoring of exposed populations gave a further boost to health risk assessment of ionising radiation.

Studies on non-ionising radiations (UV, EMF, etc.) Has been started only recently. Data on this area are available and valid, thus highly suitable for monitoring radiation safety.

Urban environment

Indicators for the effects of urban environment on human health are not readily available. Housing and characteristics of commodities for comfort are important, which is why these indicators should be given more emphasis.

Socio-economic indicators

Although not considered as immediate environmental indicators, human health is heavily influenced by socio-economic factors. In this respect, hardly any data are available, which could effectively be used for assessing human health effects. It is clear that further data collection analysis is needed in this area.

In summary, the current available data could be used for assessing the general situation on the most important areas of environmental health in Hungary. However, more specific and informative indicators should be selected and collected for monitoring the effect of the implementation and for following the trend of changes both in the environment and in health.

Part III

Indicators to Monitor NEAP and NEHAP Progress

Monitoring Progress Towards Environmental Health Objectives

by J.A. Bakkes, E. Lebret, A.E.M. de Hollander

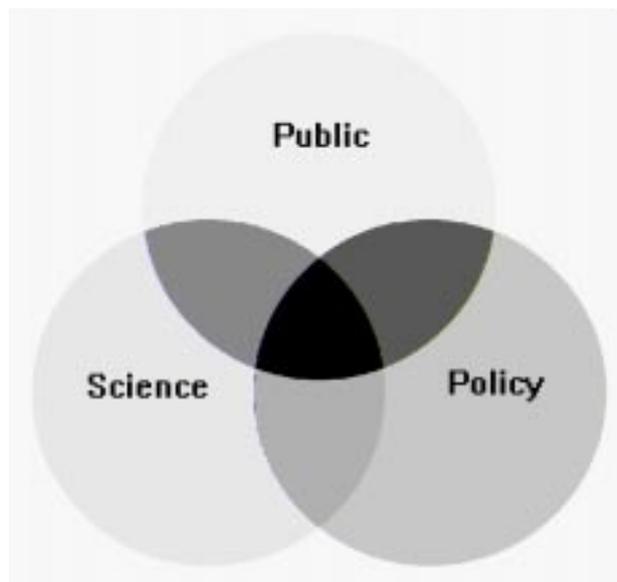
National Institute of Public Health and the Environment (RIVM), The Netherlands

This is a summary of a presentation at the Workshop on Environmental and Health Information to Support National Environmental Action Programmes (NEAPs) and National Environmental Health Action Programmes (NEHAPs), which was held on 22 and 23 May, 1997 in Budapest. The presentation aims to give an overview of possibilities and limitations to monitor the success of environmental health policies.

Progress towards what?

The general public, the scientific community and policy makers each have their own perspective and set of definitions, beliefs and values of environmental health issues. Although a substantial overlap exists between these groups, the set of shared definitions, beliefs and values is limited, as depicted in Figure 1. Environmental health objectives can relate to these three domains, separately or in combination. Ideally, the set of indicators of choice and related objectives should be meaningful and appealing to each of these groups. A balanced core set of indicators (with associated goals) should therefore contain indicators that describe: (a) environmental quality; (b) the public health status of populations with respect to pollution-related diseases; and (c) risk perception. In this set, environment quality needs to be translated into public health risks; the population health status needs to be attributed to environmental exposures; and aspects of the acceptability of environmental health risks should be in accordance with public beliefs and risk perception to provide political support. Monitoring of progress towards environmental health objectives should be designed with these three aspects in mind.

Figure 1. The Overlap in Definitions, beliefs and values about environmental health issues among policy makers, scientists and public



Using health outcomes for evaluating progress traditionally means using indicators based on mortality. Life expectancy at birth is a classical indicator; mortality risk is another. Although such data is readily available in most countries, it is difficult to attribute poor life expectancy to the different health determinants. Moreover, mortality based indicators are not appropriate in another important test: the maximum improvement in overall countrywide health outcome that can be achieved by removing environmental pressure is rather limited. That is, in a contemporary European context, where the burden of infectious diseases has since long been reduced and where access to food has been secured. Or historically speaking, environmental policy has not improved longevity notably in recent decades. It has, however, improved other important aspects of public health such as effects on non-lethal endpoints, e.g. morbidity, absenteeism, medication use, organ function and annoyance reactions.

Environmental policy is only one of many health determinants (c.f. figure 2). Generally, other determinants - such as socio-economic status (education, income), lifestyle, smoking, nutrition, occupation, health care provision, etc. - are dominant, especially when evaluated in terms of mortality. This has been elaborated in a systems analysis for the National Public Health Outlooks of the Netherlands. This is not to say that environmental factors have no effect on longevity at all, but improvement in health determinants that have been subject to environmental policy, such as carcinogens, has only had a modest effect on longevity. Of a few determinants, such as ozone and particulate matter, improvement could in theory have a distinguishable effect on mortality based indicators. But then the question is how much improvement can realistically be expected in view of (a) effective environmental policies and (b) the relative contribution of these determinants. Therefore, even for particulate matter and ozone, a monitoring system that is built, by design, on mortality indicators could only report frustratingly little progress.

Striking spatial differences in health outcomes can be observed in Central and Eastern Europe, often coinciding with differences in environmental pressure on health. However, these differences also frequently coincide with differences in the other (often dominant) health determinants, mentioned earlier. Thus, as the above systems analysis illustrates, environmental differences may not be the most important factor causing health differences. Differences in the population's strategy to cope with pressures can be more important, and the situation is probably too complex to approach it with linear causality. Therefore, monitoring of mortality in itself does not provide much of an answer for progress of environmental policy.

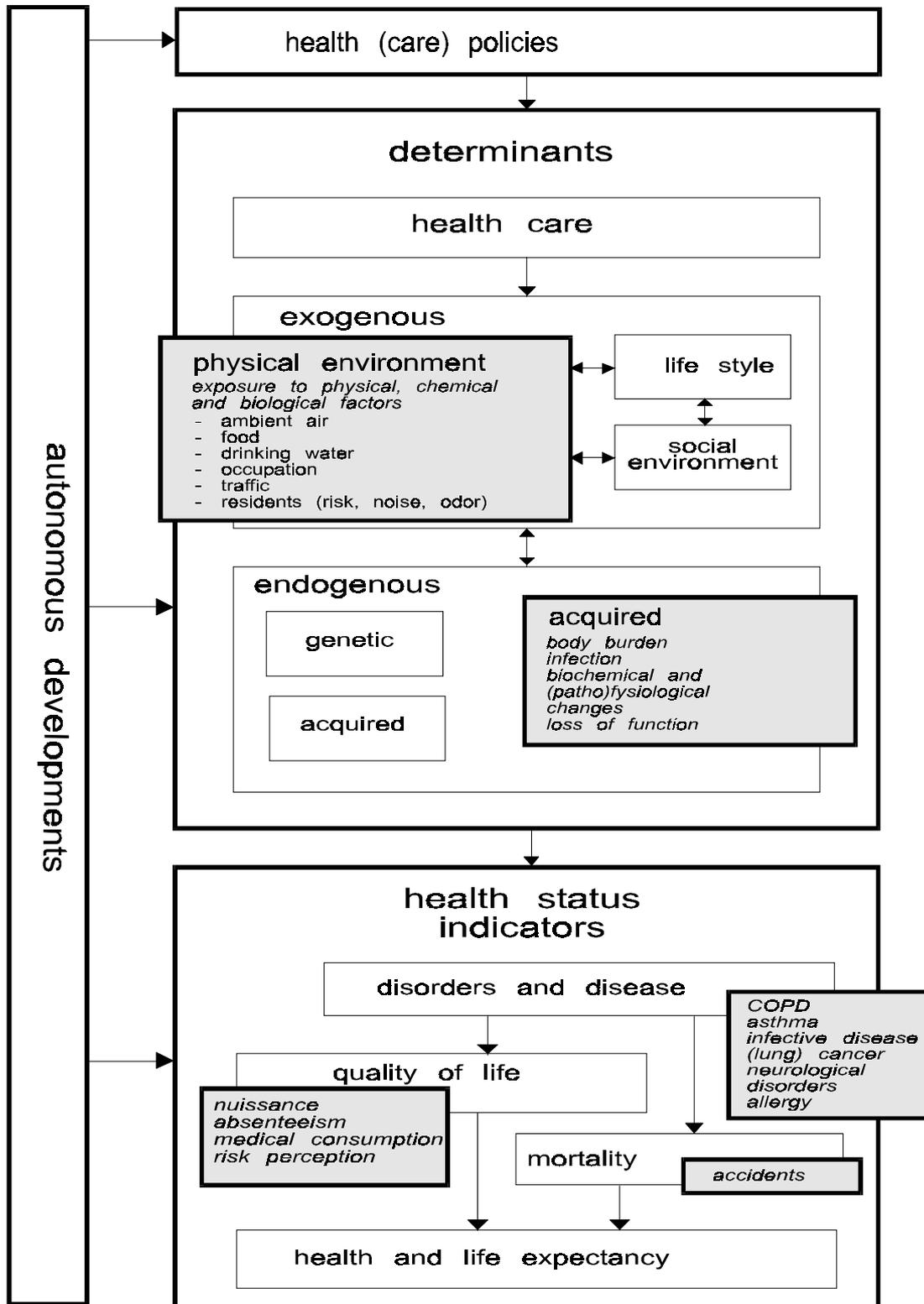
In conclusion, mortality based indicators are no longer suitable for monitoring progress towards environmental health objectives in Europe.

Health-based indicators

Based upon the WHO definition of health, or simply describing health as the ability to function well physically, mentally, and socially, it is clear that health is more than mortality and life expectancy. This is also attested by the health status indicators in Figure 2, which describe aspects of quality of life. The variety of health status indicators can be aggregated to a Disability-adjusted-life-years, or expectancy (DALY, or DALE) to describe the overall burden of disease on the population. (Murray, in World Bank 1993). When this indicator can be attributed to the various health determinants, effects of health determinants with different endpoints (including death) can be compared by weighing together the resulting disability and the age at which it occurs.

Compared to the mortality-based indicator, a superior criterion is the burden of environment related diseases. It focuses on the narrow topical area where there are health effects or risks that are indeed related to environmental factors.

Figure 2 Health status indicators



This indicator has been applied for The Netherlands, revealing sets of priority issues that markedly differ from schemes that only use mortality risk as an indicator. For example, the analysis reveals a higher impact from noise than from the short-term effects of suspended particulate matter, when overall aggregated disease burden is used instead of using only fatal effects (excluding the less well understood long term effects.) Exposure to higher environmental noise levels, which is not only widespread in the population but almost life-long, explains the associated health loss. In contrast, excess daily mortality caused by high suspended particulate matter levels is largely concentrated within the elder population with pre-existing diseases, therefore without much loss of healthy life years.

Loss of healthy life expectancy is one of the best general indicators for monitoring the effect of environmental health policy. It requires that one knows the exposure-response relation and is able to monitor the exposure distribution. It also requires that levels and changes can be related to policy. (Compare the above systems analysis).

Environmental determinants as indicators

If a specific relation between policies and health outcomes cannot be established quantitatively, the second best type of indicators is based on monitoring the related environmental pressures on health. For some determinants, this is feasible, for example, noise or dioxins. For other determinants, this does not work as well, e.g. suspended particulates, diffuse sources or mixtures, such as PCBs.

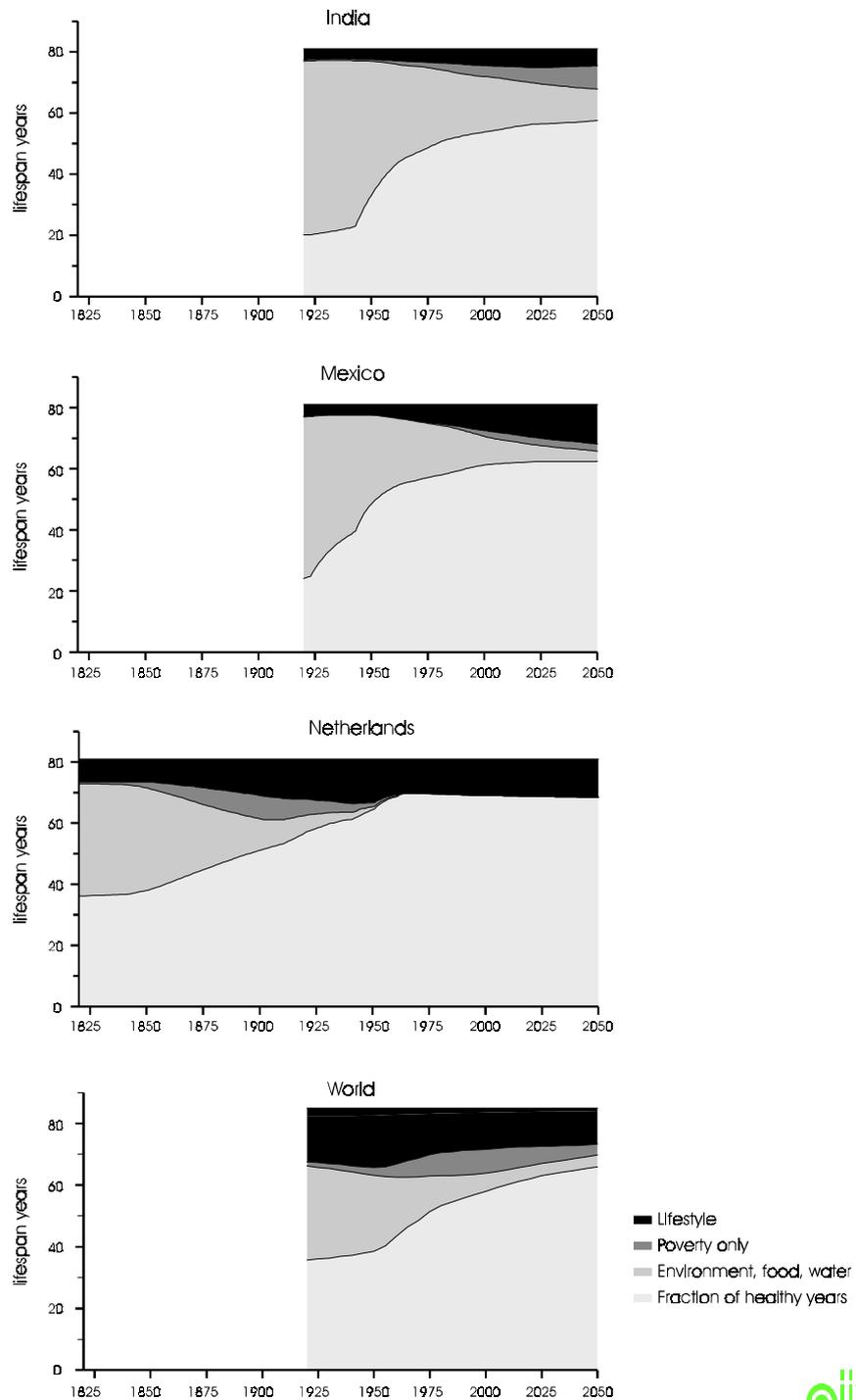
Setting health-based targets is a requirement, after which the simplest indicator is distance-to-target. Examples of relevant issues can be found among the principal environmental priorities and goals as listed in NEAPs, NEHAPs and similar documents. However, most of these targets are phrased in terms of reduction of emissions, clean-up, or modernisation of installations. In order to construe indicators for evaluating progress towards environmental health, health-based targets in terms of environmental quality need to be derived.

A number of limitations apply:

1. this approach only works with health-based quality guidelines. The target level should be toxicologically and/or epidemiologically meaningful. For example, this excludes targets based on analytical detection limits, as is sometimes the case for pesticides. Targets based on detection limit may have an intrinsic value, but will not indicate health risks.
2. this approach supplies information on a selective group of environmental pressures; monitoring these pressures only is not sufficient to evaluate Environmental Action Plans in total.
3. this is a somewhat indirect approach. Even with health-based targets, it is difficult to gauge the impact on public health when targets are exceeded. One of the reasons for this is that targets often comprise substantial safety/uncertainty margins. Therefore, exceeding the target does not necessarily mean that the exposed population's health is affected. Furthermore, health-based targets for non-threshold pollutants always involve a certain amount of risk when exposures are above zero. In this case, the overall health impact on the population is determined more by the many with moderate exposure rather than the few with high exposure.

In conclusion, a monitoring scheme based on the distance-to-target approach needs other components as well. This is the subject of the final section.

Past and projected Disability Adjusted Life Expectancy years (DALEs)



Risk perception of environmental health within the population

Clear ideas on risks of environmental exposures usually exist within the population. These perceptions often deviate from opinions of risk assessors or risk managers. In many instances, this has to do not with a different estimate on the risk level but rather with the acceptability of the risk. Acceptability of risk is determined by aspects of personal and social benefits of the risky activity, degree of personal control, familiarity and reversibility of effects, dread (e.g. of cancer), trust in authorities, etc. Risk perceptions and public priorities are relatively easy to assess when using questionnaires, (stakeholder) interviews and focus group discussions.

Components of progress monitoring

A system of progress monitoring that recognises the perspectives of policy, science and the public, and that incorporates environment quality indicators, pollution-related disease burden, as well as indicators of risk perception indicators, can be envisaged. Such a system should be composed of the following elements:

1. A periodic comprehensive assessment of environment-related health outcomes, for example, every five years. To reduce the multi-dimensionality of different health endpoints, as caused by different pollutants from various, this should preferably be based on healthy life expectancy to the degree possible.
2. Regular monitoring on the basis of environmental pressures on health.
3. Assessment of the public's perceived health, environmentally induced annoyance and public concern about health-related environmental issues. In countries or areas where public concern with environmental health is an issue in its own right, it is advisable to monitor directly how well environmental health policies are doing in the public's view. This would provide an important signal to policy makers in addition to either health-based or environment-based indicators.
4. Periodic review (monitoring and assessment) of scientific literature on environmental health. This should focus on any changes in ideas on exposure-response relations.
5. Statistical data collection, analysis and assessment of health registries, as an additional input into a periodic reality check, whether or not the monitoring is still focused on the most important parameters. This may signal emerging new environmental health issues (e.g. the issues of allergies), and is generally a way "to keep the finger to the pulse".

The latter two items are meant to contribute to indicator quality in a balanced way. In order to provide decision makers and their constituency with the right and reliable signals, construct validity and data quality are equally important.

Programme designers are probably more aware of data quality issues. This may indeed be a costly aspect. Data quality is determined by the whole processing chain from sampling or data capture to the eventual presentation of the indicator and the understanding by the audience.

The importance of up to date construct validity to the quality of the indicator is illustrated by the following three examples.

- The different interpretation that has been given to cholesterol measurements as it was understood how the various types of cholesterol affect health.
- The opposition launched by Dr. Ames since the late eighties against consequences of outdated legal interpretation of the mutagenic test that bears his own name. The test has been incorporated in rules and regulations since the seventies.
- Present research efforts to identify more narrowly the active component of fine particulate matter that can be inhaled.

Conclusions

The system of progress monitoring should clearly outline the relevant indicators from the conceptual construct that forms the basis of its components (e.g. in a way like in figure 2). It should state the objectives or targets for each indicator. Furthermore, the functionality of the monitoring instruments should be defined at the outset, e.g. should the system be able to detect changes of 10 %, 25, 50 or 100 % in environmental pressures, pollution-related disease burden, or risk perception prevalences. Finally, in addition to the conceptual model, a set of operational models are essential elements of the monitoring system, since modelling is a crucial step in the translation of environmental pressures to population exposures and resulting health effects, as well as in the derivation of disease burden for different pollutants and attribution to pollutant sources.

The Baltic Environmental Indicator Set

by Kristina Veidemane
Baltic Environmental Forum

In 1996 and 1997 Environment officials of Estonia, Latvia and Lithuania worked together to identify a set of common Baltic environmental indicators. The Baltic Environmental Forum co-ordinated this work and organised the series of workshops where the indicator set was discussed and prepared (the Baltic Environmental Forum, based in Riga, supports the exchange of environmental information and experience between the three Baltic States, in particular for the development of National Environmental Strategies and National Environmental Action Programmes - the Forum is funded largely by the European Commission).

The Baltic indicator set follows the pressure-state-response framework of the OECD environmental indicators. (See the table on the following page. Please note that, for the indicators in italics, data is not available from at least one country). The Baltic Environmental Forum, together with the governments of the three Baltic States, is preparing a Baltic State of the Environment Report using Baltic indicator set. A technical report was issued in October 1997. A report for the broader public will be presented at the June 1998 Århus *Environment for Europe* Ministerial Conference.

BALTIC ENVIRONMENTAL INDICATORS

ISSUE/PROBLEM	PRESSURE INDICATORS	STATE INDICATORS	RESPONSE INDICATORS
urban air quality	SO ₂ emissions from stationary sources (t/y)	SO ₂ concentration (µ/m ³)	
	total NO _x emissions includ. mobile sources (t/y)	NO _x concentration (µ/m ³)	
	dust emissions from stationary sources (t/y)	<i>dust concentration (µ/m³)</i>	
eutrofication	total N emissions from point sources (t/y)	total N concentrations in rivers (mg/l)	<i>inhabitants connected to centralised sewage system (% of total number of inhabitants)</i>
	total P emissions from point sources (t/y)	total P concentrations in rivers (mg/l)	
	BOD emissions from point sources (t/y)	BOD ₇ concentrations in rivers (mg/l)	
	livestock ("animal units")		
	<i>consumption of mineral fertilisers (t/y)</i>		
groundwater		<i>NO₃ concentration (% of cases where concentration exceeds the standards)</i>	
	groundwater abstraction (m ³ /y)		
waste	disposal of municipal waste (m ³ /y)	-----	<i>recycling (% of total waste)</i>
	<i>generation of industrial waste (t/y)</i>		
	<i>generation of hazardous waste (t/y)</i>		
landscape / biodiversity	sown area (% of total area)		protected areas (% of total area)
	<i>area of urban land (% of total area)</i>		
	area of mining activities (% of total area)		
	road density (length/100km ²)		
		threatened species (% of total species)	protected species (% of total species)
	abundance of top predators (number/10 th. km ²)		
renewable resources: • <i>water</i> <i>drinking water</i>	water abstraction (m ³ /y)	hydrological balance (% of available water resources)	state investment into water management (US\$/y)
		drinking water quality (% of samples bacteriological standard are not met)	
• <i>forest; timber</i>	total felling (m ³ /y) and (% of increment of growth /y)	growing stock (m ³)	reforestation (ha/y)
	final felling area (ha/y)		
		mature forest (% in growing stock)	
• <i>fish</i>	fish catch (t/y)	state of fish stock (good, fair, low)	quotas (t/y)
• <i>peat</i>	peat cutting (t/y)	mineable peat deposits (t) and areas (% of total bog area)	protected bogs (% of total bog area)
			cutting fee (US\$/y)

Part IV
Using Economic Data and Indicators

The Economic Valuation of Health Impacts

by John A. Dixon

The World Bank

There is no denying that air and water pollution lead to serious negative impacts on health and various economic goods and services. The physical evidence is compelling. The valuation of these impacts, however, has frequently been ignored because it was thought that either:

- a) it is too difficult to establish direct cause-effect relationships, or
- b) placing monetary values on those effects, either health or productivity, was not feasible.

Nevertheless, recent advances in our understanding of these links, and progress in the art of valuation (the placing of monetary values on environmental effects), have demonstrated that much can be done.

This awareness has in turn led to increased use of environmental data and statistics to assess these impacts from pollution and to use this information in setting priorities in both NEAPs and NEHAPs.

Why are economic data important?

The use of data and its economic analysis are important for several reasons:

- To compare benefits and costs. Although we would like to live in a world with perfectly clean air and water, the costs of reaching this goal is beyond most countries. This means comparing the expected benefits of competing investments with the costs of each. Economic analysis, in the form of either benefit-cost analysis or, where benefits cannot be measured (or are not measured), the use of cost-effectiveness analysis, allows one to compare the benefits and costs of alternative projects and programmes.
- To set priorities. If one can compute the expected benefits of different actions, and then one compares this to the costs of each action, this information is a critical aid to setting priorities for action. The benefit of an analysis and the use of quantitative (and, in some cases, qualitative) results is that it helps societies make more rational decisions on allocating scarce financial resources. Public perception of comparative risks or comparative damage from different environmental problems may be significantly inaccurate. Sometimes, the problem that receives the most attention may in fact be a relatively minor problem compared to other issues. Economic analysis can help set priorities rationally, and help ensure the effective use of scarce resources.
- To get the attention of decision makers. Decision makers, especially those in the Finance and Planning Ministries, often respond better to quantitative analyses of alternative, competing investments. The use of numbers can indicate when the health impacts of certain environmental problems are large and can be addressed in a cost-effective manner. To merely say, when asked how important is a specific environmentally-related health threat, "It is very important!" is usually less persuasive than being able to quantify the numbers of people adversely affected, the health outcomes, and the costs associated with these outcomes.

The major economic impacts of pollution

Urban and rural pollution affect many things that we care about. Four sets of impacts are most important:

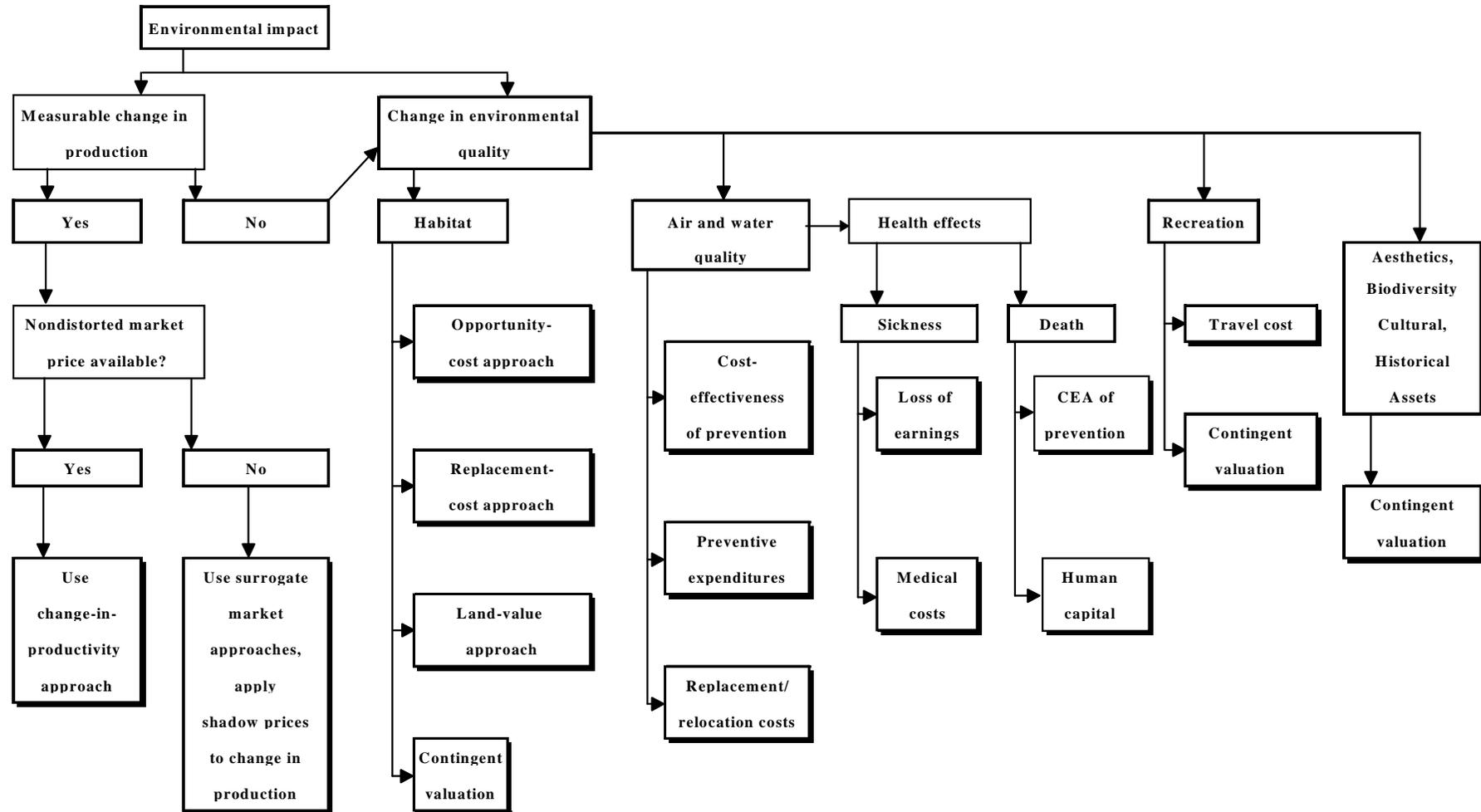
- health impacts are the most important and the ones that receive the most attention. Also, it is often easier to estimate economic costs of health outcomes; this information is useful in getting the attention of decision makers.
- productivity impacts are often also very important and can be estimated fairly easily. If individuals or firms need to install special equipment or take special measures to protect themselves from pollution, these are measurable economic costs. If polluted air or water reduces the productivity of natural systems (crop or fishery production, for example), these are additional productivity costs. Also, in some situations, pollution (especially air pollution) may be so critical that industries are closed or transportation is restricted. Both of these steps impose important economic and social costs on society.
- ecosystem impacts may also occur when such things as underground aquifers are contaminated, or vegetative areas die due to pollution. Ecosystem impacts are harder to measure and value, and the true impact may not be felt for many years. Often they are included in a qualitative manner.
- aesthetic impacts are the last, but not the least, of urban pollution impacts. People feel "hurt" if they live in a polluted environment, which results in a loss of social welfare. Both rich and poor have a "willingness to pay" for a cleaner environment, but for the poor, low income levels do not allow them to take effective counter measures. Richer people have a larger ability to pay for an improved aesthetic environment.

Given the primary concern with human well-being, we will focus on the valuation of health impacts. This does not mean, however, that the other impacts are of secondary importance -- merely that we need to focus initial attention on health impacts since they are often large and measurable, and they can be valued.

The problem of valuation

Rapid progress in the economic "art" of valuation means that many environmental impacts can now be valued and placed within the framework of a more traditional economic analysis. Figure 1 presents a flow chart of valuation methodologies and offers guidance of which approaches are likely to be most useful when dealing with pollution impacts.

Figure 1. A Simple Valuation Flowchart
(Dixon et al., 1994)



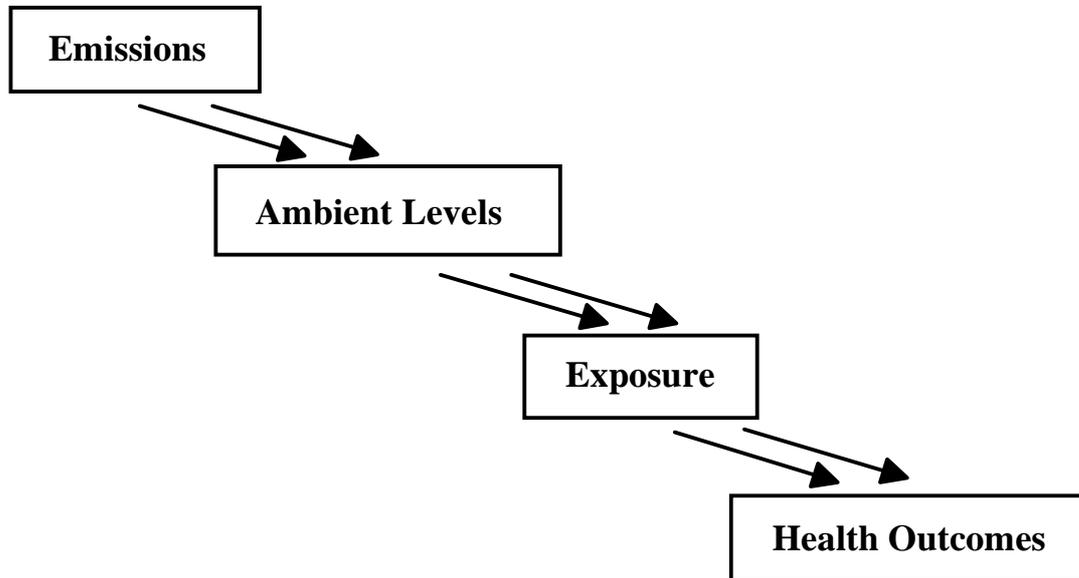
In general, the more direct and immediate the impact, the easier it is to identify monetary values. Health and productivity effects are in this category. More difficult to value are ecosystem and aesthetic impacts, although much can be done here also. (The use of various contingent valuation methods (CVM) based on the asking of hypothetical questions has expanded what is possible in identifying values for ecosystem or aesthetic impacts).

Focus on health effects

As mentioned earlier, we will focus on health impacts and those that are immediately visible, that is, those cases where the cause-effect link is clearest. Many water borne diseases are of this type as well as a number of acute air-related illnesses. This is not to say that long term, chronic impacts are not important. Rather, it is usually best to start with the most direct, easiest to quantify impacts, and then expand the analysis as time, resources, and data permit.

In urban areas, a fundamental question is whether air pollution is more damaging to health than water pollution. This will depend on the situation in each locale and the existence of mitigative measures or coping strategies. For example, two cities may have an equally serious water pollution problem with surface waters heavily contaminated with sewage and industrial waste. One city may have an effective system of potable water supply and have little water-related illness; the other may not, and the population is thus exposed to contaminated water resulting with a heavy burden of disease.

The causal sequence of disease transmission is thus very important. As seen in Figure 2, the analyst must clearly understand the link from emissions to ambient levels to exposure to health outcomes. Regulations often focus at the emissions stage, but what we are really concerned about are health outcomes and the resulting impacts on human welfare. The causal sequence is always important to deliberate when considering alternative actions.

Figure 2. The Causal Chain

For example, climatic conditions may mean that even if levels of pollutant emissions are high when measured at the stack or at the point of liquid waste disposal, they may have little or no health impact since ambient levels of pollutants (in the air or water) may be low. Or, as is often true for water, even high ambient levels of water pollution may not result in health effects if people can protect themselves from exposure by using treatment (e.g. boiling, filtering) or alternative sources of water (e.g. bottled water, private wells). Physical pollution and elevated ambient pollution levels do not necessarily translate into health impacts.

However, protection from air pollution becomes more difficult if ambient pollution levels are high. Only a careful epidemiological analysis will determine if the pollution is a real problem or not, and the economic analysis can help determine the monetary value of some of these impacts on health, productivity, ecosystems, and aesthetics. Such an analysis was done in Santiago, Chile, which clearly demonstrated that, although both air and water were polluted, the health impacts of air pollution were much higher than from water pollution. These results indicated that air pollution control in Santiago was expected to yield much higher benefits per dollar invested than similar investments in water pollution.

Examples

Several examples were given at the Budapest Workshop of the application of this approach to urban pollution problems -- for example, in Jakarta, Santiago, and several cities in Russia. When water pollution is an issue, epidemiological studies are necessary to determine cause-effect links between contaminated water and disease. In the case of air pollution, the approach used here relies on the use of dose-response relationships that links changes in levels of ambient pollution to changes in health outcomes for various diseases.

The Jakarta case is given in the Addendum (reproduced from Dixon, et al. 1995) and illustrates the application of the approach in the case of air pollution. Basically, this consists of identifying existing levels of ambient air pollution, examining various technical options to reduce those levels, calculating the population exposed to the changed levels and then estimating health outcomes on the basis of dose-response relationships (Figure 3). In the case of Jakarta, it was found that the health benefits of reducing particulate pollution to the Indonesian standards included 1 200 fewer premature deaths per year, 40 600 fewer emergency room visits, and 6.3 million fewer restricted activity days among other benefits (see Addendum Table 2).

Figure 3. Valuing Health Outcomes of Changes in Air Pollution Jakarta, Indonesia

- measure TSP levels
- estimate population exposed
- use dose-response relationships to estimate health outcomes
- examine costs of mortality and morbidity

While the Jakarta study did not place monetary values on the health outcomes projected to occur from reducing ambient pollution levels (although it could be done fairly easily), in a similar study in Chile, Eskeland and colleagues estimated the economic savings from reduced health care costs if particulate pollution were reduced in Santiago (Eskeland, 1994; Ostro et al. 1996.). As seen in Table 1 the overall benefit-cost ratio of the control strategy was 1.7 -- that is, the present value of benefits exceeded the present value of control costs by 70 per cent. Some components of the control strategy were more cost-effective than others (i.e. had a higher B/C Ratio -- as for control of pollution from fixed-sources or gasoline vehicles), but all components of the control strategy had a B/C ratio of more than 1. Moreover, it should be noted that the benefit estimate is a lower bound estimate since it only includes benefits from reduced particulate emissions and only values health benefits -- productivity, ecosystem, and aesthetic benefits are not included.

**Table 1. Comparing Benefits and Costs
Santiago, Chile (Eskeland, 1994)**

(US\$ millions)

Pollution Source	Benefits	Costs	B/C Ratio
Fixed Sources	27	12	2.4
Gasoline Vehicles	33	14	2.4
Buses	37	30	1.2
Trucks	8	4	1.8
Control Strategy	105	60	1.7

The actual economic analysis of health effects does not need to be complicated. In fact, most of the work involved is the estimating of exposure levels and the changes in health outcomes. Once these health outcomes are identified and quantified, a number of approaches can be used to assign economic values. For sickness (morbidity), the most commonly used approaches rely on information on loss of earnings and medical care costs (see Figure 1 and the Annex Box). Local data on these costs can be easily collected (as was done in Santiago and Russia), and can also be presented to decision makers to get their attention on economic and social costs of pollution.

For death (mortality), the problem of valuation is more complicated. No good technique exists -- information on the cost-effectiveness (CEA) of preventing deaths is useful but says nothing about the value of a life. When the cost of preventing an excess in death is low -- e.g. a few hundred or a few thousand (or tens of thousands) of dollars -- there is no need to go further with the analysis. The investment or action obviously makes sense, but when an action (i.e. asbestos removal from some manufacturing processes) may cost millions of dollars per life saved, is it a good investment? The answer, of course is "it depends" -- it depends on the value of a life saved, and alternative actions that can reduce premature death and total available resources. Hence the question of "value" of life cannot be ignored.

One widely known approach to estimate the "value" of a human life is the human capital approach. This approach is based on foregone earnings and treats a life as a piece of productive capital and estimates the production lost from premature death. This approach is full of methodological and moral problems, and should probably be avoided. We prefer another approach based on information on the willingness to pay of individuals to avoid premature death. These so-called willingness to pay measures are based on both contingent valuation approaches (using survey questions to determine values) and other available data (such as observing the "risk premium" individuals demand to do riskier jobs) and yield estimates of the value of a statistical life. Note that a statistical life is not any individual person's life, it represents the change in premature mortality across a population from any given cause. In addition, willingness to pay measures reflect the whole range of costs associated with premature death -- loss of production (as in the human capital approach), suffering, losses imposed on other family members and society, and all complex attributes associated with a human life.

These willingness to pay estimates are much higher, on average, than those derived from the human capital approach. In the United States, for example, the values used for a statistical life average several million dollars, with a commonly used value of about \$3 million.

In the economic analysis of pollution related health costs, we recommend that values for morbidity be quantified and expressed in monetary terms, and that in general, values for mortality be presented qualitatively (numbers of deaths involved or avoided) or that a cost-effectiveness of prevention approach be used. The Jakarta study used this approach. In Santiago, a modified human capital approach was used to place some value on premature deaths. It is possible, however, to combine "apples and oranges" in the analysis and present some health outcomes in monetary terms (e.g. for sickness) and others in non-monetary terms (e.g. deaths).

In sum, the economic valuation of health impacts from pollution is a rapidly evolving field that demonstrates the potential for using economic analysis of health outcomes to help identify priority environmental problems, and efficiently target investments in pollution control. After the hard work of estimating expected changes in health status of a population associated with changing pollution exposure is completed, the economic valuation of these health outcomes can begin. The valuation of morbidity effects is fairly direct (at least for lost production and health care costs), but premature mortality poses difficult analytical and moral issues and has to be handled carefully. The rapidly expanding literature in this area illustrates much of what can be done, both in developed and developing countries.

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Addendum:

Estimating the Health Impact of Air Pollution: Methodology and an Application to Jakarta¹

This case study presents an illustration of the use of one increasingly accepted methodology - the damage function approach using dose-response relationships - to estimate the health impacts of air pollution reduction. Additional information can then be used to place monetary values on these health effects - by either using the cost-of-illness approach to estimate monetary values of reduced illness (morbidity) or, in the case of death, estimates usually based on willingness-to-pay to reduce premature mortality.

Dose-response relationships are functions mostly based on data from the US, Canada, and the United Kingdom that relate information on changes in ambient air quality for different pollutants to different health outcomes. The principle is that changes in ambient air pollution levels for certain pollutants can be statistically related to observed changes in morbidity (sickness) and mortality (death) in a population. Through regression analysis, coefficients are estimated that are then multiplied by changes in ambient pollution concentrations and the population exposed. Most of this work has previously been done in Europe and the US and this case study shows an application of the approach to Jakarta (Ostro, 1994).

The estimated health impact can be estimated by the following relationship:

$$dH_i = b_i * POP_i * dA$$

where: dH_i = change in population risk of health effect i ;
 b_i = slope from the dose-response curve for health impact i ;
 POP_i = population at risk of health effect i ;
 dA = change in ambient air pollutant under consideration.

An Application To Jakarta

Jakarta, the capital of Indonesia, is located in the tropics just south of the equator. The population is between 8.2 to 9 million, and the city covers some 650 km². Air and water pollution are both major environmental problems. The results presented here focus on air pollution, particularly suspended particulate matter, often referred to as TSP (total suspended particulates) and the finer, more damaging, portion called PM10, or particles smaller than 10 microns in size. Pollution exposure is measured in various ways, often in terms of micrograms of TSP or PM10 per m³ of air. (One can convert directly from TSP to PM10: PM10 is about 55 percent of the total TSP; that is, a level of TSP of 100 micrograms/m³ is equal to PM10 measurement of 55 micrograms/m³).

¹ This Annex is excerpted with permission from Dixon, *Economic Analysis of Environmental Impacts*, Earthscan Publications Ltd, London 1994

This study uses dose-response functions estimated in developed countries since none were available for local conditions in Jakarta. It is implicitly assumed, therefore, that the relationship between the levels of air pollution and subsequent health effects in the developed countries can be extrapolated to estimate the health impacts in Jakarta. It is recognized that there are significant differences between developed country and Indonesian populations in baseline health status, access to health care, demographics, and occupational exposures, among other factors. It is therefore likely that the model will under-estimate the health effects for Indonesia.

In the study, dose-response functions have been identified and adapted from the available literature (see Ostro, 1994, for details on the background studies). Since there are variations in the coefficients estimated by the various studies, three alternative assumptions about health effects are presented, with the central estimate being given the most weight. High (low) end estimates are calculated by increasing (decreasing) the coefficient by one estimated standard deviation.

Available epidemiological studies relate concentrations of ambient particulate matter and several adverse health outcomes including mortality, respiratory hospital admissions, emergency room visits, restricted activity days for adults, respiratory illness for children, asthma attacks and chronic disease. TSP is the measure particulates most commonly used in Indonesia. Therefore all dose response functions were adapted to be used with TSP concentrations.

Estimates were made of the benefits of reducing TSP levels from present levels in Jakarta (ranging from less than 100 to over 350mg/m³ in certain parts of the city, to both the Indonesian standard (90mg/m³) and the midpoint of the WHO guidelines (75 mg/m³). In each case the estimates were based on information on population exposed to different levels of pollution. (This information is based on census data on population density and the results of citywide information on emissions and air quality monitoring and the use of a dispersion model.)

Mortality

Premature mortality is a major problem associated with high levels of particulates. Based on a survey of the literature, a central estimate of the change in 'all-cause mortality' associated with a change in PM10 can be expressed as follows:

Central percentage change in mortality = 0.096 * change in PM10 with upper and lower estimates having coefficients of 0.130 and 0.062, respectively. The central estimate of the number of cases of premature mortality can be expressed as:

Change in mortality = 0.096 * change in PM10 * 1/100 * crude mortality rate * population exposed.

Assuming the crude mortality rate in Jakarta is 0.007, the range in changes in mortality (per person) is:

Upper estimate of change in mortality = $9.10 * 10^{-6} * \text{change in PM10}$

Central estimate of change in mortality = $6.72 * 10^{-6} * \text{change in PM10}$

Lower estimate of change in mortality = $4.47 * 10^{-6} * \text{change in PM10}$

For example, if average PM10 levels decreased by 10 micrograms per m³ for Jakarta, and if 5 million people were exposed to this reduction, the estimated health benefit would be 335 fewer cases of premature mortality per year:

$$6.72 * 10^{-6} \text{ (DRR coefficient)} * 10 \text{ (change in PM10)} * 5,000,000 \text{ (population)} = 335$$

Morbidity

A similar approach was also used to estimate the effects of changes in air quality on air pollution-related illnesses. In each case a dose-response relationship was identified and was linked to a discrete health outcome:

Respiratory Hospital Admissions (RHA). Based on Canadian and US studies, there is a statistically significant relationship between the incidence of hospital admissions due to respiratory diseases (RHA) and ambient sulphate and TSP levels. The following functions are suggested per 100,000 population:

$$\begin{aligned} \text{Upper change in RHA per 100,000} &= 1.56 * \text{change in PM10} \\ \text{Central change in RHA per 100,000} &= 1.20 * \text{change in PM10} \\ \text{Lower change in RHA per 100,000} &= 0.657 * \text{change in PM10} \end{aligned}$$

Emergency Room Visits (ERV). The relationship between emergency room visits (ERV) and TSP exposure based on US studies was adjusted by plus or minus one standard deviation from the central coefficient to generate high and low estimates for Jakarta:

$$\begin{aligned} \text{Upper change in ERV per 100,000} &= 34.25 * \text{annual change in PM10} \\ \text{Central change in ERV per 100,000} &= 23.54 * \text{annual change in PM10} \\ \text{Lower change in ERV per 100,000} &= 12.83 * \text{annual change in PM10} \end{aligned}$$

Restricted Activity Days (RAD). Restricted activity days (RAD) include days spent in bed, days missed from work, and other days when normal activities are restricted due to illness, even if medical attention is not required. Studies from the US suggest a statistically significant relationship between particulates of various sizes and RAD. After standardizing on PM10 the relationship between RAD and PM10 is estimated as follows (these estimates are applied to all adults):

$$\begin{aligned} \text{Upper change in RAD per person per year} &= 0.0903 * \text{change in PM10} \\ \text{Central change in RAD per person per year} &= 0.0575 * \text{change in PM10} \\ \text{Lower change in RAD per person per year} &= 0.0404 * \text{change in PM10} \end{aligned}$$

Lower Respiratory Illness in Children (LRI). US studies suggest the following relationship between the occurrence of chronic coughs, annual change in bronchitis and other respiratory diseases in children and PM10, adjusted for a number of variables including the incidence of bronchitis in children:

$$\begin{aligned} \text{Upper change in annual bronchitis} &= 0.00238 * \text{change in PM10} \\ \text{Central change in annual bronchitis} &= 0.00169 * \text{change in PM10} \\ \text{Lower change in annual bronchitis} &= 0.0008 * \text{change in PM10} \end{aligned}$$

This relationship is applied to the 34.7 percent of the population below the age of 18 in Jakarta.

Other estimates. Estimates were also made for a number of other air pollution-related illnesses. These included asthma attacks, respiratory symptoms, and chronic bronchitis. Annex Table 1 summarizes the dose-response estimates of the morbidity outcomes of changes in PM10 levels for all of these possible health outcomes, and presents the central estimate and the high-side estimate. Note that some of the effects are estimated per 100,000 people in the general population, while others are person or group specific (e.g. RAD per person, or asthma attacks per asthmatic).

Addendum Table 1 - Morbidity Effects of 10 microgram/m³ Change in PM10

Type of Morbidity	Central Estimate	High Estimate
RHA/100,000	12.0	15.6
ERV/100,000	235.4	342.5
RAD/person	0.575	0.903
LRI/child/per asthmatic	0.0169	0.0238
Asthma attacks/per asthmatic*	0.326	2.73
Respiratory symptoms/person	1.83	2.74
Chronic bronchitis/100,000	61.2	

* Applies to the 8.25% of the Indonesian population that is assumed asthmatic. High estimates are obtained by increasing the coefficient by one estimated standard deviation.

An Application of the Approach to Jakarta. When the coefficients listed in Addendum Table 1 were applied to Jakarta, Ostro was able to estimate health impacts associated with decreasing particulate levels to both the Indonesian standards (90 micrograms/m³) and WHO standards (about 75 micrograms/m³). In 1989 many parts of the city had levels between 100 and 200, and 'hot spots' with readings of 300 or 350 were common. Addendum Table 2 presents the health benefits of reducing particulate matter to the Indonesian standard (90 micrograms per m³). (Meeting the more stringent WHO standards would produce even larger benefits, of course, but would cost more to achieve).

The numbers of lives saved and illnesses avoided are impressive. Using the central or medium estimate of the dose-response relationships, Ostro estimated that each year in Jakarta the benefits from reducing particulates to Indonesian standards include 1,200 premature deaths avoided, 2,000 fewer hospital admissions, 40,600 saved emergency room visits, and over 6 million fewer restricted activity days, among other benefits for the population of 8.2 million.

Achieving Indonesian TSP standards will not be easy, however, and would involve major investments. To estimate which investments and control options should be undertaken, the policymaker would ideally like to compare the benefits to the costs. The benefits are largely due to health costs that are avoided, and a decrease in premature deaths. Placing monetary values on premature death or small changes in risks of mortality is very difficult, although estimating the cost of illness is easier (for a discussion of this, see the Box at the end of this case study). In this case monetary values were not placed on the health outcomes. Still, presenting the impacts of TSP pollution in physical terms, as is done in Addendum Table 2, can still be a powerful message prompting government action. At a minimum, a cost-effective approach can be applied to identify those policy interventions that produce the largest health benefit per dollar invested.

Addendum Table 2 - Health Benefits of Reducing Particulates in Jakarta to Indonesian Standards

Health effect	Medium estimate
Premature mortality	1,200
Hospital admissions	2,000
Emergency room visits (ERV)	40,600
Restricted activity days (RAD)	6,330,000
Lower respiratory illness (LRI)	104,000
Asthma attacks	464,000
Respiratory symptoms	31,000,000
Chronic bronchitis	9,600

Box
Economic Valuation of Health Effects

Ideally, valuation of health impacts should include both the out-of-pocket costs of illness such as medical costs, lost income and averting expenditures, and the less tangible effects of illness on well-being such as pain, discomfort and restriction in non-work activities. Health impacts valued by willingness-to-pay (WTP) incorporate all of these impacts, whereas a cost of illness (COI) approach only includes out-of-pocket expenses such as medical costs and lost income.

Ostro did not estimate the economic costs of mortality and morbidity in Jakarta, although estimates can be made fairly easily in the case of illness (morbidity). There is a sizeable literature on the cost of ill-health in the US.

WTP estimates to prevent or accept small changes in the risks of death are based on empirical evidence gathered in the US and Great Britain of people making actual tradeoffs between the risks of death and some benefit, such as income. In addition, some contingent valuation studies have been conducted in which respondents are asked directly what they would be willing to pay to reduce risks associated with, for example, work or traffic accidents. Considerable controversy exists over the 'value of life'. One commonly used value in the US is \$300 for a .0001 reduction in risk. Thus, for a large population, the reduction in risk translates to \$3 million per death avoided.

Economic costs for changes in morbidity are, of course, very country-specific. In the high cost, US medical care sector, some estimates of the costs of illness include the following (Ostro, 1992):

Respiratory Hospital Admission, RHA:

average stay - 10.13 days
average cost of stay - \$26,898
lost day wage rate - \$125
So, each RHA is assumed to cost \$28,164

Emergency Room Visit, ERV:

average stay - 1 day
average cost per stay \$133
lost day wage rate - \$125
So, each ERV is assumed to cost \$258

Restricted Activity Day, RAD:

20 percent of RAD result in lost work days, and the remaining 80 percent of RAD valued at one-third of the average wage rate.
lost day wage rate - \$125
So, each RAD is assumed to cost \$58

These costs are for the US. To estimate the costs of ill-health in Jakarta, separate Indonesian-specific cost estimates are needed. These will be lower than US costs and may vary by type of illness, depending on relative differences between the US and Indonesia for labour and capital.

Sources:

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Cost- Effectiveness Analysis Of Health Risk Reduction¹

Volgograd case-study

by Elena Strukova

Commission for Natural Resources, Russian Academy of Sciences

The evaluation of health risk generated by industrial pollution is considered an important problem in Russia. Health risk reduction is an appropriate indicator for decision makers to prioritize pollution abatement investment projects. Several studies have been done worldwide to quantify such risk. Since 1996, risk analysis and risk management studies are in action in Russia. This work has been done by HIID Moscow office with support of US AID. The approach for health risk identification from stable sources of air emissions was developed by the Harvard School of Public Health. Five Russian cities are under consideration in this project: Volgograd, Novokuznetsk, Perm, Krasnouralsk, and Angarsk. The first city where a study was completed in May 1997 was Volgograd. The main health-risk generating pollutants considered were carcinogens and TSP (total suspended particulates).

The study basically consisted of two parts:

- risk analysis
- risk management

In the risk analysis part, the main problem was to develop a framework of analysis suitable for the Russian system of environmental standards and environmental data as a whole. As usual, the risk analysis procedure consisted of four steps:

- emissions inventory;
- modeling of carcinogens and PM10 concentration in the air with the help of a dispersion model;
- Annual data on the concentrations obtained;
- Calculation of annual mortality risk from carcinogens and PM10 for 20 areas in Volgograd, each with about 50 000 inhabitants.

¹ This paper describes work completed under the Newly Independent States Environmental Economics and Policy Project of the Harvard Institute for International Development, with the financial support of USAID. A large group of experts undertook this work - this includes experts in Moscow (Harvard Institute for International Development, Moscow office), Volgograd (Institute of Hygiene and Toxicology) with support from Cambridge (Harvard Institute for International Development, Harvard School of Public Health). Comments and suggestions are welcomed. The views expressed are solely those of the author(s) and do not necessarily represent the views of the U.S. Agency for International Development, the host government, or the Harvard Institute for International Development. A more detailed description of the project and its results can be found in Larson et al, *The Economics of Air Pollution Health Risk: A Case Study of Volgograd*, Harvard Institute for International Development, Environment Discussion Paper No. 38, January 1998.

All results were presented in terms of additional annual risk of mortality from carcinogens and TSP. The analysis revealed that mortality risk from PM10, as the most hazardous component of TSP, dominates mortality risk from carcinogens. Therefore, the main subject for the risk management study was the control of TSP emissions.

The results show that two plants, Volgograd Aluminum factory and Red October Steel Mill, generate the main volume of annual mortality risk. Of the estimated additional annual mortality risk of 2,666 additional deaths per year from stationary sources in the city (total population of one million), about 1 770 are attributed to the Aluminum factory and about 470 are attributed to the Red October Steel Mill. Thus, the main focus of risk management has to be concentrated on these two sources of pollution, at which point the risk management procedure started.

Risk management is the process of choosing the options to reduce health risk through evaluation and implementation. Once options are identified, the main question is in what order should they be implemented. Financial issues are difficult in countries in transition. The governments and enterprises do not have the necessary financial resources to implement all options. The only possible approach in this situation is to allocate available financial resources to get the most benefits from them. For us, such benefits are a reduction of annual mortality risk, as calculated in the risk analysis stage.

We used the cost-effectiveness approach as the main criterion to prioritise the options. In other words, we prioritised the options with regard to the possibility of obtaining the reduction in annual mortality in a least-costly way. (The main details of the analysis are presented in Golub, Larson and Strukova, 1997).

To apply the cost-effectiveness principle to health risk reduction policy making, it is necessary to complete five steps:

- identify a baseline health risk;
- identify relevant investment and policy/regulatory options;
- determine the cost of each option;
- determine the change in health risk from the baseline from each option;
- prioritise options in term of cost-per-change in risk from each option.

With as a baseline health risk from stationary sources of TSP emissions (Step 1), we were able to identify investment options to reduce health risk (Step 2). We used information from the US-Government funded Russian Air Management Project (RAMP) (SAIC, 1995). This RAMP project identified 'low' and 'high' cost measures for the Aluminum factory and Red October Steel Mill. For each project, initial capital and annual operating costs were calculated as part of the RAMP project analysis. For almost all of the projects, the RAMP reports also provide annual particulate emissions reductions due to implementation of the projects, which also provide necessary information to complete Step 4. Annual risk reduction can be calculated with the data on emissions reductions from specific sources.

To complete Step 3 we used the present discounted value of project costs (up-front capital costs and maintenance costs) as a simple criteria for defining project costs. At the same time it is necessary to mention that due to the undeveloped capital market in countries in transition, projects have different access to the credit market. This influences cost calculations a consideration that should be included in the next stage of analysis.

The simple approach is to compare projects in terms of present discounted value of costs (PVC) of the project. Given an interest rate r_i and assuming that costs in each year are paid at the beginning of the year, the formula for PVC is:

$$\text{PVC} = \sum_{I=0}^{T-1} (\text{K}_i + \text{C}_i) \{1/(1+r_i)\}^I$$

where K_i is capital costs in year I ;

- C_i is operating costs in year I ;
- T is the life-time of the project.

Since each project yields a change in risk dR for each time period over the project life, it is convenient to set annual data on this one-time PVC and determine an annual average present value of cost (APVC), where

$$\text{APVC} = \text{PVC}/T$$

We used APVC to calculate the cost of each project.

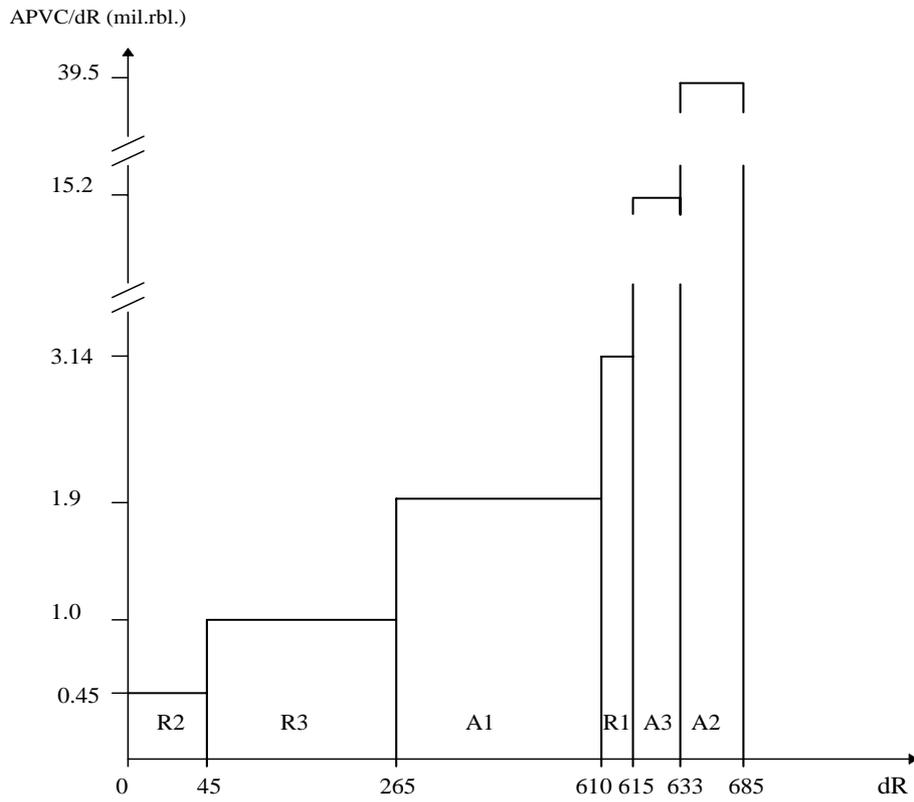
On Step 5, to prioritise projects, we used criteria of average present value of cost per change in risk per year (APVC/ dR).

Such calculations have been done for Volgograd Aluminum factory and Red October Steel Mill. We identified 3 projects for each facility and prioritised them in terms of least-costly annual health risk reductions. Results are presented on Figure 1.

Thus, based on the above analysis, we ranked abatement measures by cost for one unit of risk avoided. The next important question is to search for financial resources for the implementation of these measures. The assessment helps make decisions regarding effective use of funds. For example, about 10 billion roubles were collected by Environmental Fund of Volgograd oblast in 1995. If we assume that about 15% were allocated to air protection, this comes to 1.5 billion roubles. With regard to risk assessment results, that amount might be spent on measures R2, R3, A1, R1, A3. This would help avoid 633 deaths annually.

The approach seems very simple; however, it could be extremely useful for environmental management practices in the NIS. Each day, decision-makers in these countries have to choose between about ten enterprises and hundreds of pollutants which need control. As decision-makers have limited financing, they have to find clear and transparent methods, such as least-costly risk reduction.

Figure 1. Prioritisation of projects for Volgograd Aluminium factory (A1, A2, A3) and Red October Steel Mill (R1, R2, R3) in mln.rbl./dR. (Prices of 1995).



Further analysis requests more detailed consideration of financial sources and incentives to implement different environmental policy tools. The main attention would then be drawn on methods of realising the risk reduction strategy formulated on the above mentioned method.

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The Economic Value Of A Healthier Environment in Hungary What Do We Know, What Are The Research Needs?

by Péter Kaderják
Budapest University of Economic Sciences &
Harvard Institute for International Development

1. Introduction

National Environmental Action Programmes (NEAPs) and National Environmental Health Action Programmes (NEHAPs) have been developed in Central and Eastern European countries (CEECs) in order to shape environmental policy to deal with key environmental risks in these countries. Since such risks are substantial and widespread in the region, the NEAPs and NEHAPs are ambitious in setting goals for environmental policy. By taking into account that development needs are significant in both the private and the public sectors in the region, one will recognize that the opportunity cost of funds available for investment is exceptionally high in most of these countries. Thus, environmental projects have to compete sharply for available funds; and the number of environmental projects that promise improving social welfare is reduced.

I think that in such a situation environmental policy makers are in need for a clearer understanding of the nature and, if possible, of the economic value of the benefits associated with the programmes they try to implement. I have at least two reasons in mind to think this way. First, it is essential for a civil servant to promote welfare-improving policies. Second, environmental policy makers are already and will be increasingly under substantial pressure to demonstrate to the public and to other decision makers these benefits. However, it is well-known how problematic it is to derive the economic value of environmental and health improvements associated with certain public policies.

In this note, I address three issues related to the above mentioned problems, using the Hungarian case as an example. First, I present two policy cases I am familiar with, where credible figures on environmental benefits would have been essential for efficient policy making. Second, reflecting on information shortages, I give a brief overview of existing estimates on the economic value of environmental (mostly air quality) improvements in Hungary. Finally, I comment on some critical points that lead to substantial uncertainty in the case of these estimates and briefly propose directions for future research.

2. Policy proposals and the need for environmental benefit estimates

What follows here is the description of two ongoing environmental policy initiatives of the Hungarian Ministry of Environment and Regional Planning and the related needs for credible estimates on environmental benefit values. In the first case such estimates are needed primarily to judge some fee rates, proposed by the ministry, from the point of view of economic efficiency. In the second case the benefit estimates are assumed to improve priority setting in the course of a public investment project.

Emission load fees for air pollutants

Act LIII of 1995, the Environmental Framework Law commands the establishment of the economic basis of environmental protection, including (as article 60⁵) the creation of a law on the Environmental Load Fee (ELF).² According to a recent draft proposal of the MoE, the ELF would be levied on emissions of major air and water pollutants (here we concentrate on air pollutants). SO₂, NO_x, Particulates, CO, Hazardous I and II emissions of point sources would fall under the proposed regulation. The fee rates originally proposed by the MoE were ad hoc. The Economics Department initiated a research to investigate the economic impacts of the proposed fees given the proposed rates. One question of particular interest from the Economics Department was whether the proposed fee rates fell close to some efficient (or Pigouvian) rates (that is, fee rates close to the marginal costs of damage from air pollution).

In order to answer the above question, one has to estimate marginal damage functions for the pollutants in question. Given time and data limitations, the researchers developed a simple methodology to complete this task³ - using essentially a benefit transfer methodology^{FN}. A conclusion of the study was that the ELF rates proposed by the MoE fell far below the efficient rates. However, the limitations on the availability of local benefit figures makes the results highly uncertain.

The Hungarian “Superfund” programme

In 1996, the Hungarian government launched a relatively ambitious environmental programme (hereafter the Superfund Programme) aimed at cleaning up past contamination at sites where the liable party for the contamination cannot be identified.⁴ Although the Program has started recently, there were already hundreds of sites identified to fall under the regulation. The cost estimates for this long-run (15-20 years) project approaches USD 500 million at present prices. Within Hungarian standards, such a project is expected to have a significant welfare effect.

¹ The ELF for air pollutants is essentially what economists would call emission charges, so terminology should not make confusion.

² A brief description of the applied method can be found in Kaderjak (1996). The impact assessment is documented in QUERCUS (1996).

FN In the benefit-transfer methodology, the economic benefits from reduced pollution in one country are estimated based on empirical research of the benefits from reducing the same pollutant(s) in another country.

One major task of the Programme Management Office is to develop a National Priority List for clean-up, indicating, in what order and to what extent the given sites should be cleaned. The question, of course, is what criteria should be applied for such an ordering process. Initially, the project management developed a kind of risk assessment / risk analysis for this aim. However, it soon became evident how difficult it is to demonstrate the extent to which society would benefit from decreasing a given site's risk-score with some measurable amount. Thus, the Office decided to investigate how cost-benefit analysis could be applied to set priorities in the course of the Superfund Programme. However, at present, the vital need for environmental benefit values meet with essentially missing valuation data in this field. I think that³ the joint effort of physicians and economist to value, in economic terms (that is, based on the willingness to pay concept), the different health outcomes which are associated with land and groundwater contamination, could provide a valuable contribution.

After having indicated some information gaps, I turn to the discussion on estimates of some domestic environmental valuation, and the uncertainties associated with them.

3. Existing results on the economic value of environmental improvements in Hungary⁴

The topic of monetizing economic benefits from air quality improvement in Hungary has received a good deal of attention, thereby providing a situation where we have different studies, which apply alternative methods and answer similar questions. Table 1 compares the results of four calculations on the external damage caused by air pollution in Hungary.

Table 1. External cost of air pollution in Hungary: a comparison of existing results

Description	Method	Per capital value, 1993 HUF
Várkonyi (1994): Health damages due to air pollution *	Intuitive, 'reduced form' cost of illness	1,396
Harrison et al. (1996): Potential health benefits from meeting EU ambient air quality standards**	Benefit transfer, US data	13,016-188,274
Powell et al. (in Kaderják and Powell, 1997): WTP for 75 per cent improvement in countrywide air quality*	Contingent valuation method (CVM)	3,045-6,352
Kaderják (1996): External costs associated with air pollution from fossil fuel use ***	Benefit transfer, US data	4,000-43,087

Notes:

* All major air pollutants.

** TSP, SO₂ and Pb; based on median benefit figures provided for Hungary in Tables VII and VIII (pp. 325 and 327).

*** SO₂, NO₂, TSP, CO₂, VOC, CO, CH₄, N₂O.

Source: Kaderják and Powell (1997).

³ A more precise delimitation of state liability for cleanup is given in Governmental Decree No. 2205/1996

⁴ The section of this Note draws heavily on Chapter 8 of Kaderják.

The comparison of the above studies suggests at least two points for discussion.

First, the upper limit estimates provided by benefit transfer techniques turn out to be very high. Probably, the most important contributing factor to this result lies in the difference in the evaluation of excess mortality, caused by changes in air pollution, across the studies. For example, the economic value of a lost life, according to Várkonyi (1994), would equal the lost annual earnings of the person who had died if he or she had been an active worker, and zero otherwise. According to him, the economic value of a lost statistical life is then USD 7.490. In contrast, Harrison et al. (1996) estimate the value of a lost statistical life to range between USD 130 000-3 600 000 HUF: 17-480 (!) times difference in comparison with Várkonyi. Consequently, I would suggest that the upper-bound estimates in Table 1 are unreliable. Further research is needed to get information about Hungarians' preferences and WTP for reduced mortality risk. Second, despite the different techniques applied and the somewhat different 'product' the alternative studies concentrated on, the lower-bound estimates on per capita damages/benefits of air pollution show considerable consistency across the studies.

Complete uncertainty about the economic value of a statistical life in the CEECs and the impact of this uncertainty on the environmental valuation results clearly underlay one basic problem of the benefit transfer technique in the CEE context, namely, the transfer of valuation figures across populations with significantly differing preferences. To my knowledge, researchers have not even tried to address the problem of taste differences in benefit transfer ventures up to now. This is not the case with the other fundamental issue which has to be addressed when transferring benefit figures across populations with significantly differing income levels. The Harrison et al. (1996) and the Kaderják (1996) papers used average hourly wage rate ratios, the Markowska and Zylicz (1996) study applied per capita GDP ratios to correct the original benefit figures for income differences. These practices are heuristic at best. Probably, some comparative surveys explicitly addressing the issue of how such substantial income differences, which prevail between EU member states and CEECs, affect the demand for environmental quality, could help in improving benefit transfer practices in this respect.

My prediction is that it will be a long time before monetary figures on the value of environmental resources and services become credible and acceptable to decision makers in the CEECs. Primarily because of the above reasons, I do not think that the establishment of credibility will be very successful if the primary source of environmental benefit figures is benefit transfer.

4. Directions for future research

I argued that credible estimates on the economic benefits from environmental and health improvements could shape the implementation of NEAPs and NEHAPs and could improve, in general, the efficiency of environmental policy making. I have also identified major existing environmental projects where the need for environmental benefit estimates has been identified and the shortage of such information encountered. Based on these findings, I put forward three points as proposals for future work in this area.

1. Linking existing emission and emission data in order to create the background of reliable dispersion modeling is a necessary condition for valuation work to be successful. The publicity and availability of these data for researchers is strictly limited at present in Hungary.
2. A careful review of the existing literature on the benefit transfer technique could help research in the CEECs by providing relatively inexpensive data for it. The transferability of both value figures and dose-response functions have to be investigated.

3. To carry out major local valuation studies are necessary to put credible monetary figures on major health outcomes linked to environmental pollution.

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Part V

Improving environmental/health information systems

The Development Of Environmental/Health Information Systems In Countries With Economies In Transition

by Paul C. Rump

Consultant, Environmental Information and Policy

Introduction

The need for improved information for sustainable development decision making is consistently recognised by global, international, and national action plans. This is particularly pertinent for countries experiencing the transition from a centrally planned to a market economy. The Environmental Action Programme for Central and Eastern Europe (EAP), for example, calls for better policy making, planning, and management tools to facilitate a transition to a market economy based on an integrated and sustainable approach to environment and development (EAP, 1993). Governments, with the support of national and international organisations, are urged to adopt improved systems for the acquisition, interpretation, and integrated analysis of data to support sound decision making. These views are echoed by the Environmental Health Action Plan for Europe.

Since 1990, many countries with economies in transition have experienced highly volatile political circumstances and declining economies. Institutional change has been rapid, under a prevailing climate of decreased production and falling living standards. Although the common goal of transition is sustainable development under a market economy, the Central and Eastern European Countries (CEEC) and the Newly Independent States (NIS) are very different in character and stage of transition development. The countries are diverse in terms of size and population; and environmental, social, and economic circumstances. Within the larger countries, such as Russia, there are tremendous differences among regions. Economic stability and investment have increased significantly in most of the countries over the last two or three years, while in some, such as Poland, Estonia, and the Czech Republic, the initial transition stage has been passed and renewed development is occurring.

With this diversity, the state of environmental decision making, of policy development, and of the evolution of the environmental/health information system⁵ varies considerably among countries. Nevertheless, under these fluid circumstances, when environmental and human health conditions are critical, difficult policy and investment choices have to be made with limited budgets. This situation is made even more difficult without open information and the full participation of all segments of society.

This overview paper is based on a review of various international studies and workshops which have addressed the state of environmental/health information systems¹ in selected CEECs and NIS. It focuses on the generic characteristics of environmental/health information systems which are common to economies in transition.² The paper outlines the conceptual dimensions of information systems, and briefly describes the relevant information review programmes of international organisations. This is

¹ For the purpose of this paper, the phrase “environmental/health information system” includes environmental and environmental health information systems which both focus on some combination of environment, health, and socioeconomic factors.

² A listing of the reports of these studies and workshops is given in the reference section at the end of this paper.

followed by a discussion of the status of information system development in CEECs and NIS based on the findings of international studies. This section covers the demands for information, the institutional framework, data and monitoring, information dissemination, and financial considerations. A short section on recent developments is included to give some idea of progress subsequent to international reviews. Finally, the paper concludes with suggested discussion topics to guide the deliberations of working groups at the Workshop on Environmental and Health Information.

Some examples are provided in the paper for illustrative purposes, but its scope cannot attempt to reflect all national information programmes in a comprehensive manner. Neither can it completely capture recent information system developments.

It should be emphasized that the comments and recommendations made in the international reviews are often not unique to CEECs and NIS. Many countries face problems of inadequate information for decision making, insufficient resources for monitoring, and less-than-ideal vehicles for information dissemination. What does make the information situation very critical for economies in transition, however, is the combination of severe fiscal constraints and the inherited legacies of environmental and human health problems. Under such conditions, it will take considerable time and effort to fully implement the changes suggested to improve information systems in the majority of the CEECs and NIS, although notable progress has already been achieved.

International Reviews of Environmental/Health Information Systems

Since the beginning of the transition period, numerous studies have been conducted and workshops convened on the nature and conditions of existing environmental/health information systems in CEECs and NIS. These projects have been completed primarily under the auspices of the Organisation for Economic Co-operation and Development (OECD), the United Nations Environment Programme (UNEP), and the World Health Organization (WHO), although other international organisations such as the World Bank, and several national governments have made substantive contributions to the individual studies and workshops.

The information system assessments have contributed to the broader programme objectives of these international organisations for countries with economies in transition. These objectives, which are consistent with the direction provided by Agenda 21, include:

- integrating environment and health considerations into the overall restructuring process;
- advancing the analysis and assessment capability through experience transfer, training, and capacity building; and
- building the information base at international, national, and sub-national levels for strategic purposes.

For OECD, the reviews of environmental information systems are part of the program of the Centre for Co-operation with Economies in Transition (CCET), implemented by the Environment Directorate. With its holistic scope, this OECD initiative is intended as a catalyst for change. Reviews have been conducted for Poland, Hungary, the former Czechoslovakia, Belarus, and Russia. The resulting reports assess current environmental information systems and make recommendations for future development aimed at meeting decision making needs. They examine institutional arrangements, the generation of data and information, the design information systems, and information dissemination. Associated OECD activities with selected CEECs and NIS include the development of internationally-

consistent environmental data and indicators, and the completion of national environmental policy performance reviews (OECD, 1996a).

UNEP's Environment and Natural Resources Information Networks Programme (ENRIN) focuses on capacity building in the field of environmental information. For CEECs and NIS, the program is coordinated by GRID-Arendal. The capacity building process, which has been officially launched in 18 countries, follows four stages: initial assessment; feasibility and pilot projects; implementation; and operational. The initial assessment provides an overview of the current status of environmental information in the country, including systems capabilities, user needs, and potential integration and harmonization constraints. The second stage provides a thorough assessment of environmental information systems, and recommends actions to strengthen capacities and access to information. The 3-5 year implementation phase leads to the development of a country's environmental information network in concert with the Global Resource Information Database (GRID) system of UNEP. For operational status, the country must have trained personnel; state-of-the-art equipment; and a sound legal, institutional, and economic base for the generation and dissemination of environmental information relevant to decision makers and the general public (Rump, 1996).

WHO's European Centre for Environment and Health (ECEH) provides technical assistance to Central and Eastern European countries to strengthen the assessment of environmental implications to human health. Through this assistance, National Integrated Programmes on Environment and Health (NIPEH) have been cooperatively established with six national governments. The objective of these programmes is to improve policy decision making and public awareness on health-environment interactions. This is accomplished by establishing reliable and integrated databases appropriate to analyzing health-environment linkages and strengthening institutional capacity building in such fields as environmental epidemiology, quality assurance, and geographic information systems (GIS) application. Health and environment geographic information systems (HEGIS) are being established to help identify priority issues and risk factors, forecast trends, and measure the impact and cost-effectiveness of interventions (WHO, 1993).

What are Environmental/Health Information Systems?

In a general conceptual sense, three stages in the evolution of environmental information systems can be recognised (see Figure 1). During the first stage, a series of independent databases and software systems are characteristically developed to serve rather narrow, sectoral needs. Subsequently, there is a partial integration centred on a broader theme such as natural resources or environment. Finally, full integration is achieved with adequate linkages between the various components of a macro-system (Collinson, 1994). This final stage must be the ultimate goal under the current paradigm of sustainable development, in which health, environment, social, and economic factors are all recognised to be inter-dependent.

An effective integrated environmental/health information system brings together monitoring networks and databases, remote sensing and GIS capability, quality control and standard setting, and communications networks for data sharing and access. This does not imply a centralised approach, but rather a management infrastructure to foster the generation of integrated and quality information to support sound decision making.

The main functions of an information system are to:

- encourage data sharing among agencies;

- promote the integration, harmonisation, and orderly archiving of data;
- increase the interpretation and analysis of data for policy making;
- facilitate public access to and use of environmental information; and
- improve the consistency and efficiency of responses to requests for information (Rump, 1996).

Such functions usually imply the designation of an institutional centre for overall management and coordination purposes. Such centres should not compromise or duplicate the production of primary data sets, but focus on the provision of referral linkages between existing data systems. This can be achieved through the development of metadata³ consistent spatial frameworks, data quality standards, and inter-agency agreements on cooperation. Through these mechanisms, information centres encourage the transformation of disparate data into meaningful and relevant material for awareness raising and decision making.

The role of such institutional centres is not to determine policy responses, but to bring credible, understandable, and timely information on conditions and trends of the state of the environment and human health to decision makers. From this user perspective, an environmental/ health information system should provide efficient retrieval, analysis, interpretation, and presentation of information. This can be most effectively provided using on-line access via appropriate communication networks.

Status of Environmental Information System Development

Current Situation

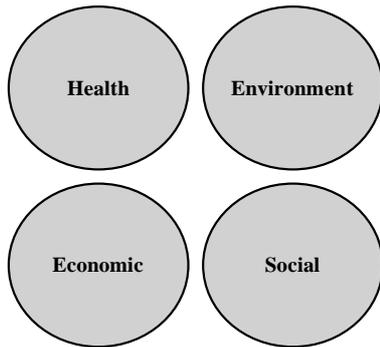
This section provides an overview of the characteristics of information systems in countries in transition. It outlines both the typical constraints of existing systems and the requirements to modify and improve systems to meet contemporary needs. As indicated above, the discussion primarily reflects the situation at the time of the individual country reviews.

Two overriding conclusions are evident from the studies of environmental/health information systems in CEECs and NIS. First, the countries have an existing base of environmental, health, and socio-economic data on which to build and improve information systems. In addition, the countries have a solid education and research tradition which has supported the development of highly qualified personnel. Second, the countries entered the transition period with first-stage information systems characterized by independent and isolated components. Subsequently, several countries, for example Poland, Estonia, and Russia, have established initiatives aimed at integrating information systems for environment, human health, or natural resources (WHO, 1993; Simonett, 1995; OECD, 1996a)

³ A data base reference or inventory providing information on database characteristics such as purpose and content, data acquisition methods, units of measurement, geographic and temporal coverage, update frequency, output format, conditions of use, contact point, etc.

FIGURE 1

INFORMATION SYSTEM EVOLUTION

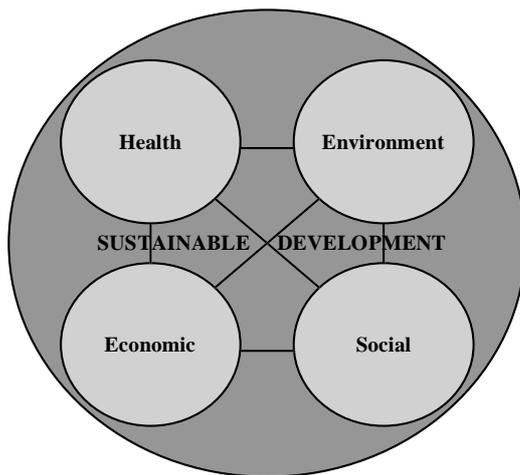
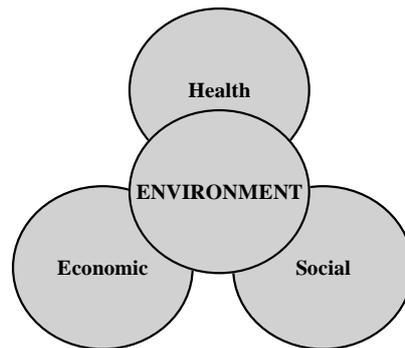


A: SECTORAL INFORMATION SYSTEMS

Separate; little or no integration

B: ENVIRONMENTAL INFORMATION SYSTEM

Partial integration



C: INFORMATION SYSTEM FOR SUSTAINABLE DEVELOPMENT

Full integration

————— *Environmental/Health Information Systems* —————

Demand for Information

Sound information related to public health and the environment is used to determine and adjust policy directions, invest funds, and raise public awareness. It helps decision makers analyse cause and effect, develop strategies for action, manage natural resources, prevent and control pollution, and evaluate progress towards goals and targets. This role is particularly critical during a period of radical change and adjustment, which the CEECs and NIS have faced since 1990.

The purposes and public expectations of environmental and health information have fundamentally altered with the establishment of democratic governments. Information is no longer the sole domain of government to support centralised state planning. Under contemporary circumstances, with less government intervention, reliable and accurate environmental information is needed by various societal interests for the multiple tasks associated with decision making. The most pertinent of these tasks include:

- the development of proactive and integrated policy related to the achievement of sustainable development;
- the monitoring and enforcement of environmental protection and natural resource management regulations;
- the support of private sector investment using such information tools as environmental audits and impact assessments; and
- the evaluation of progress towards national and international sustainability goals (OECD, 1994).

Thus, information becomes a key ingredient to sound decision making by the public, the private sector, interest groups, as well as government. Furthermore, within the public sector, decision making is becoming more decentralised, with increasing responsibility for environmental and health matters residing with regional and local governments (OECD, 1996a; Nemes, 1995).

CEECs and NIS are characterised by severely constrained fiscal resources, yet face major challenges in addressing the legacy of problems associated with achieving a sustainable future. Under these circumstances, the determination of priority issues under National Environmental Action Programmes (NEAPs) and National Environmental Health Action Plans (NEHAPs) become significantly relevant. The priority issues under these programs are currently centred on human health; irreversible ecological change; and the linkages between health, environmental protection, and economic development. Human health issues related to environmental exposure are extremely critical. Populations are characterized by low life expectancy, threats to normal childhood development, and high levels of respiratory and other diseases. Serious environmental problems typically include air, water, and soil contamination; solid and hazardous waste; and ecosystem degradation.

The emphasis on private sector development has at least three dimensions from an information perspective. First, liability for past pollution represents a major impediment to privatization and foreign investment. Second, the demands on land management and regulation are increased with the

decentralisation of land ownership. Third, economic restructuring provides an opportunity to emphasize energy and waste efficient plant processes (OECD, 1996a). In this respect, information pertinent to site evaluation and re-commissioning, land regulation and planning, the cost-benefit evaluation of pollution abatement and waste minimization alternatives become of prime significance. Finally, the sustainable management of natural resources is important for the longer term future of most CEECs and NIS. Here, information on natural resource capability, and resource stocks and flows are required for decision making.

Institutional Framework

Within CEECs and NIS, agencies with principal responsibilities for data and information on human health, environmental quality, and natural resources usually exist. National statistical organisations compile survey data based largely on self-reporting, while environmental agencies play an increasing role in data generation particularly related to emissions and other anthropogenic impacts on the environment. Typically, many other agencies have more specialised responsibilities for data collection related to their particular mandates. In addition, research and scientific institutions, private companies, and non-government organizations (NGOs) contribute to health and environmental information collection. The role of the private sector and NGOs in the information field is expected to increase with the movement to a market economy. Private firms, for example, already perform a substantial amount of work preparing databases and digital maps in countries such as Ukraine (Semichaevsky, 1995).

Institutional arrangements in CEECs and NIS tend to be complex and fragmented, often with overlapping responsibilities. The tradition has been to collect and use data for internal, sectoral purposes. In the early transition period, this situation deteriorated in response to scarce and falling resource levels. Despite the establishment of central bodies responsible for national informatics development and coordination, several countries have witnessed the proliferation of subsidiary bodies eager to compete for any commercial advantage related to the marketing of data and information (OECD, 1996a; Semichaevsky, 1995).

Now, under the rubric of sustainable development, it is important to understand the interrelationships between human health, social factors, the economy, and the environment. Under these circumstances, institutional cooperation and collaboration are essential. Furthermore, increased cooperation based on clearly defined responsibilities should lead to a more cost-efficient information system. In the information field, cooperation is particularly important on three fronts, namely: interagency collaboration; coordination between the various government levels within a country; and international cooperation. International cooperation, for example, is significant with respect to meeting global and transboundary commitments; capacity building and information exchange; and achieving standardised definitions, classification systems, and data management protocols.

Data and Monitoring

A considerable wealth of data exists in CEECs and NIS. However, the data's usefulness for decision making is limited by a number of factors. Most data are available only in analogue form, although digital databases are becoming more common. With the use of agency-specific definitions, classification systems, sampling and data collection methods, and data processing approaches, data sets are not always compatible or of appropriate quality. Data are often localised or available for limited time periods, making it difficult to obtain reference benchmarks, trend series, or national coverage. These are serious limitations making it difficult to be definitive about environmental-health relationships (WHO, 1992). This can lead to new, potentially duplicating data gathering activities by frustrated clients, as has occurred in Hungary (OECD, 1993b)

These deficiencies, however, do not mean that monitoring and survey efforts should be drastically expanded. Data gaps and imbalances certainly exist and better data may be needed for selected priority areas such as waste, land resources, and biodiversity. In general, however, the overriding focus should be to provide a coordinating framework aimed at integrating monitoring systems and data generation. Various efforts are underway in some countries, such as Poland and Russia, to provide such a framework (see the section on recent progress).

The purpose of integrated monitoring is to harmonise existing systems to improve data flows--vertically between national and local levels of government, and horizontally among the various agencies responsible for sustainable development. The objective is not to radically distort existing sectoral monitoring networks, but to improve the compatibility, comparability, and reliability of data in order to increase the analysis and interpretation capability. This can be accomplished, for example, by:

- developing or updating metadata and digitizing databases to encourage their wider use;
- concentrating on quality assurance with standardised definitions and classifications to
- achieve national and international comparability; and
- adopting GIS systems to facilitate integration based on georeferencing and the use of consistent spatial frameworks.

With these features, information systems are better able to support the development of a number of analytical tools appropriate to decision maker needs. These would include the use of sets of indicators, maps and other visual outputs, and models to promote interpretation and understanding. Such tools help to reduce the clutter of too much data, thereby improving the communication process with users (OECD, 1993a).

Access and Dissemination

In the past, information tended to be dispersed, not readily available, and only used internally by the originating agency. General distribution was limited to selected releases by the State, while multi-purpose use and data sharing were not encouraged. Access to information was frequently only possible by direct contact with the data holder, which took considerable time and effort. For example, in Russia where the vast majority of data are stored on paper, only 16% of all known databases are remotely accessible (Denisov, 1995). Physical telecommunications access is rapidly expanding, especially in the urban areas of some countries, but capacity problems, high cost, and network incompatibilities remain inhibiting factors. Consequently, information transfer has often been difficult and unreliable.

As a result of these barriers to effective communication and data sharing, decision making in CEECs and NIS has often been based on intuition rather than reliable information. The first steps to change this situation have been made in most countries. Interagency access to information is now generally stipulated by legislation, while agencies in some countries such as Hungary and Ukraine are moving to establish data sharing agreements (Nemes, 1995; Semichaevsky, 1995). Similarly, public access to information on the state of the environment and its influence on human health is a constitutional right in most countries. However, in practice, open access and sharing of information is far from ideal.

Under these circumstances, public awareness and understanding of environment and health issues has been limited. The availability of public information has been severely restricted due to the system of controlled releases, low print runs, the high cost of data, and the absence of independent NGOs.

Some recent efforts are being made to improve information dissemination to the public: for example, through the release of national state of the environment (SOE) reports and health-environment bulletins. At least 23 CEECs and NIS have released national SOE reports since 1991, with the majority providing recent editions in the last two years (GRID-Arendal WWW site, 1997).

Nevertheless, the international reviews call for a more systematic and comprehensive approach to information dissemination through the development of appropriate education programmes and communication strategies (OECD, 1994; OECD, 1996a). Adjustments to incorporate environmental education and a sustainable development philosophy in school and university curriculums are suggested. Communication strategies to raise public awareness would cover the use of partnerships with the private sector and NGOs, the establishment of information access points, the development of multi-media products for diverse audiences, and the assessment of user needs and satisfaction. Such a holistic approach is advocated as a means to achieve full and effective public participation in decision making.

Information Centres

Most of the international studies call for the creation of information centres to advance the development of environmental/health information systems. Such centres promote integrated monitoring, uniform standards, and improved communications technology. Their role is to foster cost-effective data collection and transfer; the provision of reliable, timely, and integrated trend information; and improved access. Several countries, including Estonia and the Czech Republic, have established institutions with these coordinating functions.

The information centres also serve as foci for training and capacity building in the fields of health and environmental information. Links between the centres and the international community are particularly appropriate to enhance the transfer of technology and experience. In CEECs and NIS, the highly educated workforce, with its foundation rooted in science and technology, needs to be complemented by the development of multi-disciplinary skills related to the use of information in policy and management decision making. Training and capacity building is particularly essential, for example, in integrated data analysis, data management, decision-support approaches including modeling and scenario development, and information visualization and presentation. Training is particularly required at the territorial and local level where natural resource, health, and environmental decision making is increasingly taking place.

Economic Considerations

In most economies in transition, funding for environment and information systems is extremely limited. Traditional internal mechanisms for funding environmental projects include agency budgets and special environmental funds; the latter based on revenues from fines and permits. Both sources have been severely limited by the poor economic climate of the transition period and are not adequate for establishing the desired level of environmental information system development with open information access. In Estonia, for example, 2.4% of the state budget was allocated for environmental matters in 1995. Of that total, only 2.3% was used for environmental information management, with no specific funds designated for information dissemination. In other countries, budget allocations are considerably lower: in Latvia, for example, most of the financial support for environmental system development comes from international sources (Simonett, 1995). Under these circumstances, funding support for information development must be regarded as a legitimate component of NEAPs and NEHAPs.

The level of funding represents a severe constraint to the modernisation of information and telecommunications technologies. However, the low level of public sector salaries compared to those in private firms is frequently cited as the most serious problem affecting the viability of information systems. In addressing these difficult issues, the international reviews call for new sources of funding from partnerships with the private sector and international donors.

Increased cooperation and collaboration is recognised as a means for stretching scarce fiscal resources. This is beginning to occur in some countries through joint ventures between the government, NGOs, and the private sector, related for example, to data analysis and report preparation. The reviews advocate greater cooperation to facilitate the rationalisation of existing monitoring networks. Financial requirements for monitoring would be eased with reductions in the number of field stations and parameters measured and more emphasis on the collocation of monitoring sites. This streamlining could be supported by an increase in self-monitoring by enterprises, although appropriate quality control mechanisms would be needed for verification purposes. Moreover, some of the earlier reviews suggest increased use of sample surveys to replace census methods. In addition to being more efficient, this would reduce individuals', as well as the private sector's, burden of reporting .

A controversial question in many of the reviews is the use of data itself as a financing mechanism to support agency budgets. With reduced government support, many research institutes are searching for new revenue sources, while the private sector is rapidly expanding its role as an information supplier. Recent legislation suggests "free" access and exchange, but mechanisms are generally not in place to recognise the costs associated with data processing to meet requests. Under this situation, there needs to be a clear distinction between information that is in the public domain and available freely or at cost, and information that is used for commercial purposes and can be used as a source of revenue.

Recent Progress

Since the reviews, evidence from several countries show that efforts are made to advance towards a more integrated information system that will assist decision making in sustainable development issues. This includes adjustments to strengthen institutional arrangements, moves to integrate monitoring systems, increased generation of credible and meaningful information, and improved access to information products. Indeed, the convening of this workshop to focus on the linkages and coordination of environment and environmental health information systems is one indication of the progress in these areas.

This progress is reflected in the most recent country reports to the UN Commission on Sustainable Development. From the current five-year review of progress since the UN Conference on Environment and Development (UNCED), it is evident that countries are moving towards the integration of monitoring and information systems. However, based on the available reports from CEECs and NIS, data and information for decision making remains somewhat poorer than for most western European countries.

Of course, progress in information system development varies from country to country. Some countries have built on the existing solid base of technical expertise and data to create integrated information systems which are contributing to increased public awareness and sound decision making; others have made gains related to specific elements of information systems or remain in the early stages of information system assessment and development.

In general, considerable progress has been made in most countries to establish the appropriate legislative and institutional framework aimed at promoting the coordinated development of integrated information systems. This includes the creation of inter-ministerial councils to encourage cooperation and the exchange of data; and the establishment of focal institutions to manage and coordinate the development of information systems, including integrated monitoring. In addition, free access and exchange of environmental and health information has been widely established, at least in principle. In terms of products, many countries are now disseminating SOE reports on a regular basis, and at the same time, developing sets of health, environment, or sustainable development indicators. For example, indicators consistent with international standards have recently been published for six countries, and used for environmental policy performance reviews in Poland and Bulgaria (OECD, 1996b).

A few concrete examples can be given to illustrate recent progress. Three environmental information centres will be in operation in Poland, Hungary, and Russia by the end of 1997 as part of the UNEP/GRID network. The centre in Poland, GRID-Warsaw, is part of a national environmental information system which also has central, regional, and thematic components (WHO, 1993). Since its inception in 1991, the centre has developed a catalogue of data sources, initiated the development of a core environmental database, attained and applied remote sensing and GIS technology, and published a national SOE assessment. The new GRID centre in Budapest will be able to benefit from the work under the NIPEH. To date, these activities have focused on capacity building and the establishment of a health/environment GIS capability (WHO, 1994). In Russia, promising early results have been achieved in developing integrated information systems at the territorial level as part of an initiative to establish a Unified State System of Environmental Monitoring (USSEM). The GRID centre represents another step supporting USSEM implementation. In addition, overall interagency collaboration will be fostered by the recent commitment at an OECD-sponsored workshop to establish a permanent steering committee that will guide the future development of the USSEM⁴

Despite the latter, and successes in other countries, the development and use of integrated environment/health information systems is far from complete. Sound decision making and a high degree of public awareness based on consistent and meaningful information is still not the everyday “way of doing business” in CEECs and NIS. The poor quality of telecommunications systems impedes access and exchange of information. The dialogue between data producers and users, and the level of data interpretation and transformation into meaningful information is far from optimum.

It has always been recognised that the achievement of functional information systems to support sustainable development decision making takes considerable time and effort. The discussions at this workshop will provide an opportunity to advance this iterative process by focusing on better linkages between health and environmental information systems.

⁴ Workshop on Environmental Information Systems in the Russian Federation, St Petersburg, Dec 10-11, 1996

Box: Key Issues for Consideration

The following issues for discussion were presented during the workshop. The issues attempt to capture some of the challenges and priorities that lie ahead for the further development of environmental/health information systems.

- Since the completion of the various national information system assessments, what progress has been made better meeting the needs of policy decision making? What aspects of information system development have been relatively easy to achieve and what are the critical constraint areas requiring future attention?
- How are environmental/health information systems being used for national and regional decision making? What have been the results? Is the degree of coordination between environmental and environmental health information systems satisfactory?
- To what extent is information generation “demand driven”? Is the dialogue between data producers and users sufficient, and are user requirements well known? What approaches and mechanisms can be used to improve this interdependence?
- What steps have been taken to bring public awareness and education to more satisfactory levels? Are the various societal groups sufficiently empowered to play an effective and contributory role in public decision making?
- What progress has been made with the development of information dissemination strategies? Which media and products are proving to be most effective?

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Health and Environmental Cooperation on the Regional level in Hungary

by I. Antal, E. Vermes, L. Jesztak, Gy. Kosztolanyi

Two regional authorities, the National Public Health and Medical Officer Service, Baranya County, and the South-Transdanubian Regional Authority for Environmental Protection, are responsible for the environmental and health protection of people living in the region.

Their administrative, official work is based on the laboratory investigations. Since the samples to examine the state of environmental health are taken and used by both authorities, the cooperation between the two official bodies is of great importance, even if it is not a common phenomenon in the country.

Cooperation in official work:

The Regional Authority for Environmental Protection:

1. Supervises the enforcement and effects of environmental protection regulations
 - makes decisions
 - sets rules and resolutions for the operation of factories, authorises and refuses new technologies and industrial developments
 - determines obligations
 - inflicts penalties
2. Eliminates the effects of environmental catastrophes

The Public Health Service as a regional professional authority:

Supervises the enforcement of Public Health Interests

- gives professional standpoints to the decisions of the Authority for Environmental Protection
- controls and qualifies: air quality of settlements, quality of drinking water, natural waters used for bathing, water of swimming-pools, and sewage.

Cooperation in laboratory work:

While the Public Health Service's task is to measure the chemical (SO₂, NO₂, CO, O₃, dust, nmHC) and biological (pollen) air pollutants, the Authority for Environmental Protection performs environmental-emission monitoring and the routine measurement of environmental indicators originating from industry and traffic.

On the one hand, the Public Health Service takes control over the microbiological, biological, and chemical quality of drinking water, natural waters used for bathing, and water of swimming-pools; on the other, it carries out microbiological and chemical examinations of springs and observer wells, as well as microbiological and parasitological examinations of surface water and sewage.

The Authority for Environmental Protection is responsible for both the control of chemical, biological, physical, and radiological investigations of surface water, and the chemical control of industrial observer wells and other ground waters.

While the Public Health Service, in the Baranya county, uses physical-chemical, microbiological, and toxicological methods, the Authority for Environmental Protection applies ecotoxicological methods for laboratory examinations of hazardous waste.

The results of laboratory analyses are regularly exchanged between the two authorities of the Baranya county.

According to the above statement:

1. The Public Health Service provides the Authority for Environmental Protection with on-line emission data on Pecs.

Other data are sent to the Authority for Environmental Protection each month (emission data from more than 90 sampled-places in the Baranya county) or on six-month intervals (bacterial and parasitological data on surface water, sewage, and observer wells).

2. The Regional Authority for Environmental Protection informs the Public Health Service on emission data and the list of harmful chemicals for the ozone layer. It also gives, once a year, information on the list of firms producing hazardous waste and, twice a year, chemical data on surface water, sewage, and observer wells.

Laboratory data are used in official work, including classification of air and water quality, and in expert opinion, which are part of Environmental - Environmental Health Impact Assessments, Industrial Development Plans or the Complex Estimation of the Environmental State.

1. For example, in 1996, the Public Health Service of the Baranya county used laboratory data for preparing: (a) Regional Environmental Development Projects; (b) Development Plans of Power Stations in Pecs and Komlo; and (c) the Environmental Impact Assessment of burning tires and organic solvents in the Cement Plant, Beremend.

2. Information on air and water quality, and on pollen activity is conveyed to people living in the region through newspapers, local television, radio, and even the Internet, which plays an important role in providing information on the work of the two regional authorities.

3. One of the obligatory tasks of city councils is the preparation of the smog-alarm plan built on air-quality data.

Specialists from the Public Health Service, the city councils, and the Authority for Environmental Protection participate in this work.

Within this process, the Public Health Service appraises air-quality data and evaluates the situation; the Mayor of the County Council orders the smog-alarm; and the Environmental Protection Authority limits the activity of factories or traffic, and controls the enforcement of smog-alarm regulations.

4. Laboratory data are used in two projects of the National Environmental health Programme in the Baranya county.

The title of the first project is the following: Correlation Between the Arsenic Level of Drinking Water and the State of Health of the Population.

As the arsenic level of drinking water is more than 50 µg/l in South-Baranya, we study symptoms and diseases that probably originate from people's exposure to arsenic, as well as morbidity and mortality data on inhabitants of four settlements.

In order to improve the present situation, we have proposed to some local governments the most suitable technical method for removing arsenic from drinking water.

The aim of the second project is to define the main sources of pollution and the quantity of hazardous waste in the Baranya county.

These projects are good examples of the cooperation between specialists of the National Public Health Institute, the Regional Public Health Service, the Regional Authority for Environmental Protection, and the local governments.

Cooperation between the two regional authorities has been undergoing for five years, during which time it proved to be very profitable for both parties. Our work has also been extended to two neighbouring countries, the Somogy county and the Tolna county.

With the participation of those countries and the support of the Soros Foundation, we intend to improve people's state of health within the scope of the so-called "Model Region Programme" (the three countries serving as a model). This programme includes Environmental Health Assessments, the specification of problems to be solved, and the determination of the appropriate strategies.

ANNEXES

**OECD Seminar on Environmental Indicators
In Central and Eastern European Countries and In New Independent States**

Budapest, 21 May 1997

Hosted by the Hungarian Ministry of Environment and Regional Policy, the Hungarian Institute for Environmental Management, the Hungarian Ministry of Public Health and the Hungarian National Institute of Public Health. Held back to back with the Workshop on "Environmental and Health Information to Support NEAPs and NEHAPs" (Budapest, 22-23 May 1997).

Conclusions of the Chairman

The purpose of the seminar was to provide Central and Eastern European Countries (CEECs) and New Independent States (NIS) with appropriate information on OECD work on environmental indicators and to thereby support an early harmonisation of activities concerning environmental indicators both within CEECs and NIS, and with ongoing international work.

The seminar was chaired by Dr. Tibor Faragó, Director General of the Hungarian Ministry for Environment and Regional Policy. He was assisted by Mr. Jaroslav Benes, Director of the Department for Strategies and Environmental Statistics of the Czech Environment Ministry and Prof. Sandor Kerekes, Head of the Department of Environmental Management and Technology of the Budapest University of Economics.

On the basis of the presentations and individual experiences, participants discussed why governments of CEECs and NIS needed environmental indicators and for which audiences they would use them. They viewed environmental indicators not only from the perspective of specific national needs, but also in terms of common needs that could be the focus of a harmonised approach. These include:

- I the need for environmental information and indicators to:
 - measure changes and trends with respect to the state of the environment and natural resources;
 - better assess the effects of past actions;
 - contribute to the development, implementation and harmonisation of environmental policies, plans and strategies;
- II the need to integrate environmental considerations into economic and sectoral decision-making;
- III the need to promote sustainable development within CEECs and NIS and beyond;
- IV the need to improve environmental information and its dissemination to all stakeholders, the public and interested international organisations.

The diverse geographic, economic and cultural background of CEECs and NIS was taken into account, as well as institutional arrangements and the average data availability in CEECs and NIS.

Discussions showed a high interest in environmental indicators in the region. Differences exist, however, among CEECs and NIS concerning the level of indicator development, the approach adopted to

define indicators and the actual capacity to mobilise and validate underlying data. Several countries (e.g. Czech Republic, Hungary, Poland, Baltic countries) have already launched projects derived from OECD and UNCSD work; others are planning to do so in the framework of their national environmental action plans. In a number of countries, indicator development was viewed from the data supplier perspective (bottom up approach), rather than from the user perspective (top down approach). It appears that discrepancies between the demand for environmental indicators and the current possibilities of data supply are important. Reasons for this are largely rooted in the current institutional arrangements and in the overall lack of appropriate resources and assistance to adapt and maintain existing monitoring systems, and to ensure the quality of primary data.

Participants agreed that the OECD approach provides a useful framework for environmental indicators, and helps to connect environmental, social and economic issues. In addition, it provides a building block for sustainable development indicators.

Special attention was given to the:

1. major issues identified in the OECD Core Set of environmental indicators, and to the three dimensions of the Pressure-State-Response model; and
2. areas of importance for national environmental plans and strategies.

Specific areas of concern identified at the seminar were: environmental conditions, including human health issues (e.g. those linked to urban air pollution, to drinking water quality); effects of past actions and policies; effects of current economic and sectoral policies; responses such as economic and fiscal instruments; and transboundary issues. The environmental implications of the privatisation process and industrial restructuring during the transition period were also mentioned.

Participants expressed concern about their countries' capacities to mobilise relevant primary data and to ensure its quality. Generally it was accepted that countries can work with available data in the short term to produce useful indicators. However over the longer term, data quality and coverage need to be improved, as well as environmental information systems in general.

Several factors were identified that can foster the acceptance and credibility of environmental indicators:

Co-operation. An open, collaborative process involving all stakeholders is needed to decide on priority issues, the appropriate indicators, the best data, and the significance of the indicators. This necessitates co-operation between institutions and ministries including appropriate data sharing and flows. Involvement of relevant agencies can be lengthy but has significant pay-offs in terms of acceptance of results. A similar argument applies to the relationship between sub-national and federal authorities. The latter is of particular importance since real action in a number of CEECs and NIS will increasingly take place at the sub-national level.

Interpretation. It was stressed that environmental indicators need qualifications and careful interpretation due to varying socio-economic and cultural backgrounds of countries. The basis of the indicator, the data quality and limitations must be explained and openly available. The indicator itself must be clear, understandable and placed within an issue context for decision-makers.

Dissemination. In order further improve the quality of the indicators and to get feedback on their policy relevance and usefulness, they must be made widely available and be regularly used in analytical work.

Participants suggested that CEECs and NIS in particular:

- I intensify their efforts by various means, including through strengthening institutions and financial arrangements, to improve statistics, indicators and information on the environment;
- II use the OECD approach and framework as a reference for developing and using environmental indicators (Pressure-State-Response model, terminology and criteria for indicator selection; guidance for the interpretation of indicators);
- III identify, through appropriate co-ordination, those areas where common environmental indicators could actually be developed at the present stage, maximum use being made of existing data. Concrete work could start on selected priority issues which are of common relevance to a number of CEECs and NIS. Generally, work should be concrete, user-oriented and pragmatic in its ambitions;
- IV identify, whenever appropriate, additional national and sub-national environmental indicators that could be developed to reflect specific national concerns and issues;
- V reinforce their co-operation with a view to improving and harmonising environmental indicators. This could be done through ad hoc meetings bringing together selected countries of the region and focusing on specific indicator issues.

In this respect, Hungary was ready to further promote the international exchange of information and experiences of the OECD countries and the countries of the CEECs and NIS by taking into account the achievements and results of the OECD in this area.

OECD Seminar on Environmental Indicators in CEECs
(Budapest, 21st May 1997)
Workshop on Environmental and Environmental Health Information to Support
NEAPs and NEHAPs: Using Data and Indicators
(Budapest 22-23rd May 1997)

FINAL LIST OF PARTICIPANTS

ALBANIA

Ms. Marita Afezolli
Primary Health Care Directory

Tel: +355 42 64 671
Fax: +355 42 422 6213/426 5229
E-mail: cep@cep.tirana.al

Ministry of Health and Environment
Boulevard "Bajram Curri"
Tirana
Albania

ARMENIA

Mr . Boris Ghazaryan
Head
Department of International Co-operation
Ministry of the Environment
35 Moskovian Street
Yerevan 375002
Armenia

Tel: +3 742 53 36 29
Fax: +3 742 15 18 40/53 49 02

Dr. S. Ogasian
Chief Specialist Department of
Hygienic and Anti-epidemic
Surveillance of the Ministry of Health
Toumanian Str. 8
375001 Yerevan
Armenia

Tel: +374 2 56 53
Fax: +374 2 15 10 97
E-mail: hrair@who.armenia.su

AZERBAIJAN

Mr. Fikret Djafarov
Planning Department
State Committee for Environment
31 Estiglaliyat St.
370001 Baku
Azerbaijan

Tel: +9 9412 92 60 19
Fax: +9 9412 92 59 07

Mr. Rauf Muradov
Head of Department
State Department of Ecology
31 Estiglaliyat St.
370001 Baku
Azerbaijan

Tel: +9 9412 92 68 63
Fax: +9 9412 92 59 07

Dr. Namik Aliyev
Centre for Supply and Information
34 Djabbarly Str.
370065 Baku
Azerbaijan

Tel: +994 12 949 342
Fax: +994 12 215 189
E-mail: fma@who.baku.az

Professor Namik Nariman oglu Aliyev
Director of the Institute of Preventive
Medicine
34 Djabbarly Str.
370065 Baku
Azerbaijan

Tel: +994 12 947 345
Fax : +994 12 947 572
E-mail: fma@who.baku.az

BELARUS

Dr. Cheslav Adamovich Romanovsky
Deputy Director
BelRC "Ecology"
Khorugej St., 31A
220002 Minsk
Belarus

Tel: 375 172 34 69 11/34 70 65
Fax: +375 172 34 80 72

Mrs. Galina Gasyuk
Deputy Minister
Ministry of Statistics
Partizansky ave. 12
220070 Minsk
Belarus

Tel: +375 172 49 02 79
Fax: +375 172 49 22 04

Dr. Petr Amvrosiev
Belarus Research Institute
of Sanitary and Hygiene
ul. F. Skoriny 8/47
220012 Minsk
Belarus

Tel: +375 17 268 43 66/4386
Fax: +375 17 268 43 72

BULGARIA

Ms. Dafina Dalbokova
National Centre of Hygiene
Medical Ecology and Nutrition
15 D. Nesterov Str.
1431 Sofia
Bulgaria

Tel: +3592 75 12 363
Fax: +3592 95 81 277

CROATIA

Mr. Zarko Jakovljevic
Ekoneg Institute Fax: +385 1 530 604
Ulica grada Vukovara 37
10000 Zagreb
Croatia

Tel: +385 1 6125 080

E-mail:zarko.jakovljevic@
open.hr

Mrs. Vesna Koletic
Central Bureau of Statistics
Ilica 3
10000 Zagreb
Croatia

Tel: +385 01 4554 422
Fax: +385 01 429 413

Dr. Krunoslav Capak
Environmental Health Department
Croatian National Institute of Public Health
Rockefellerova ul. 7
10 000 Zagreb
Croatia

Tel: +385 1 272 822/424 669
Fax: +385 1 276 248

CZECH REPUBLIC

Mr. Jaroslav Benes
Director
Department for Strategies and
Environmental Statistics
Ministry of Environment
Vrsovická 65
100 10 Prague 10
Czech Republic

Tel: +420 2 67 12 28 38
Fax: +420 2 67 31 03 08

Mr. Erich Lippert
Department for Strategies and
and Environmental Statistics
Ministry of Environment
Vrsovická 65
100 10 Prague 10
Czech Republic

Tel: +420 2 67 122 167
Fax: +420 2 67 310 308

Ms. Helena Cizková
Ministry of Environment
Project Management Unit
Prokesovo Na'm. 8
70200 Ostrava
Czech Republic

Tel: +420 69 628 2362
Fax: +420 69 6212 061
E-mail: cizkova@env.eg

Dr. R. Kubinova
National Institute of Public Health
Srobarova 48
14200 Prague 10
Czech Republic

Tel: +420 274 1955/267 08 2623
Fax: +420 274 19 55
E-mail : kubinova@szu.anet.cz

FRANCE

Ms. Cécile Rechatin
French Institute for the Environment (IFEN)
61, boulevard Alexandre Martin
F-45058 Orléans
France

Tel: +33 38 79 78 78
Fax: +33 38 79 78 70

ESTONIA

Mr. Lauri Klein
Environment Information Centre
Ministry of the Environment
Mustamae tee 33-428
EE-0006 Tallinn
Estonia

Tel: +372 252 7665
Fax: +372 6 564 071
E-mail: klein@ic.envir.ee

Professor Raiot Silla
Institute of Preventive Medicine
Ministry of Social Affairs
Paldiski mnt. 52/6 A
EE-0006 Tallinn
Estonia

Tel: +372 2 493 184
Fax: +372 2 493 185

GEORGIA

Mr. Merab Sharabidze
Deputy Minister
Ministry of Environment
68a Kostava Street
380015 Tbilisi
Georgia

Tel: +995 32 230 664
Fax: +995 32 983 425
E-mail: irisi@gmep.kheta.ge

HUNGARY

Mr. Alán Pintér
"B. Johan" National Institute of Public Health
Gyáli u. 2-6
1097-Budapest
Hungary

Tel: +36 1 215 21 46
Fax: +36 1 215 21 46

Dr. Istvan Vincze
'B. Johan' National Institute of Public Health
Gyali Str. 2-6
P.O. Box 64
H-1966 Budapest
Hungary

Tel: +36 1 215 22 50
Fax: +36 1 215 01 48
E-mail : h1889vir@ella.hu

Ms. Idikó Farkas
Epidemiologist
Head, Department of Experimental Hygiene
National Institute of Public Health
Gyáli út. 2-6
H-1097 Budapest
Hungary

Tel: +36 1 215 2250/291
Fax: +36 1 215 0148
E-mail: h7260far@ella.hu

Mr. Pál Bozó Tel: +36 1 374 3365
Head
Department of Environmental
Information Systems
Ministry of Environment and
Regional Policy
Fo u. 44-50
H-1011 Budapest
Hungary

Fax: +36 1 201 4361
E-mail: bozo@ktm.
x400gw.itb.hu

Mr. Elemér Szabó
Advisor
Department of Environmental
Information Systems
Ministry of Environment and
Regional Policy
Fo u. 44-50
H-1011 Budapest
Hungary

Tel: +36 1 374 3365
Fax: +36 1 201 4361
E-mail: elemer.szabo@ktm.
x400gw.itb.hu

Mr. István Pomazi
Chief Advisor
Department for
Environmental Strategy
Ministry of Environment and
Regional Policy
Fo u. 44-50
H-1011 Budapest
Hungary

Tel: +36 1 457 3383
Fax: +36 1
E-mail: istvan.pomazi@ktm.
x400gw.itb.hu

Dr. Tibor Faragó
Head
Cabinet Bureau of the Minister
Ministry of Environment and
Regional Policy
Fo u. 44-50
H-1011 Budapest
Hungary

Tel: +36 1 457 3344
Fax: +36 1 201 4091
E-mail: farago@kik.ktm.hu

Mr. Gábor Valké
Hungarian Statistical Office
Keleti Károly u. 5-7
Budapest
Hungary

Tel: +36 1 345 6731

Mr. Attila Hajdu
Environmental Department
Hungarian Privatisation and State
Holding Company
Pozsonyi út 56
H-1133 Budapest
Hungary

Tel: +36 1 269 8600 ext. 2706
Fax: +36 1 267 6698

Mr. Tibor László
Office for the State of
Environment Survey
Institute for Environmental Management
Alkotmány u. 29
H-1054 Budapest
Hungary

Tel: +36 1 374 3539
Fax: +36 1 374 3538

Ms. Zsuzsanna Flachner
Office for the State of
Environment Survey
Institute for Environmental Management
Alkotmány u. 29
H-1054 Budapest
Hungary

Tel: +36 1 374 3539/131 1533
Fax: +36 1 374 3538

Mr. Attila Nováki
Office for the State of
Environment Survey
Institute for Environmental Management
Alkotmány u. 29
H-1054 Budapest
Hungary

Tel: +36 1 374 3539
Fax: +36 1 374 3538

Ms. Györgyi Vékey
Chief Expert
Office for the State of
Environment Survey
Institute for Environmental Management
Alkotmány u. 29
H-1054 Budapest
Hungary

Tel: +36 1 374 3539
Fax: +36 1 374 3538

Ms. Katalin Zánkai
Project Coordinator
Office for the State of
Environment Survey
Institute for Environmental Management
Alkotmány u. 29
H-1054 Budapest
Hungary

Tel: +36 1 374 3539
Fax: +36 1 374 3538

Ms. Olga Kádár
Expert in Remote Sensing
Office for the State of
Environment Survey
Institute for Environmental Management
Alkotmány u. 29
H-1054 Budapest
Hungary

Tel: +36 1 374 3539
Fax: +36 1 374 3538

Mr. Gábor Szarvas
Senior Consultant
ERM Hungária Ltd.
Fehérvári út 44 - III Floor 311
H-119 Budapest
Hungary

Tel: +36 1 204 3966
Fax: +36 1 204 3966

KAZAKSTAN

Mr. Bulat Esekin
Chariman NEAP/SD Center
Panfilova St. 106 E-mail: neapkz@online.ru
480091 Almaty
Kazakstan

Tel: +7 3272 631 612
Fax: +7 3272 207 784

Mr. Eugeny Tyrtyszny
Deputy Chairman NEAP/SD Center
Panfilova St. 106 E-mail: neapkz@online.ru
480091 Almaty
Kazakstan

Tel: +7 3272 631 612
Fax: +7 3272 207 784

Mr. Sergey Ivlev
NEAP/SD Center
Panfilova St. 106
480091 Almaty
Kazakstan

Tel: +7 3272 631 612
Fax: +7 3272 207 784

Dr. Fajzula Bismildin
Department of Sanitary and
Epidemiological Surveillance
of the Ministry of Health
63, Ablajchan Str.
Almaty
Kazakstan

Tel: +7 3272 33 44 69
Fax: +7 3272 33 17 19

KYRGYZSTAN

Mr. Nurlan Kenenbaev
Head of Program Development
Department of National Centre of Environmental
Strategy and Policy
Ministry of Environmental Protection
131 Isanova Str.
720033 Bishkek
Kyrgyzstan

Tel: +7 3312 21 97 97
Fax: +7 3312 21 97 97
E-mail: env@imfiko.bishkek.su

Ms. Ainash Sharshenova
Kyrgyz Institute of Prophylaxy and
Medical Ecology of the
Ministry of Health
34 Sovetskava str.,
720005 Bishkek
Kyrgyzstan

Tel: +7 3312 444105
Fax: + 7 3312 293593

LATVIA

Mr. Edgars Bojars
Environmental Consulting and Monitoring Centre 1
Ministry of Environmental Protection
and Regional Development
Rupniecibas Str. 25
LV-1045 Riga
Latvia

Tel: +371 7 323 595/3665
Fax: +371 7 830 503
E-mail: vkmc@main.vvi.gov.lv

Ms. Liga Blanka
Ministry of Environmental Protection and
Regional Development
Peldu iela 25
LV-1494 Riga
Latvia

Tel: +371 7 026 504
Fax: +371 7 820 442
E-mail: ruksis@varam.gov.lv

Dr. Signe Velina
Department of Public Health
Ministry of Welfare
28, Skolas St.
LV-1331 Riga
Latvia

Tel: +371 7 021-677
Fax: +371 2 271 055

LITHUANIA

Mr. Liutauras Stoskus
Joint Research Centre at EPM
Environmental Protection Ministry
Juozapaviciaus 9 nt.gamta.lt
LT-2600 Vilnius
Lithuania

Tel: +370 2 722 554
Fax: +370 2 723 202
E-mail: liutauras.stoskus@

Dr. Romualdas Sabaliauskas
Department of Public Health
Ministry of Health
Gredimino av., 27
LT-2600 Vilnius
Lithuania

Tel: +370 2 22 47 40
Fax: +370 2 22 46 01

REPUBLIC OF MOLDOVA

Mr. Petru Cocirta Tel: +373 2 761 964
National Institute of Ecology
Ecological Monitoring Center
Bd. Dacia 58
2060 Chisinau
Republic of Moldova

Fax: +373 2 761 964

Ms. Janna Tafi
Head of Department for Social Statistics
The Department for Statistics
Bulevard Stefan cel Mare
124 Chisinau
Republic of Moldova

Tel: +373 2 22 50 02/22 42 32
Fax: +373 2 54 51 62

Dr. Nicolae Ion Opopol
National Centre for Scientific and Applied Hygiene
and Epidemiology
Gh. Asachi Str., 67A
2028 Chisinau
Republic of Moldova

Tel: +373 2 73 58 22/72 96 47
Fax: +373 2 72 97 25
E-mail : cnspie@mdearn.cri.md

**THE
NETHERLANDS**

Mr. Erik Lebret
RIVM
Environmental Epidemiology
PO Box 1
3720 BA Bilthoven
The Netherlands

Tel: +31 30 274 27 77
Fax: +31 30 274 44 07
E-mail: erik.lebret@rivm.nl

POLAND

Ms. Maria Szczepka
Ministry of Environmental Protection,
Natural Resources and Forestry
ul. Wawelska 52/54
00-922 Warsaw
Poland

Tel: +48 22 25 64 39
Fax: +48 22 25 87 61

Ms. Lucyna Ciolkowska
Ministry of Environmental Protection,
Natural Resources and Forestry
ul. Wawelska 52/54
00-922 Warsaw
Poland

Tel: +48 22 25 69 76
Fax: +48 22 25 87 61

Mr. Jerzy Sleszynski
Warsaw University
Economics Department
Ul. Plugha 44/50
00-241 Warsaw
Poland

Tel: +
Fax: +48 22 831 2846

Dr. J. Swiateczak
Department of Environmental Health Hazards
The Nofer Institute of Occupational Medicine
8 Sw. Teresy Str.
P.O. Box 199
PL-90 950 Lodz
Poland

Tel: +48 42 31 575
Fax: +48 42 31 48 49
E-mail : jsw@a.imp.lodz.pl

Professor S. Tarkowski
Department of Environmental Health Hazards
The Nofer Institute of Occupational Medicine
8 Sw. Teresy Str.
P.O. Box 199
PL-90 950 Lodz
Poland

Tel: +48 42 31 48 42
Fax: +48 42 56 83 31
E-mail:

Ms. Viktoria Takacs
University of Agriculture
Ul. Umultowska 100/G/52
Department of Zoology
Poznan
Poland

Tel: +48 6 148 7652
E-mail: takacsv@owl.au.eou.pl
or viki@ludens.elte.h4

ROMANIA

Ms. Christina Secui
Ministry of Waters, Forests and
Environment Protection - Monitoring Directorate
Bd. Libertatii nr. 12 - Sector 5
Bucharest
Romania

Tel: +40 01 410 0482
Fax: +40 01 410 0482

Dr. Anka Dumitrescu
Institute of Hygiene and Public Health
Str. Dr. Leonte 1-3
76256 Bucharest pcnet.ro
Romania

Tel: +401 63 83 970
Fax: +401 31 23 426
Email: andumitrescu@pcnet.

Mr. Radu Cadariu
Director Fax: +401 410 0482
Ministry of Waters, Forests and
Environment Protection
Monitoring Directorate
Bd. Libertatii, nr 12, Sector nr 5
Bucharest
Romania

Tel: +401 410 0482

**RUSSIAN
FEDERATION**

Mr. Eugeny Belkin
Deputy Director
Department for Environmental Programme
Ministry for Environment Protection and
Natural Resources
B. Gruzinskaya Str. 4/6
123812 Moscow
Russian Federation

Tel: +7 095 254 50 55
Fax: +7 095 254 82 83

Ms. Elena A. Lobanova
Federal Centre for GeoEcological Systems
State Committee for Environmental Protection
B. Gruzinskaya Street 4/6
123812 Moscow, GSP
Russian Federation

Tel: +7 095 176 75 20/60
Fax: +7 095 176 26 75
E-mail: root@ipofcgs.msk.ru

Mr. Vladislav D. Fourman
CPPI
36 Obrucheve Str. - 5th Floor
117342 Moscow
Russian Federation

Tel: +7 095 334 42 09
Fax: +7 095 334 29 33
E-mail: vlad@eneemp.msk.ru

SLOVAK REPUBLIC

Mrs. Sona Mrázová
Ministry of the Environment
Nám. L. Stúra 1
812 35 Bratislava
Slovak Republic

Tel: +42 17 516 2111
Fax: +42 17 516 2031

Mrs. Jana Matejová
Ministry of the Environment
Nám. L. Stúra 1
812 35 Bratislava
Slovak Republic

Tel: +42 17 516 2151
Fax: +42 17 516 2031

Dr. Katarina Halzlova
Department of Hygiene of Environmental
and Working Conditions
Ministry of Health
Limbova 2
83341 Bratislava
Slovak Republic

Tel: +421 07 378 98 64
Fax: +421 07 376 142

Ms. Eleonóra Fabiánová
Specialized State Health Institute
Cesta k nemocnici 1
975 56 Banská Bystrica
Slovak Republic

Tel: +42 1 88 405 733/744 040
Fax: +42 1 88 742 642
E-mail: fabianova@suhe.siph.sk

SLOVENIA

Ms. Doroteja Carni
Ministry of Environment and
Physical Planning
Vojkova 1a sigov.mail.si
Ljubljana
Slovenia

Tel: +386 61 178 45 38
Fax: +386 61 178 40 51
E-mail: doroteja.carni@mopuvn.

UNITED KINGDOM

Mr. John Custance
Department of the Environment
Romney House
43 Marsham Street
London SW1 3PY
U.K.

Tel: +44 171 276 8421
Fax: +44 171 276 8748

UKRAINE

Dr. Olga I. Tymchenko
Ukrainian Scientific Centre of Hygiene
50 Popudrenko Str.
253660 Kiev
Ukraine

Tel: +380 44 559 14 66
Fax: +380 44 559 90 90
E-mail: tymchenko@ushc.kiev.ua

Mr. Valeriy G. Malyarenko
Ministry for Environmental Protection and
Nuclear Safety
5 Khreshatyk Street
352001 Kiev
Ukraine

Tel: +380 44 228 7343
Fax: +380 44 229 8050
E-mail: malyaren@mep.freenet.
kiev.ua

UZBEKISTAN

Dr. Shuchrat Boltochodzhajev
Department of Sanitary and
Epidemiological Surveillance
of the Ministry of Health
63, Navoji Str.
Tashkent
Uzbekistan

Tel: +7 3712 41 57 20/441041
Fax: +7 3712 41 16 41
E-mail: rufat@who.org.uz

WORLD BANK

Ms. Krisztina Kiss
Project Manager
Bank Center, Granite Tower
H-1944 Budapest
Hungary

Tel: +36 1 302 9581
Fax: +36 1 302 9586

Mr. John Dixon
The World Bank
1818 H Street, N.W.
Washington, D.C. 20433
U.S.A.

Tel: +1202 473 8594
Fax: +1202 477 0968
E-mail: jdixon@worldbank.org

EBRD

Ms. Nobuko Ichikawa
European Bank for Reconstruction
and Development
One Exchange Square
London EC2A 2EH
U.K.

Tel: +44 171 338 6274
Fax: +44 171 338 6848
E-mail: ichikawan@ebrd.com

UNEP

Mr. Nickolai Denisov
UNEP/GRID - Arendal
Longum Park, PO Box 1602
Myrene N-4801
Arendal
Norway

Tel: +47 37 035 650
Fax: +47 37 035 050
E-mail: denisov@grida.no

Ms. Katarzyna Wójcik
Assistant
UNEP/GRID - Warsaw
Ul. Merliniego 9
02-511 Warsaw 12
Poland

Tel: +48 22 488 561
Fax: +48 22 627 4623
E-mail: gridw@plearn.edu.pl
or kasia@robin.sggw.waw.pl

HIID

Mr. Jozsef Fucskó
HIID
Roosevelt ter 7-8/164
H-1051 Budapest
Hungary

Tel: +36 1 131 5763
Fax: +36 1 131 5763

Mr. Gabor Valke
HIID
Roosevelt ter 7-8/164
H-1051 Budapest
Hungary

Tel: +36 1 131 5763
Fax: +36 1 131 5763

EEA

Mr. Peter Bosch
European Environment Agency
Kongens Nytorv 6
DK-1050 Copenhagen K
Denmark

Tel: +45 33 34 71 07
Fax: +45 33 36 71 28
E-mail: peter.bosch@eea.dk

REC

Mr. Miroslav Chodak
Regional Environmental Center for
Central and Eastern Europe
Ady Endre ut. 9-11
2000 Szentendre
Hungary

Tel: +36 1 311 199 ext. 308
Fax: +36 1 311 294
E-mail: mchodak@rec.org
miroslav@fs2.bp.rec.hu

EXPERTS

Mr. Edward Bellinger
Dean
Department of Environmental Sciences
and Policy
Central European University
Nador u. 9
H-1051 Budapest
Hungary

Tel: +36 1 327 30 21
Fax: +36 1 327 30 31
E-mail: envsci@ceu.hu

Dr. Clyde Hertzman
Department of Health Care and
Epidemiology
Faculty of Medicine
University of British Columbia
Vancouver, British Columbia V6T 1Z3

Tel: +1604 822 3002
Fax: +1604 822 4994

Mr. Peter Kaderjak
Budapest University of Economics
Fovám tér 8
H-1093 Budapest
Hungary

Tel: +36 1 216 7218
Fax: +36 1 217 4539
E-mail: kaderjak@ursus.bke.hu

Dr. Katherine J. Kaye
Hungarian Environmental Information
Systems Project
School of Geography
Mansfield Road
Oxford OX1 3TB
UK

Tel: +44 1865 271 919
Fax: +44 1865 271 929
E-mail: kkaye@ermine.ox.ac.uk

Professor Sandor Kerekes
Dean
Department of Environmental
Management and Technology
Budapest University of Economics
Fovám tér 8
H-1093 Budapest
Hungary

Mr. Norman J. King
WHO-EURO Fax: +44 1844 34 36 79
Chairman - NEHAP Task Force
"The Gyles" - Bledlow Road
Saunderton, Princes Risborough
Bucks HP27 9NG
U.K.

Tel: +44 1844 34 36 79

Mr. Vladan Raznatovic
Ministry of Environmental Protection
Nemanjina obala bb
81000 Podgorica
Montenegro
Yugoslavia

Tel: +381 81 459 21
Fax: +381 81 259 06/257 26
E-mail: ladan@sezam.co.yu

Mr. Paul Rump
Paul Rump & Associates
129 Keefer Street
E-mail: rumpp@cyberus.ca
Ottawa, Ontario
Canada K1M 1T7

Tel: +1613 741 7358
Fax: +1613 741 2003

Mr. Andrey V. Semichaevsky
Department of Environmental
Sciences and Policy
Central European University
Budapest
Hungary

Tel: +36 1 327 3091
Fax: +36 1 327 3031
E-mail: semichae@sirius.ceu.hu

Ms. Elena Strukova
Senior Consultant
HIID Environmental Policy
34 Bolshaya Cheryomushkinskaya 218a
117259 Moscow
Russian Federation

Tel: +7 095 245 0963
Fax: +7 095 245 0963
E-mail: sasha@agolub.msk.ru

Mr. Simon Turner
Hungarian Environmental Information
Systems Project
ADAS Wolverhampton
Woodthorne
Wergs Road
Wolverhampton WV6 8TQ
UK

Tel: +44 1902 693 126
Fax: +44 1902 693 166
E-mail: Simon_Turner@adas.co.uk

Ms. Kristina Veidemane
Baltic Environmental Forum
Ministry of Environment
Peldu Str. 25
LV-1494 Riga
Latvia

Tel: +371 7 223 108/227 018
Fax: +371 7 228 892
E-mail: bef@com.latnet.lv

WHO

Mr. Carlos Corvalán
Office of Global and Integrated
Environmental Health
World Health Organization
CH-1211 Geneva
Switzerland

Tel: +4122 791 4208
Fax: +41 22 791 4123

Dr. Dinko Kello
WHO Regional Office for Europe
Scherfigsvej 8
DK-Copenhagen 2100
Denmark

Tel: +45 39 17 12 51
Fax: +45 39 17 18 78
E-mail : dke@who.dk

Dr. Alexander Kuchuk
WHO European Centre for Environment and Health
A. van Leeuwenhoeklaan 9, Bilthoven
P.O. Box 10
3730 AA De Bilt
The Netherlands

Tel: +31 30 22 95305/309
Fax: +31 30 22 94 120
E-mail : aku@who.nl

OECD

Mr. Brendan Gillespie
Head
Non-member Countries Branch
OECD - Environment Directorate
2, rue André Pascal
75775 Paris Cedex 16
France

Tel: +33 1 45 24 93 02
Fax: +33 1 45 24 96 71
E-mail: brendan.gillespie@
oecd.org

Mr. Anthony Zamparutti
Non-Member Countries Branch
OECD - Environment Directorate
2, rue André Pascal
75775 Paris Cedex 16
France

Tel: +33 1 45 24 16 25
Fax: +33 1 45 24 96 71
E-mail: zamparutti@oecd.org

Mrs. Myriam Linster
State of the Environment Division
OECD - Environment Directorate
2, rue André Pascal
75775 Paris Cedex 16
France

Tel: +33 1 45 24 97 44
Fax: +33 1 45 24 78 76
E-mail: linster@oecd.org

Ms. Olga Savran
EAP Task Force Secretariat
Non-Member Countries Branch
OECD - Environment Directorate
2, rue André Pascal
75775 Paris Cedex 16
France

Tel: +33 1 45 24 13 81
Fax: +33 1 45 24 96 71
E-mail: savran@oecd.org

Ms. Mary Crass
OECD
European Conference of Ministers
of Transport
2, rue André Pascal
75775 Paris Cedex 16
France

Tel: +33 1 45 24 13 24
Fax: +33 1 45 24 97 42
E-mail: mcrass@compuserv.com

Mr. Valts Vilnitis
NEAP Regional Co-ordinator
PO Box 109 E-mail: valts@park.lv
LV-1047 Riga
Latvia

Tel: +371 612 624
Fax: +371 9309 117