

**Report of the Meeting on Integrated  
Environmental Assessment/Global  
Environmental Outlook (IEA/GEO)  
Core Data Working Group**

DPCSD Office, New York, 22-23 January, 1996



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## 1 Introduction

The first meeting of the Core Data Working Group for Integrated Environment Assessment (IEA)/Global Environment Outlook (GEO) studies took place on 22-23 January 1996 at UNDP/UNEP offices in New York. The meeting was attended by over 20 representatives of UN agencies, inter-governmental organizations and private research institutions active in the field of environmental data, including most major global data reporting agencies (Annex I and II give the Agenda and list of participants).

The Core Data Working Group was assembled in the context of preparations for UNEP's Global Environment Outlook (GEO) report series, which will replace the more traditional State-of-the-Environment Reports. For the GEO process, four working groups have been set-up: Scenarios (led by SEI); Modelling (led by RIVM); Policy (not yet started), and Data, currently led by UNEP, with strong inputs from RIVM. There are, however, many other institutions preparing global data sets and/or reporting on global issues using global or regional data sets. Examples are the World Bank with the World Development Report, UNDP with the Human Development Report, WRI with the WRI/UNDP/UNEP World Resources Report, the Earth Council with the Earth Audit Report, plans of UNDP/UNEP for a global report on progress following up Agenda 21, and more sectoral global reports from agencies like FAO, WHO and the like. Indicators of sustainable development, which are being developed through broad-based consultation and consensus, and coordinated by UNDP/UNEP on behalf of the UN Commission on Sustainable Development, will also need to rely heavily on the availability of good core data sets. All of these efforts would profit from better access to existing data sets, more efficiency in improving or developing new data sets, more comparability between them and other advantages. Thus, UNEP felt it would be more effective, efficient, and desirable to join efforts and agree on a process for coping with data-related issues in global reporting which are of common interest to most if not all global data producing and reporting agencies and institutions.

The specific objectives of the meeting were:

- to list a limited number of existing core data sets for Integrated Environment Assessments and Global Environment Outlook studies, and identify major data gaps and shortcomings;
- to devise a realistic strategy and agree on joint actions to make such data more easily accessible, more freely and openly available to major global data producing and reporting agencies and institutions and developing countries in general, and to collaborating scientific centers working with UNEP to prepare the GEO studies in particular.

Brief introductions were given on the objectives of GEO and recent events which led up to this Meeting, such as the symposium sponsored by NASA/UNDP/UNEP on "Core Data Needs for Environmental Assessment and Sustainable Development Strategies" which took place in Bangkok, Thailand in November 1994. Each of the participants then briefed the Meeting on their institution's involvement in core data activities, and voiced their expectations of the meeting. A Background Paper for the Meeting and an initial "Core Data Sets/Variables Matrix" were presented, which set the scene for further discussions. The Background Paper, a revised version of the Core Data Sets Matrix, as well as a brief summary of individual presentations given during the opening session are included as Annexes III, IV and V respectively.

The Meeting spent considerable time on discussing such issues as global data set quality, data gaps and shortcomings, meta-data, accessibility/availability, standards, minimum core data sets and the like. Much of the discussion took place as the participants went through the initial version of the Core Data Sets/Variables Matrix. Since comparable points came up repeatedly during different stages of the meeting, the discussions are summarized not sequentially but by topic (see Section 2 of this report).

In summary, there were strongly recognized needs to improve the quality of existing data sets, add meta-data to them, and deal with access, harmonization and cost issues associated with data management. Joint action was identified and agreed regarding core data sets for IEA/GEO studies. In Section 3 an agreed-upon timetable and skeletal workplan for action is presented that could be implemented over the next six months to one year. It was clearly recognized though that this pilot should be seen as a process which will require much follow-up and broader participation in future.

## 2 Summary of Discussions

### 2.1 Core Data

The initial "Core Data Sets Matrix" was discussed extensively and practical suggestions were offered for improvements, most of which have been incorporated in the new version included in Annex V:

- a column for "Actions Needed" on each data set will be added;
- a column to allow cross-referencing to the UNDP/PCSD list of indicators will be added (a rough effort was made at this time; a more thorough analysis is needed - see explanatory paragraph at end of Annex IV)
- the column "Quality Indicator" has been re-labelled to "Documentation (available)";
- changes in definitions and adding/deleting/re-grouping of data sets and variables;
- a ranking was given, in terms of overall importance and appropriateness for IEA/GEO studies (A = important or critical, B = of secondary importance, C = not currently relevant)
- where time and expert knowledge represented in the meeting allowed, data sets were rated as either plus, zero or minus in terms of a "best estimate" of their quality for IEA/GEO studies.

It should be noted that the ranking exercise was a very approximate one, and in many cases the expertise necessary to judge quality and currency may not have been present in the Meeting. Thus, they should at this point be treated as preliminary only.

All "Environmental Information" variables were ranked as A variables. However, a brief evaluation of available data sets showed a severe lack or at least inadequacy of existing data. This theme, perhaps more than any other, needs a vast amount of data improvement and "gap filling" for IEA/GEO studies.

Several additional data areas related to Indicators of Sustainable Development (ISDs) that have emerged through the consultation process coordinated by UNDP/PCSD for use by decision-makers at the national level are missing in the current list. These include: (i) financial mechanisms and resources; (ii) human settlements (housing etc.); (iii) income distribution; (iv) institutional issues; (v) public awareness; and (vi) radioactivity. These will have to be taken into consideration at some point in future, even if to collect information on these variables will be neither easy nor straightforward.

### 2.2 Data Quality

There were two different attitudes expressed concerning data quality. The predominant school of thought believed that the important thing is to make data accessible, and then see what feedback is prompted, even in the case where data are (much) less than perfect. The other school was more cautious, and felt that only fully validated data should be offered for publication and use. Their arguments: the overall error in many data sets is so high as to render them mostly if not entirely useless and even when data are reasonably up-to-date, they are often needed in much greater detail than can currently be found.

While these positions are somewhat oversimplified here, it was useful that such a discussion took place, since data should profit both from scientific rigor and the exposure of less-than-perfect data to the world community for their relevant feedback and subsequent improvement. The issue of data quality is clearly of critical importance, and remains one of the most difficult to resolve satisfactorily. There is a need to improve the dialogue between experts and non-experts, and between disciplines, in carrying out data verification. It was concluded that data sets should indeed be made available as much and as soon as possible, but accompanied by ample documentation and quality reports, keeping in mind that data have multiple uses and, thus, can have multiple quality requirements.

The question was raised as to whether there is no reliable supply mechanism for these core data sets existing. This issue will need to be explored in the proposed pilot study (see Section 3 below). Many institutions are secondary data collectors (RIVM, UNEP, UNSD, the World Bank, WRI), but even then they do not necessarily have the resources to maintain more than a limited number of core data sets.

### 2.3 Data Gaps and Shortcomings

One of the objectives of the meeting was to identify data gaps and shortcomings, and solicit possible solutions or work-arounds to fill these gaps. Current data gaps and shortcomings were identified based on two different lists of missing or inadequate data sets: one compiled during the Meeting as a result of core data sets ranked as 'A' but currently missing or less than adequate; and another compiled by RIVM, based on their data support work for IEA/GEO modelling studies being carried out by RIVM (both lists are included as Annex VI).

It was noted that 12 of the data variables listed as gaps or shortcomings are maintained by FAO. Thus, the absence of an FAO representative at the Meeting was very much regretted, and it was agreed that FAO should be kept well-informed of the Meeting discussions, results and follow-up plans so that they will be able to collaborate as much as possible. It is hoped that the conclusions of such Meetings will encourage FAO in their continuous efforts to improve many of their much-needed global data sets and to participate directly in future.

Several suggestions for work-arounds were made on how best to fill data gaps and, though little actual progress was made, some ideas were given of where to find alternatives for missing or inadequate data sets. Suggestions offered were: (i) try to fill data gaps with the best data currently available, though it was realized that little significant progress could be made in the short-term or "on the cheap", because most of the gaps are not easy or inexpensive to complete; (ii) RIVM to prepare a list of potential gap-filling data sets and techniques for the Data Working Group to examine; and (iii) the GEO collaborating scientific centers could be requested to assist in gap-filling.

### 2.4 Meta-data

There was full agreement that without accompanying, explanatory meta-data, core data sets themselves would not be useable. Thus, one of the first steps which the Data Working Group will have to initiate is an evaluation of existing meta-data systems (examples are systems of CIESIN, NASA, RIVM, UNEP, WRI) so that a synthesis and recommendations can be made.

There is already a certain level of compatibility or at least overlap between the contents and functionality of many of the systems referred to above, and most of the same systems do focus on what can be considered "core data sets", either geo-referenced or statistical or both. A more extensive study will have to be carried out specific to the needs of IEA/GEO and the participating agencies and institutions, before more exact requirements of any such system can be precisely determined. As a start the attendee from WRI prepared an initial list of basic meta-data attributes to be included in any such system (see Annex VII). Others present, such as RIVM, UNEP, CIESIN, will contribute to this evaluation exercise based on their own extensive experience in this area.

### 2.5 Data Sources

During the discussions concerning availability/accessibility of core data sets for IEA/GEO studies, there were several prominent sources of data which were repeatedly mentioned. These included DESIPA/UNSD for a wide variety of statistical data sets, mostly socio-economic in nature; FAO for data relating to agriculture, fisheries and forestry; UNEP and RIVM for a wide variety of geo-referenced (typically global and regional) data sets relating to the terrestrial surface, oceans and atmosphere; and other more primary data collectors and providers for specific data sets.

The Group realized that most if not all of the institutions mentioned above would have a role to play in the provision of data for IEA/GEO studies, and more specifically for the pilot phase which the Data Working Group envisions during the coming year (see section 3 below).

### 3 Strategy and Actions

The Strategy and Actions discussion focussed on a plan and concrete steps which should be taken to make core data sets (more easily) available to data reporting agencies, GEO collaborating centers and institutions in developing countries. Several reasons were given as to why such action should be taken, ranging from global and regional reporting needs, to a need for greater cooperation within the UN family, to the need for data sets for national level decision-making, to the common need for an agreed process, and finally, to achieve cost-effectiveness.

It was agreed that in a one year pilot a number of best available core data sets (10-15) should be produced on an appropriate electronic medium in a common format with accompanying meta-data and a database access system. Such a package will be for use by GEO collaborating scientific centers, by major international data-producing and reporting agencies and institutions and by other regional and national groups. Data included should be the best available at the time from DESIPA/UNSD, FAO, RIVM, UNEP, the World Bank, WRI and others. In the pilot a specific product is envisaged, but the process itself is important as well, because if/when the data are supplied to well targeted users, major discrepancies, distortions and errors will be detected and feedback or reactions provided.

It was agreed that the institutional responsibility for such a mechanism needs to be within the UN system (UNEP was mentioned as an option, with possibly a "political window" at UNDPCSD). Large NGOs such as WRI and CIESIN or private companies can be involved in actual implementation.

In order to formally introduce the pilot, it was decided to start with writing a scoping paper in which the effort will be outlined. The paper will serve as a vehicle to search for financial support both within and outside the agencies and institutions involved. The paper will include:

- a discussion of how to set up a distributed data or information system;
- whether any related meta-database should be centralized or distributed/virtual;
- other possible support mechanisms and feasible links for such a system, including those at various institutions who are not electronically linked;
- logistical requirements which were tentatively identified as:
  - (i) one full-time coordinator;
  - (ii) two to four meetings per year of (minimum) five people, including the coordinator and data managers from the major agencies and institutions participating;
  - (iii) two meetings per year of approx. 20 people: the coordinator, data managers plus one representative from each of the GEO Collaborating Scientific Centers;
  - (iv) operating funds (not specified).

The table on the next page lists concrete steps to be taken in the next six months and a slightly longer-term time-frame to create such a product. For sake of simplicity activities and outputs have sometimes been mixed.



Activity/output	Responsibility	Timing
a) Core Data Working Group Meeting Report - first draft	UNEP	end Jan 96
b) New matrix column on link to CSD Indicators on Sust. Dev.	UNEP	mid Feb 96
c) Core Data Meeting Group Meeting Report - final draft	UNEP	end Feb 96
d) Scoping paper - first draft *	World Bank	end Feb 96
e) New matrix column on "Action needed on data sets"	WRI + RIVM	mid Mar 96
f) Scoping paper - final draft	World Bank	end Mar 96
g) Propose 10-15 core data sets for inclusion in the "Product"	UNEP + TexA&M	end Mar 96
h) Approach potential data-supplying agencies to join forces	UNEP (Mooneyhan)	Apr/May 96
i) Using Scoping Paper recommendations: propose prototype for a unified IEA/GEO information system, covering both meta-data descriptions and core data sets themselves, making use of existing systems as a starting point	CIESIN, WRI, UNEP	Apr/June 96
j) Interim coordination	UNEP	Feb/Jun 96
k) Hold next Data Working Group Meeting	UNEP	May 96
l) Technical work for production of system prototype : <ul style="list-style-type: none"> <li>• Cleaning/(re-)formatting data sets (agreed format)</li> <li>• Write meta-data for core data sets (agreed format)</li> <li>• Creation of a query system to access actual data</li> <li>• Proposal for data up-dating/improving mechanism</li> <li>• Design and incorporation of a product user feedback</li> </ul>	to be decided	Jul/Dec 96
m) Select expert team to advise on publishing/technical aspects of production (convening and/or communicating regularly)	UNEP and/or WRI, CIESIN ?	Jul/Dec 96
n) Select expert review team to verify core data set contents (convening and/or communicating regularly)	UNEP = coord. + agency contrib. ?	Jul/Dec 96
o) Identify operational group within UN system, to keep the activity and the product going	all	towards end 96
p) Information system prototype completed	to be decided	Dec 96 / Jan 97
q) Further populate the prototype	to be decided	Feb/Jun 97
r) CD-ROM or other electronic publication ("the Product") (ready for opening of General Assembly at the latest)	to be decided	Jun or Sep 97

\* draft will also be circulated to the Earth Council, FAO, IDRC, UNDP/DHRO and UNESCO

#### 4 Concluding Remarks

The Core Data Working Group Meeting for IEA/GEO studies recognized that fundamental improvements in basic data sets are essential, and that a number of key data sets are currently unavailable altogether. One of the important dimensions of the exercise is to identify and help set priorities for the improvements that will be required in specific subject areas (agriculture, demographics etc.) in order to promote their use in international, interdisciplinary studies. Despite the improvements that are clearly needed, cooperation on core data sets during the pilot phase will:

- (i) make use of existing data and meta-data (and modest improvements that can be made in these); and
- (ii) emphasize systems and content review mechanisms that will both promote access to the summary, global-level "core" data sets, and ensure responses from well-defined groups of user (e.g. GEO collaborating centers).

The proposed pilot phase should be seen and understood by all of the agency and institutional participants as a learning process. When "the Product" is delivered next year, this will have to be accompanied by a thorough report on how a broader exercise should be pursued in future. This Data Working Group is most certainly aware of the many ongoing relevant activities that can and should contribute both to the pilot phase and to any follow-up thereafter. While this initial effort will focus mainly on existing procedures and tools, it will also document prospective candidates (data sets, methods, tools, initiatives, institutions) that may not have been included "up front", but certainly warrant inclusion in a broader effort in future.

## AGENDA FOR THE IEA/GEO CORE DATA WORKING GROUP (DWG) MEETING

United Nations, DC2 Building No. 2, UN Plaza, 22-23 January 1996, New York

### Day 1 - Monday 22 January 1996

09:00 - Opening of Meeting

Welcome by UNEP and UNDP/CSD

Round of Introductions and Expectations

Presentation of Agenda for approval

Explanation of background for Data Working Group within the framework of UNEP's IEA/GEO Project (Goals and Purposes of the DWG Meeting)

Brief review of efforts to date (Ten-minute inputs from the global data reporting groups; e.g., CIESIN, NASA, RIVM, UN/ECE, World Bank, WRI etc.)

Follow-up to Core Data Sets Meeting in Bangkok (NASA)

(Coffee Break)

11:00 - Presentation of background paper for the meeting, the proposed list of "core data sets" and various critical definitions to avoid confusion (UNEP-Ron Witt/RIVM-Jaap v Woerden)

11:30 - Begin discussion on characteristics and definition of core data sets; their status/availability/ quality/utility for global reports; baseline versus derived data sets; their resolution in space and time, etc.

12:30 - LUNCH

14:00 - Continue discussion on "core data sets" for global reports

15:00 - Begin discussion on a series of actions required to meet the needs of "core data sets" for global reporting, including:

- Common database service for handling of and access to data sets for global reports (not necessarily centralised one);
- Is there need for a common meta-database to catalog entries of core data sets (or are existing mdb systems sufficient?)

17:00 - Closure of Day One

Day 2 - 23 January 1996

- 09:00 - Continue discussion on series of actions required to meet the needs associated with "core data sets" for global reporting:
- Definition of "standard" data format(s) for core data sets;
  - Processing of relevant core data sets to above format(s);
  - Distribution of relevant data sets - ways and means;
- (Coffee Break)
- How to handle data quality-related issues; how to handle regional inputs in the context of global reporting, and ensure that regions have access to core data sets?
- 12:30 - LUNCH
- 14:00 - Discussion concerning how to proceed and resources needed:
- Formulation of a Workplan and Timeframe for future common activities (participants of the entire DWG to contribute)
  - Need for formation of a Core Data Working Group 'per se'?
  - Institutional Issues and Links; achieving economies of scale
  - How to stay in touch on core data set-related issues? (such as e-mail, electronic bulletin board, newsletter, WWW HomePage)
  - Need for a follow-on meeting?
- 17:00 - Closure of First DWG Meeting

IEA/GEO CORE DATA WORKING GROUP MEETING

United Nations, DC2 Building No. 2, UN Plaza, 22-23 January 1996, New York

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**BACKGROUND PAPER PREPARED BY UNEP AND RIVM  
FOR THE IEA/GEO CORE DATA WORKING GROUP MEETING  
New York, 22-23 January 1996.**

**I Introduction/Background/Rationale for IEA Data-related Activities**

Global environment assessment and reporting activities carried out or coordinated by a global network of data-producing and reporting agencies require that a wide variety of coherent and consistent data be available for integrated environmental assessments (IEAs). As an example, UNEP's recently initiated Global Environmental Outlook (GEO) provides a major impetus for data management activities, since along with other IEAs it requires that specific global and regional data layers be made accessible to major scientific collaborators for modelling purposes, scenario development and other relevant research.

While it is understood that IEA is a long-term process, it is necessary to assure the provision of critical data sets and associated information which are required for the production of IEA outputs during the next several years, even if this means working with sub-optimal data sets at the current time. The globally coordinated IEA-related data management activities will help to make available, in a cost-effective manner, the distributed series of key environmental and other data sets which are essential inputs to reports generated by a series of global reporting agencies and institutions (such as DPCSD, UNDP, UNEP, the World Bank, WRI etc.).

It should be noted that such activities will also provide a service in the establishment of "common (and) compatible data systems" mentioned in Chapter 40 of Agenda 21. The DPCSD in particular has referred to the importance of developing among UN agencies a "system of access to their respective databases, in order to share data fully, to streamline the collection and interpretation of data and identify data gaps, for the purpose of providing more comprehensive and integrated data to decision-makers at national, regional and international levels."

Several international agencies have recently embarked on entirely new series of IEAs, with far-reaching implications for their programmes in the realm of data. For example, the GEO series of reports are to provide insights into environment and development interactions, and serve as the basis of the decadal UNEP State of the Environment report for the year 2002. Thus, the GEO report series will require many socio-economic data sets while addressing the topic of sustainable development from a purely environmental perspective.

While the nature of this task is vital, there is great opportunity and risk in moving beyond the traditional types of assessment and state-of-environment reporting on status and trends, to an examination of physical mechanisms and dynamic processes. The major objectives of IEAs in general, and the GEO project in particular, have been elucidated as follows:

- provide insight into the interaction between environment and socio-economic and institutional factors, particularly at global and regional levels, using new methods & tools for the analysis of these interactions;
- assess, through an iterative process, progress made towards sustainable development;
- identify strategic and emerging issues that require international attention, amongst others, through projections into the future;
- support international policy setting and action taking on priority issues; and
- strengthen capacities, particularly in developing countries, for integrated, policy-relevant assessments.

(after V. Vandeweerd, "Proposal for Annotated Outline and Workplan for the first edition of GEO", May 1995.)

Thus, IEA reports analyse issues of international importance, but often with a major emphasis on regional perceptions and priorities, and do so using new or innovative methodologies. The integrative nature and breadth of IEA activities which are undertaken by the international agencies necessitate a collaborative approach, with significant participation from all of the major reporting agencies and institutions. These analyses require vast amounts of data on a wide variety of themes as input to models, for scenario generation and evaluations of indicators, without which proper results will not be forthcoming for IEA reports.

Thus, there is a common need among major data-producing and reporting agencies and institutions for access to timely, accurate and quality-controlled data and information relating to both human and physical environments, as fundamental inputs for their respective IEAs. This includes provision of best-available (to date) global and regional data sets, and coordination of their improvement where needed.

## II Summary of Major Global Data Initiatives

Many global organisations having a mandate to report on development and environment-related activities publish major data reports on an annual or less frequent basis. These include many UN agencies and specialised bodies thereof (UNDP, UNEP, UNESCO, WHO, WMO, FAO etc.), intergovernmental organisations (the World Bank), and private/public research institutes (the World Resources Institute, for example). These reports are a vast source of published information on most if not all sectors of the global economy and society, including a variety of topics related to both environment and development, and typically present a fairly up-to-date picture of important global issues and trends such as agricultural and economic production, land degradation, pollution of air, soil and water, human health and welfare, etc. These reports include a great deal of information in the form of tables, graphs and charts as collected by the agencies themselves or third parties, often supplied by countries at the national level or by other governmental bodies at the regional level. These basic data often are not comparable or compatible from country-to-country or region-to-region, and thus need to be standardised either categorically, geographically and/or temporally, due to different means of collection or measurement, for example, before they can be aggregated into one more-or-less harmonised and valid presentation. In some cases the data standardisation is done by the original source of the data, but in other cases it may be done by the final data publisher.

More and more, these reports are attempting to present integrated information on development and environment in the form of ISDs; indicators of sustainable development. Such indicators often allow more "basic", aggregated variables to be summarized with a single number or statistic, to simplify more complex phenomena and improve communication.<sup>1</sup>

However, one form of data which these reports normally lack (though they may contain an occasional reference) are digital, geo-referenced environmental data sets or "computerised maps" for use in geographic information systems (GIS) and related analyses. Such data sets are one of the most basic and necessary inputs for modelling studies which attempt to predict land/oceans/atmosphere interactions, anthropogenic impacts on and changes to these natural systems, and the complicated feedback mechanisms which affect both human and physical systems. They are also a vital component of regional and global-scale integrated environment assessments (IEAs), as well as attempts to predict and provide early warning of future environmental problems and trends.

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1 Hammond, A., Adriaanse, A., Rodenburg, E., Bryant, D. and R. Woodward. "Environmental Indicators: A systematic approach to measuring and reporting on environmental policy performance in the context of sustainable development". A report of the World Resources Institute, May 1995, 43 pages plus Appendices.

### III Summary of Recent Related Meetings

Over the previous few years, there have been a number of meetings held in an attempt to come to grips with and define the specific data-related needs of IEA. One of the most prominent and recent of these meetings took place in mid-November 1994 in Bangkok, Thailand under the title of "International Symposium on Core Data Needs for Environmental Assessment and Sustainable Development Strategies". The meeting, which was co-sponsored by UNDP, UNEP, U.S. EPA, NASA, USGS and USRA, issued a report including the papers given, other proceedings and results in two volumes. The stated objectives of the Bangkok meeting were as follows:

- Seek consensus on priority environmental assessment and sustainable development (hereafter, EA&SD) issues and the core data sets needed to respond to these issues;
- Define the minimum characteristics of these data in relation to national and trans-national purposes;
- Establish collaborative mechanisms to foster harmonisation of core environmental data; and
- Examine the barriers to their general access and use.<sup>1</sup>

The Bangkok meeting succeeded in identifying ten high-priority "core data sets" which are central to many types of EA&SD-related studies. In fact, the recommended list is a compilation of ten broad data themes which are common to most IEAs, as follows:

- |                       |                 |
|-----------------------|-----------------|
| - Land use/land cover | - Topography    |
| - Demographics        | - Economy       |
| - Hydrology           | - Soils         |
| - Infrastructure      | - Air quality   |
| - Climatology         | - Water quality |

Within these broad data themes, a series of 66 specific data sets were identified by Topical Panels and Regional groups of the Bangkok meeting. These were ranked in terms of importance and grouped under the ten major data themes, after being discussed in an open session. This allowed the participants to see which "core data sets" were deemed to have various priority levels by both the Regional and Topical Panels.

Among the recommendations of the Bangkok meeting were the following:

- That a forum be established to provide follow-up and develop action plans to carry out (these) recommendations, under the sponsorship of UNDP and UNEP, with a standing core membership and links to other, similar fora;
- UN agencies and donor organisations should influence national bodies to help create and maintain core data sets;
- International agencies, donors and national governments should work together to promote an understanding of the need for, status of and general knowledge about core data sets (ibid, pp. 3-4).

<sup>1</sup> "Report of the International Symposium on Core Data Needs for Environmental Assessment and Sustainable Development Strategies", Bangkok, Thailand, 15-18 Nov. 1994, Volume I, Executive Summary, page 1.

Thus, the current "Core Data Sets Working Group" or DWG meeting can be seen as a logical follow-up to action either taken at or further recommended by the Bangkok meeting. Indeed, one of the major objectives of the current meeting and work carried out prior to it was to confirm the list of core data sets, and define them in terms of their general characteristics and availability for IEA-related studies. Other explicit objectives of the current DWG Meeting are as follows:

- Identify and agree upon a limited number of core data sets that can be used by all major IEA report producers;
- Agree on potential cooperation for a common, distributed database system, and if considered feasible a meta-database to document the contents of same, in order to service IEA data and information-related needs, as well as a strategy for data set distribution and maintenance;
- Determine the major critical data gaps and shortcomings for those data variables in the current list which lack corresponding known data sets;
- Agree on a realistic strategy among major data-producing agencies and institutions to fill these data gaps, taking into consideration the resources which may be available for such an effort;

Section V of this paper deals with the list of proposed core data sets/ variables themselves, and the matrix of their defining characteristics (see Annex I) which was prepared for discussion during the current DWG meeting.

#### Other Meetings

During the week previous to the current DWG meeting, a series of three other meetings on UNDP/Development Watch, UNEP/Earthwatch and UNEP-DPCSD Common/ Compatible Systems of Access to Data and Information are to be held. It is also anticipated that these meetings (particularly the latter) will confirm many of the core data needs, as well as reinforce the concept that the UN and other major global data producing/reporting agencies and institutions must work closely together in the provision or sharing of core data sets, and the relevant information (meta-data) which describes and makes them useable for IEA and other studies.

Indeed, one could go a step further and suggest that the same agencies and organisations could use the opportunity of the current DWG Meeting to begin discussion of a distributed "environment and development" UN database system, which would be commonly run and maintained to the benefit of all, and follow principles of open data access enshrined in various international treaties.

#### **IV The "Core Data Sets" Matrix and related Definitions**

The general purpose of the current IEA Core Data Working Group Meeting is to progress beyond the work already completed at the Bangkok and other meetings related to "core data"; that is, not only to confirm the list of general data themes and specific data sets for IEA studies, but to identify their status in terms of an entire series of characteristics. The following descriptive items are all included in the Matrix of Potential/Proposed Core Data Sets for IEA Studies (Annex I):

- Title of major theme and variables; then, for each appropriate/corresponding data set:
- Original source of the data set;
- Current holder/provider of the same (responsible for technical coherence of the data, if not actual data contents and quality);

- Type of data (from geo-referenced to statistical, in descending order of desirability/priority):
  - Digital, geo-referenced or "GIS-ready" data sets
  - Digital, non-georeferenced (ascii data for areas, e.g.)
  - Analog maps
  - Statistical data in digital form
  - Statistical data in analog form
  - Charts/figures/graphs only
- Data format, whether digital or analog only;
- Spatial coverage, normally, this will be global or regional;
- Resolution or scale, normally, as associated with raster or vector data in geographic format;
- Frequency/Reference year, that is, how often produced or published, most recent or single date if data set/map only collected/created/issued once;
- Quality indicator, this column indicates only if the data set in question is currently adequately documented and accompanied by suitable meta-data including lineage and some quality rating;
- Remarks, name of the data set and other relevant or useful information, e.g. public or proprietary data.

In order that the DWG Meeting discussions can proceed, and that future activities can take place in a coherent fashion, a number of definitions must first be accepted or agreed upon by most if not all of the participants. The following definitions are proposed, with examples given for each one:

**Data Theme:** a general data category or heading which can be used to group many specific data variables and data sets; e.g., Agriculture, Climatology, Demographics/Health, Economy, Infrastructure, Supporting Data.

**Data Variable:** a specific parameter relating to the human or physical environment, the state or condition of which can be mapped, measured or recorded; data variables can all be classed under one of the major headings; for example, all of the following:

- Agricultural(/Fishery/Forestry) Productivity;
- Precipitation or Temperature; average annual or monthly;
- Human Population Distribution or Density
- Administrative boundaries;
- Transport network.

**Data Set:** a specific manifestation or rendering of a data variable, that is collected, created, produced and/or published at a specific point in time (or over a known period) by an identifiable institution(s) and/or person(s), and including all relevant meta-data necessary for its proper application for a specific purpose or study; e.g., the "Major World Ecosystem Complexes based on Carbon in Live Vegetation" from Olson et al., U.S. DOE/ORNL, circa 1986.

**Data file:** a single computerised manifestation of the above, normally available in digital format only and without meta-data.

**Data Set Collection:** a series of data sets linked by theme, geography, origin or other criteria.

**Basic Data Set or Variable:** equivalent to "baseline, fundamental or raw" measurements from gauges or met. stations, satellites or statistical surveys. These data can be aggregated, quality-checked and refined for further use, but are neither interpreted nor converted to GIS (geographic) format; instead, they are the necessary inputs for the same; some examples are:

- monthly precipitation totals/temp. averages from stations;
- geometrically corrected but otherwise "raw" satellite image (analog or digital);
- population survey statistics at district or town level.

**Core Data Set or Variable:** one on which a consensus has been reached and or "prevailing wisdom" dictates is necessary for, as well as common to, multiple IEA and Sustainable Development studies; these are often derived from Basic Data Sets and are needed by many agencies/groups/individuals; e.g., World Gridded Elevation map such as the 'ETOPO-5' data set; long-term Monthly Average Precipitation and Temperature data sets.

**Derived Data Set or Variable:** as "Core Data Set" above, except derived from another data set as a "second-generation" product; e.g., a shaded relief map of the world derived from a gridded elevation data set, or climate anomalies based on Monthly Precipitation and Temperature data.

**EA & SD Indicator:** an aggregated, representative and/or simplified version of one or more of the above core data sets used in IEA studies, which allows for better communication about and greater understanding on a particular EA & SD issue or topic; e.g., greenhouse gas emissions, protected areas as % total land area threatened.

## V Proposed Core Variables and Data Sets

### Origins and Relevance

The proposed list of core data variables and data sets potentially useful for IEAs and included as Annex I of this Background Paper was initially prepared by RIVM's Informatics Service Centre (ISC), and draws heavily upon the list of 66 specific data sets compiled by the Bangkok meeting. This matrix and proposed "core data sets" list very similar, though not identical to, the one derived at the Bangkok meeting, in terms of both major headings (Data Themes) and specific Data Sets. Completion of the Data Set Matrix and suggestions for a few additional data variables was carried out by UNEP/EAD/GRID-Geneva staff, with assistance from GRID-Nairobi for the statistical data reports. Other inputs were received on a more preliminary version of the list from staff of UNEP/EAD-Nairobi, UN/ECE and the World Bank.

The Data Set Matrix was filled in partially by electronic searching for data sets via the World Wide Web (WWW), and partially by going through existing data reports of the major data-producing agencies and institutions, as well as known data archives, CD-ROM products and major data repositories of the international agencies and various national/regional governmental bodies.

At the data theme and data variable levels, it follows closely the list established by the Bangkok meeting. What is entirely new in this version, however, is the naming (identification), location and major characteristics of specific data sets proposed as preliminary "core data sets" for the global data requirements of IEA-related studies. In cases where no data set or less than adequate data only are available, this is indicated by a blank, question mark and/or a relevant comment under "Data Set Name/Remarks". Thus the matrix can also be used to identify critical data gaps and short-comings for IEA-related studies. For example, the fact that no coherent data set could be located for the variable "Morbidity" means that it needs either to be found (should it exist), or somehow compiled or created.

### Question of Data Quality

It was not within the scope of the current activity to determine detailed data quality information for each data set, as this is a major task in and of itself. Instead, a "yes/no" appears under the "Quality Indicator" column to show whether or not a given data set is accompanied by documentation and/or other relevant information ("meta-data") such as on how it was developed; by whom; for what use/application(s)/purpose(s); its technical characteristics; name, date and citation of published paper or other scientific material which are necessary to render the data set useful for IEA studies. In any case, the purpose of including a field for data set "quality" is to draw attention to the critical importance of this item, which ideally should be available in a standardised format, and without which data may not be useable at all.

### Question of Access/Availability

While the matrix identifies the original source and current holder of given data sets, it does not specifically comment on their actual availability or conditions of access, unless they are known to be proprietary or restricted for other reasons (such as "security"). Normally, a given data set should be available from the "Current Holder" for no charge or on a cost-recovery basis. One of the critical points the DWG Meeting should address is how to handle exceptional cases of missing and proprietary data sets (see below).

### Problems posed by Proprietary Data Sets

Given the increasing trend - even within the UN system - to "privatise" or at least charge for data, it would behoove the DWG Meeting participants as a group to again call for the highest level of international cooperation to make such data more and not less accessible, particularly for IEA studies. Furthermore, any collaboration undertaken between the data-producing agencies and institutions to find or create additional core data sets should proceed on the basis of "free and open access" for all UN family members, governments at all levels, public institutions and the general public.

This is not to minimize the fact that increasingly restrictive national and international data access policies mean opposing or overcoming such a trend, but the major international data-producing and reporting agencies, inter- governmental organisations and private/public research institutions can at the very least try to set a better example. Given that the "core data sets" are required for so many purposes including IEAs and that they are typically available at global and not national scales (i.e., have limited geographic detail and thus are "non-threatening" in terms of national sovereignty), there should be no reason for any agency to restrict their availability. This is particularly the case when they have been collected or created through international efforts or programmes utilizing public funds (see also the Bangkok meeting report, Vol. I, p. 35 and p. 42.).

## **VI Recommendations for Future Activities/Cooperation (among the major data-producing/reporting agencies)**

### Core Data Sets for IEA

It is anticipated that the DWG Meeting will make progress towards final agreement on the proposed core data sets and their appropriateness, given their specific characteristics, for IEA studies. While many of those listed should be "confirmed" as vital for this purpose, others may be disputed or even eliminated from the list as not necessary. In any case, it is preferable that the core data sets list be seen as dynamic, flexible and open to addition rather than closed, as new data sets may become available and needs change through time. Thus, a second tier of desirable but non-core data sets could also be designated by the DWG Meeting, to be addressed as a second priority and only as time, opportunity and resources allow.

### Strategy for filling the major data gaps

It is also anticipated that discussion about the data set matrix and its contents will reveal the existence of further data sets not yet identified, but also the need to determine the existence or collect/create key data sets which are missing, as well as to upgrade current data sets which exist only in analog or non-geographic formats to a GIS-compatible or at least more advanced, cartographic status for use in IEA-related studies.

Ideally, the DWG Meeting will attempt to develop a specific plan and timeframe for filling data set gaps, but this is dependent on the willingness of participants to take on various responsibilities, either working individually or together to improve and expand current collection of core data sets for IEA. During the DWG Meeting and at the appropriate time on the agenda, the chair would welcome any useful ideas or suggestions that might be forthcoming on this topic.

### Strategy for Sharing Existing Data Sets (and meta-data)

Given that the major data-producing and reporting agencies and institutions have a similar need for direct access to core data sets for IEA-related studies, and that many of these are already in their possession, it is proposed that such data sets should be made available to all participants by the current holders. This also implies a responsibility to maintain the data sets in question as up-to-date as possible, and to assure that they are accompanied by coherent and comprehensive meta-data which allows for their proper use. In cases where the current holder of a given data set is unable to perform or provide such services, the DWG Meeting can attempt to identify another candidate agency or institution to do the same tasks.

A similar strategy is proposed, at least as a "default solution", for those data sets which are not currently available in geographic format. The current holders could be asked to devise a plan and timetable for rendering, e.g., tabular data in a GIS-ready format, even if this only means creating a global map of administrative polygons with some statistical attribute. Again, in cases where the current holding agency or institution is unable to take on such responsibilities, the DWG Meeting needs to discuss viable alternatives.

### Formalization of the above activities

The chair of the DWG Meeting will consider any ideas or suggestions which may be forthcoming on the need or utility of "formalizing" any or all of the above-mentioned activities and tasks. For instance, the participants may decide based on impetus developed during this and the prior week's meetings (particularly on "Access to Data and Information" that a common, distributed database system should be deliberately set up or at least encouraged to evolve among/between the major data-reporting agencies and institutions. In similar fashion, consideration of a common meta-data structure and eventually a shared tool for meta-data management (input/access/update etc.) can be discussed among the participants.

The probability is that in the current situation of scarce human as well as financial resources, such a shared database of core data sets and/or related meta-data system will in any case not develop overnight. By the same token, the very scarcity of resources makes it more likely, if not imperative, that the major data-producing and reporting agencies and institutions work ever more closely together to make core data sets and their related information for IEA studies readily available and accessible, to the great advantage of all groups and individuals who are concerned in working with the same.



## **VII Conclusion**

The IEA/GEO Core Data Working Group (DWG) Meeting will only be as successful in launching common data-related activities of the major data-producing and reporting agencies and institutions, as the participants are interested in devoting both time and resources to the development and management of "core data sets" and related information. It is certainly possible to stimulate useful discussion on this subject and perhaps agree on how next to proceed, but to achieve concrete results within a few years' time is another matter. Ultimately, how well this and other, similar meetings may serve to catalyse necessary activities among the major data-producing and reporting agencies will be measurable by the number of shared core data sets and the amount of related information transparently available, and the level of common effort devoted to create, improve and manage all of the same in the years to come.

### **Annex I      Core Data Sets/Variables Matrix for IEA**

### **Annex II      List of Major Global Data Reports**

World Development Report (IBRD)  
Human Development Index Report (UNDP)  
Environmental Data Report (UNEP)  
World Resources Report (WRI/UNDP/UNEP)  
Earth Audit Report (Earth Council)  
Periodic sectoral reports from other agencies such as FAO, etc.  
Planned: Global Environment Outlook - GEO (UNEP)

## IEA/GEO CORE DATA SETS/VARIABLES MATRIX; VERSION 3.

**NOTES on the Last Column on UN CSD ISD - links :**

The UNDP CSD indicator menu lists approximately 130 indicators. The Core Data sets Matrix lists some 170 parameters/datasets. For about 60 parameters a no-link ("0") could be given quite confidently (though even here some of the datasets may well be used/useful indirectly).

Some 55 question marks occur, either because not enough details were directly available about the dataset or about the methodology to derive certain indicators.

Some 30 "doubt-pluses" were given (" + "). These are datasets that might be used to derive an indicator (again depends on indicator methodology and/or on dataset details). Note that in some cases a dataset was given both a "?" and a " + ".

Some 40 quite confident "double-pluses" were give (" + + "). These are the datasets that seem to have a very direct link with listed indicators. Note that often "double-pluses" in fact relate to the same type of dataset, of use only for one or a few indicators (see eg. the Ambient Air Quality data sets which link to only a few (interrelated) indicators).

Additional remarks:

- (i) Even in case of a "double-plus" link the quality of the data may not be sufficient; also the coverage of the datasets is not always clear, and may not be good enough.
- (ii) A "no-match" ("0") means that a dataset is available, but it is not required for the current indicator menu. There are, however, also many "no-matches" the other way around : no dataset available for a certain indicator (could not be indicated in this table - can only be recorded in the indicator menu).
- (iii) The datasets listed are of a very different level, varying from a single large database to spelling out of detailed parameters, which does not make it easier to find "matches".
- (iv) The Indicators listed are not always single, straight forward. In case of complex, composite indicators the methodology to derive the indicator becomes very important, when trying to find matches with datasets.
- (v) The structure of the indicator menu is different from the dataset matrix and in some cases datasets are even listed twice. Ideally the dataset matrix would be restructured to match the indicator menu.

In summary : a more detailed analyses is required.

CLIMATE												
Variable name	Rank	Original sources	Main distributor	Type	Format	Spatial coverage	Resolution	Reference Year	Dataset name	Rating	UN CSD- ISD Link	
General	A	WMO, WCDMP	WMO, WCDMP	various	digital, analog	global and regional	various	1734-1995	Global and Regional Atmospheric, Hydrologic and Oceanic Data from the INFOCLIMA catalog of climate system Data sets		? +	
General	A	UNEP	GRID-GNV	vector (ArcInfo)	digital	57S-180E, 72N-180E	not mentioned	1930-1989	UNEP/GRID and UEA/CRU Climate Data (GNV172-178)		? +	
General	A	CDIAC, NCDC	CDIAC	points	digital	global	not mentioned	1892-1992	The Global Historical Climatic Network: long term Temperature, Precipitation, Pressure data (GHCN; NDP041)		? +	
General	A	USAF + Navy, NWS stations, foreign stations	NCDC	statistical tables	digital	global	none		International Station Meteorological Climate Summary (ISMCS); 2200 locations worldwide; CD-Rom		? +	
General	A	NCDC	NCDC	statistical tables	digital	global	none	1977-1991	Global Daily Summary (GDS); 10'000 stations: daily temperature, precipitation, position; CD-Rom		? +	
General	A	US Navy	NCDC	statistical tables	digital	global	none	1870-1992	Global Tropical and Extratropical Cyclone Climatic Atlas (GTECCA); CD-Rom		? +	
General	A	RIVM	RIVM	database	digital	global	none	1976-1990	CLIMATE Database; temperature, precipitation, evapotranspiration		? +	
Precipitation	A	GEOS ground stations	NCAR	raster, datasets	digital	global and regional	2.5/2.5-1/1 degrees	1890-1995	Global and Regional Precipitation and Water Data since 1890 from NCAR		? +	
Precipitation	A	RIVM (IIASA)	GRID-GNV	raster	digital	global	56/56 km	1930-1960	Mean Monthly Precipitation (long-term) GNV14		? +	
Precipitation	A	CIRES, NOAA	CDIAC	raster	digital	60S-180E, 80N-180E	4/5 degrees	1851-1981	A comprehensive Precipitation Data set for Global Land Areas (dataset:tr051)		? +	
Temperature	A	DAAC, CIT	GRASS	raster	digital	global	4.5/4.5 degrees	1981-1986	Sea Surface Temperature Map		? +	
Temperature	A	RIVM (IIASA)	GRID-GNV	raster	digital	global	56/56 km	1930-1960	Mean Monthly Temperature (long-term) GNV15		? +	
Cloudiness	A	RIVM (IIASA)	GRID-GNV	raster	digital	global	56/56 km	1930-1960	Mean Monthly Cloudiness (GNV13); land areas; %		? +	

DEMOCRAPHY AND HEALTH	Rank	Original sources	Main distributor	Type	Format	Spatial coverage	Resolution	Reference Year	Dataset name	Rating	UN CSD- ISD Link
Numbers, growth rate, density	A	NCGIA	SEDAC	raster (ArcInfo)	digital	global	5/5 degrees	1994	Gridded Population of the World	+	+
Numbers, growth rate, density	A	University of London	GRID-GNV	vector (ArcInfo)	digital	global	not mentioned	1981-1987	World Cities Population Database (WCPD; GNV29)	-	+
Numbers, growth rate, density	A	DESIPA, UNPD	WRI	statistical tables	digital	global (by country)	none	1955-2025	World Resource Database (1992): population average annual growth; %	+	++
Numbers, growth rate, density	A	FAO, UNSC, OECD	WRI	statistical tables	analog	global (by country)	none	1993	Population Density; derived data set; per 1000 hectares	-	++
Numbers, growth rate, density	A	DESIPA, UNPD	WB	statistical tables	digital	global (by country)	none	1965-1993	Social Indicators of Development; 191 countries; 87 social and economic indicators; diskette, CD-Rom, release '95		?
Age and sex structure	A	DESIPA, UNPD	WRI	statistical tables	digital	global (by country)	none	1965-1995	World Resources Database (1992): age 0-14, 15-64, greater than 65 years; %	+	+
Age and sex structure	A	DESIPA, UNPD	WB	statistical tables	digital	global (by country)	none	1965-1995	Social Indicators of Development: age 0-14, 15-64, greater than 65 years; %	+	+
Urban/rural breakdown	A	DESIPA, UNPD, ILO	WRI	statistical tables	digital	global (by country)	none	1950-2025	World Resources Database (1992): Total Urban, Rural Population; thousands	+	+
Urban/rural breakdown	A	DESIPA, UNPD	WB	statistical tables	digital	global (by country)	none	1965-1995	Social Indicators of Development: urban population average annual growth rate; %	+	++
Urban/rural breakdown	A	DESIPA, UNPD	WB	statistical tables	digital	global (by country)	none	1965-1995	Social Indicators of Development: urban/rural growth differential	+	++
Urban/rural breakdown	A	DESIPA, UNPD	WRI	statistical tables	digital	global (by country)	none	1965-1995	World Resources Database: urban population; %	+	++
Urban/rural breakdown	A	CIR, IDB	CIESIN	vector (ArcInfo)	digital	global	20' lat/30' long		Global Population Database: total, urban, rural	?	?
Crude birth and death rates	A	DESIPA, UNPD	WRI	statistical tables	digital	global (by country)	none	1955-2025	World Resources Database (1992): crude death rates; per 1000 population	+	0
Mortality by cause of death	A	WHO	WHO	statistical tables	digital	global (by country)	none	1950-1995	The WHO's Mortality Database: by country, age, sex, cause of death, others; Data available for member states	+	+
Life expectancy from birth and 6 months	A	DESIPA, UNPD	WRI	statistical tables	digital	global (by country)	none	1955-2025	World Resources Database (1992): life expectancy at birth (in years), male, female, total		++
Literacy rate (by sex)	A	UNESCO	WRI, WB	statistical tables	digital	global (by country)	none	1970-1990	World Resources Database (1992): Literacy Adult Male, Female; %		++



ECONOMY											UN CSD- ISD Link
Variable name	Rank	Original sources	Main distributor	Type	Format	Spatial coverage	Resolution	Reference Year	Dataset name	Rating	UN CSD- ISD Link
GDP per capita	A	UNPD	WRI	statistical tables	digital	global (by country)	none	1970-1989	World Resources Database (1992): GDP total, per capita; current US\$		++
GDP and income	A	OECD, IMF	WB	statistical tables	digital	global (by country)	none	1973-1993	World Data (1995): GDP, Gross Domestic Income; 161 countries; CD-Rom		+
GDP by sector	A	UNPD	WRI	statistical tables	digital	global (by country)	none	1970-1988	World Resources Database (1992): distribution of GDP for: Agriculture, Industry, Services; %		0
GDP growth rate	A		WB	statistical tables	analog	global	none	1970-1993	World Bank Reports: Growth of: Agriculture, Industry, Manufacturing, Services, others		0
Earnings per employee	A		WB	statistical tables	analog	global	none	1970-1992	World Bank Reports: Earnings per employee: average annual growth rate; %		?
Earnings per employee	A		WB	statistical tables	analog	global	none	1990-1992	World Bank Reports: Earnings per employee; index (1980=100)		?
Earnings per employee	A	UNIDO	WB	statistical tables	digital	global (by country)	none	1973-1993	World Data (1995): Real Earnings per Employee; CD-Rom		?
GNP per capita	A		WB	statistical tables	digital	global (by country)	none	1965-1993	Social Indicators of Development: Income, GNP per capita; diskette, CD-Rom		++
Fresh water use (includes groundwater)	A	FAO	FAO	statistical tables	digital	Africa	none	1994	AQUASTAT: Rural Water Statistics		?
Fresh water use (includes groundwater)	A		WB	statistical tables	digital	global (by country)	none	1965-1993	Social Indicators of Development: Access to safe Water; diskette, CD-Rom; % population urban, rural		++
Fresh water use (includes groundwater)	A	various	WRI	statistical tables	analog	global (by country)	none		Fresh Water Resources and Withdrawals		++
Material input	B	US Bureau of Mines; WBMS, IISI	WRI	statistical tables	digital, analog	global (by country)	none	1975-1990	World Resources Database 1992: production of selected metals: annual production; Al, Cd, Cu, Pb, Hg, Ni, Sn, Zn, Fe, steel (crude); metric tons		?
Material output	A										?
Trade	A	FAO	FAO	dataset	digital	global	none		FAOSTAT-PC: Trade; commercial		?
Trade	A		WB	statistical tables	analog	global	none	1993	World Bank Reports: Merchandise trade exports and imports; millions US\$		?
Trade	A	UN Statistical Office	UNCTAD, WTO	statistical tables	digital	OECD countries (by country)	none	1990-1994	PC-TAS (Trade Analysis System); data extracted from COMTRADE Database; OECD and newly industrialized countries (60 countries); CD-Rom		?

Product standards	A	OECD, IMF	WB	statistical tables	digital	global (by country)	none	1973-1993	World Data 1995: value of exports and imports, goods and services; CD-Rom		++
Prices	A	UNMSPAD	WRI	statistical tables	digital	global	none	1975-1989	World Resources Database (1992): commodity prices for 55 products		0
Prices	A	OECD, IMF	WB	statistical tables	digital	global	none	1973-1993	World Data 1995: agriculture, industry, manufacturing price indexes, consumer price index (goods, services); CD-Rom		0
Investment/industry, investment/agriculture	A	OECD	OECD, DSTI	statistical tables	digital	OECD countries	none	1995	Industrial Structure Statistics (ISS): investments in industry; diskettes, commercial		?
Investment/industry, investment/agriculture	A	FAO, ISNAR	WRI	statistical tables	analog	global (by country)	none	1961-1985	World Resources Report (94-95): Total public agricultural research expenditures; millions of 1980 US\$		++
Mineral reserves (consumption of fossil fuels)	A	US Bureau of Mines; WBMS, IISI	WRI	statistical tables	digital, analog	global (by country)	none	1977-1992	World Resources Database (1992): reserves of selected metals: bauxite, Cu, Pb, Ni, Sn, Zn, Fe, other; thousands of metric tons		?
Type & costs of environmental protection	A		UNECE ?								?

ENVIRONMENTAL INFORMATION		Rank	Original sources	Main distributor	Type	Format	Spatial coverage	Resolution	Reference Year	Dataset name	Rating	UN CSD- ISD Link
Occurrence and distribution of biotopes	A	US, DOE	GRID-GNV	raster, vector	digital	global	55.5/55.5 km	1983	Olson major ecosystems complexes (GNV1)	0	0	
Occurrence and distribution of biotopes	A	ILASA	GRID-GNV	raster	digital	global	0.5/0.5 degrees	1990	The Holdridge Life Zones (GNV5)	0	0	
Occurrence and distribution of biotopes	A	USDA Forest Service	WCMC	vector	digital	global		1989	Ecoregions of the Continents (Bailey)	?	0	
Location and areas of fragile ecosystems	A	Sierra Club	GRID-GNV	vector (ArcInfo)	digital	global	1:2'000'000	1989	World Wilderness Areas (GNV157); scale: from 1:2'000'000 to 1:1'000'000	0	0	
Location and areas of fragile ecosystems	A	various	WCMC	vector (ArcInfo)	digital	global	1:1'000'000		Tropical Forests Digital Map Database	-	?	
Location and areas of fragile ecosystems	A	IWRB, IUCN, others	WCMC	vector (ArcInfo)	digital	global			Wetlands Digital Map Database (marshes, deltas, lagoons, others); various scales	?	0	
Location and areas of fragile ecosystems	A	WCMC, DCW	WCMC, ICLARM	vector (ArcInfo)	digital	global	1:250'000		World Coral Reefs Map and Database (ReefBase); 1:250'000 is the minimum scale	?	0	
Location and areas of fragile ecosystems	A	ISRIC	GRID-GNV	vector (ArcInfo)	digital	57S-180E, 72N-180E	1:10'000'000	1990	The Global Assessment of Human Induced Soil Degradation (GLASOD; GNV18); Drylands/Deserts	-	++	
Location and areas of fragile ecosystems	A	NASA, GSFC	GRID-GNV	raster	digital	global	111/111 km	1986-1987	Natural Wetlands (Matthews and Fung; GNV8)	0	0	
Area (of land) protected	A	UN	WCMC	data set	digital	global (by country)	none	1993	1993 United Nations List of National Parks and Protected Areas	0	+	
Ambient air quality, emissions	A	RIVM, TNO	RIVM	raster	digital	global	1/1 degree		EDGAR Database: air emissions for several substances (CO <sub>2</sub> , NO <sub>x</sub> , others) and sources (industries, traffic, others)		++	
Ambient air quality, emissions	A	NASA, GSFC	GRID-GNV	raster	digital	global	111/111 km	1988	Annual Methane Emission from livestock (GNV9); kg/km <sup>2</sup>		++	
Ambient air quality, concentrations	A	GEMS Air	GEMS Air	statistical tables	digital	global (by city)	none	1975-1995	GEMS Air data bank: Total Suspended Particulate Matter, Black Smoke, SO <sub>2</sub> ; 55 cities from 33 countries; ug/m <sup>3</sup>		++	
Ambient air quality, concentrations	A	WMO, GEMS, BAPMON stations	WMO, GEMS, BAPMON	statistical tables	digital	global	none	1984-1990	Continuous atmospheric CO <sub>2</sub> , SO <sub>2</sub> , NO <sub>x</sub> , suspended particles, light scatter, sulfate; ppm, ug/m <sup>3</sup>		++	
Ambient air quality, concentrations	A	NOAA	CDIAC	points	digital	global	none	1968-1986	Atmospheric CO <sub>2</sub> concentrations (ndp005/R1); 29 stations around the world		++	
Ambient air quality, concentrations	A	CDIAC	CDIAC	points	digital	global	none	1978-1995	The ALE/GAGE/AGAGE/Network: CH <sub>4</sub> , NO <sub>2</sub> , CFC, CH <sub>3</sub> , CCl <sub>3</sub> , CCl <sub>4</sub> concentrations (DB1001/R1); 7 stations		++	



	A	OGIST	CDIAC	points	digital	global	none	1975-1992	Globally Average Atmospheric CFC-11 concentrations: monthly and annual data (DB1010); 7 stations	
Ozone layer	A	NASA, GSFC	GRID-GNV	raster	digital	global	111/111 km	1978-1991	NASA/TOMS Ozone Image Data (GNV180); extracted from CD-Rom	++
Acid content of precipitation	A	WWF	GRASS	raster	digital	global	4.5/4.5 degrees	1992	Acid Rains: WWF Atlas of the Environment	?
Discharges to surface water	A	GRDC	GRDC	data sets	digital	global	various		Monthly Discharge and Yearly Runoff Database; 143 countries; m3/s; mm	0
Discharges to surface water	A	IGBP, LOICZ	NIOZ	statistical tables	digital	global	none		River Discharge to the Sea: a Global River Index (GLORD); m3/s	0
Biodiversity	A	various	WCMC	vector (ArcInfo)	digital	global	various		Biodiversity Map Library: species, habitat, marine and coastal mapping: spatial coverage: depends on theme ?	+ ?
Landfills and waste (non-radioactive)	A	SBC	SBC	statistical tables	analog	global	none	1994	Secretariat of Basel Convention; 80 countries	?
Landfills and waste (non-radioactive)	A		WRI	statistical tables	digital	OECD countries	none	1989	World Resource Database (1992): Municipal waste: glass, plastic, paper and cupboard, metals, others; % total weight; annual total; annual per capita	+ ?
Landfills and waste (non-radioactive)	A	IAEA								?
Soil degradation/desertification	A	ISRIC	GRID-GNV	vector (ArcInfo)	digital	57S-180E, 72N-180E	1:10'000'000	1990	The Global Assessment of Human Induced Soil Degradation (GLASOD; Induced Soil Degradation (GLASOD; 18)	++
Fresh water quality	A	PNL, EESC	EESC						Hydrologic and Geochemical Characterization	?
Fresh water quality	A	GEMS	GEMS		digital	global			Water quality of World River Basins	+
Fresh water quality	A	GEMS, NWRI	GEMS	statistical tables	digital	global (by country)	none	1979-1990	GEMS/Water Program: fresh water quality (rivers, lakes, groundwater stations); 69 countries; Phase I; statistical summaries available on Gopher	+
Marine water quality (coastal waters)	A	GEMS	GEMS		digital	global			GEMS/Water Program: coastal marine water quality; Phase II	+
Marine water quality (coastal waters)	A	ICES	ICES	databank	digital	Atlantic, North Sea, Baltic Sea	none	1978-1995	Environment/Pollution Databank: contaminants in fish/shellfish, sea water, sediments	?
Environmental treaties and compliance	A	IUCN, ELC	WCMC	text	analog	none	none	1992	Global Biodiversity: status of the earth's living resources; multilateral treaty table: global, regional, plants, birds, fisheries, others; list by country (status: party, signed, terminated)	?



Environmental treaties and compliance	Rank	Original sources	Cornell University; Law School (Ithaca)	text	digital	none	Resolution	Reference Year	Dataset name	Rating	UN CSD- ISD Link
	A	various				none			Complete list of Environmental Treaties, Conventions, agreements, protocols, charters; available on Gopher		++
<b>AGRICULTURE, FISHERY, FORESTRY</b>											
Variable name	Rank	Original sources	Main distributor	Type	Format	Spatial coverage	Resolution	Reference Year	Dataset name	Rating	UN CSD- ISD Link
Use of pesticides, general	B	FAO	FAO, ESSA	statistical tables	digital	global (by country)	none	1990-1993	Statistics on Pesticide Use (insecticides, herbicides, fungicides, plant growth regulation); summary statistics, extracted from FAOSTAT Database	+	++
Use of pesticides, general	B	FAO, UNDP	WRI	statistical tables	analog	global (by country)	none	1989	Pesticide Consumption; metric tons	+	++
Use of pesticides, agricultural land	B										++
Use of pesticides, forest land	B										++
Use of fertilizers, general	A	FAO	FAO, ESSA	statistical tables	digital	global (by continent)	none	1993-1994	Fertilizers Statistics-Summary Table 1993-1994 (N, PO4, K); extracted from FAOSTAT Database	+	++
Use of fertilizers, general	A	FAO, UNDP	WRI	statistical tables	digital	global (by country)	none	1970-1989	World Resource Database (1992): Fertilizers consumed - total; thousands tons	+	++
Use of fertilizers, general	A	FAO	RIVM	statistical tables	digital	global (by country)	none	1940-1990	HYDE - consumption of fertilizer (total of N, P2O5, K2O)	+	++
Use of fertilizers, by major crop type	A										+
Use of fertilizers, organic/inorganic	A										0 ?
Production (monetary value) by crop type (incl. timber)	A	FAO	FAO	dataset	digital	global			FAOSTAT-PC: Production; commercial	+	0
Production (monetary value) by crop type (incl. timber)	A	FAO	FAO	dataset	digital				FAO-AgriMarket: agricultural product prices and quantities exchanged	+	0
Crops (physical units harvested)	A	various	FAO	statistical tables	digital	global (by country)	none	1986-1995	Agricultural World Census: Crops	+	0
Domestic livestock	A	various	FAO	statistical tables	digital	global (by country)	none	1986-1995	Agricultural World Census: Livestock	+	?
Domestic livestock	A	FAO	FAO, ESSA	statistical tables	digital	global (by country)	none	1961-1990	Country Food Supply Indicators: crops/livestock/fishery; sector shares in %	+	?



Variable name	Rank	Original sources	Main distributor	Type	Format	Spatial coverage	Resolution	Reference Year	Dataset name	Rating	UN CSD- ISD Link
Administrative boundaries (sub-national)	A	University of Illinois	GRASS	raster	digital	global	4.5/4.5 degrees	1982	World Political Boundaries		0
Administrative boundaries (sub-national)	A	NOAA, NGDC	NOAA, NGDC	vector	digital	global	various	1992	Global Geopolitical Boundaries (coastlines, countries, rivers, lakes, shorelines, islands)		0
Physical features	A	GEOS-3	NOAA, NGDC	raster, dataset	digital	global	1/1 degree	1980	One-Degree Global Topography and eight global data files (lands, oceans, ice caps, rivers, lakes, coastlines, islands)		0
Infrastructure	A	DMA, ONC	ESRI	vector	digital	global	1:1'000'000	1992	Digital Chart of the World (aeronautical, canals, pipelines, cities, railroads, roads, others)		0
Geology	B	Geological Survey Canada	Geological Survey Canada	raster, dataset	digital	global	1:35'000'000	1995	Generalized Geological Map of the World		0
Water table level	B										0
Elevation	A	NOAA, NGDC	NOAA, NGDC	raster	digital	global	5/5-10/10 minutes	1960	Global Elevation Data for GIS		0
Elevation	A	NOO, DMA, FNOG	NOAA, NGDC	raster	digital	global	5/5 degrees	1985	5 minutes gridded World Elevations (ETOPO5): land and oceans		0
Elevation	A	DMA, ONC	ESRI	vector	digital	global	1:1'000'000	1992	Digital Chart of the World		0
Geomorphology	B	USA-CERL	GRASS	raster	digital	global	4.5/4.5 degrees		Major mountains of the World		0
Geomorphology	B	CERL	GRASS	raster	digital	global	4.5/4.5 degrees		Shaded Relief Map		0
Drainage basins	A	various	USGS, EDC	raster	digital	global	1/1 degree		Global Hydrographic Data: terrain type, ice/water runoff, streams, drainage basins, cryosphere		0
Drainage basins	A	GRASS, Rutgers, US-ACE	GRASS	raster (?)	digital	global	?		River basin database		0
Properties of chemical compounds	B	IRPTC	IRPTC	dataset	digital	none	none	1992-1995	IRPTC Databank on Chemicals ; 7035 chemicals, eco-toxicological and legal infos; data profiles on 800 chemicals; 80 Mb		0
Properties of chemical compounds	B	PNL	Window Chem Software	statistical tables	digital	none	none		Multimedia-Modeling Environmental Database Editor (MMEDE); 550 contaminants (42 parameters): organic, inorganic, radioactive, carcinogenic, non-carcinogenic		0

<b>LAND COVER</b>											
Variable name	Rank	Original sources	Main distributor	Type	Format	Spatial coverage	Resolution	Reference Year	Dataset name	Rating	UN CSD- ISD Link
Land cover type	A	NOAA, GVI	GRID-GNV	raster	digital	global	16/16 km	1985-1987	Murai and Honda World Vegetation Map (GNV27)	-	?
Land cover type	A	GISS	GRID-GNV	raster	digital	global	111/111 km	1983	Global Vegetation Database for Climate Studies (Matthews, GNV2)	-	0
Land cover type	A	GISS	GRID-GNV	raster	digital	global	111/111 km	1983	Global Cultivation Intensity (Land Use, Matthews, GNV3)	-	?
Land cover type	A	DMA, ONC	ESRI	vector	digital	global	1:1'000'000	1992	DCW, Land Cover: cultivated areas, salt pans, quarries, mines, others	-	?
Land cover type	A	NASA, GSFC	GRID-GNV	raster	digital	global	111/111 km	1986-1987	Natural Wetlands (Matthews and Fung; GNV8)	-	?
<b>TRANSPORT</b>											
Variable name	Rank	Original sources	Main distributor	Type	Format	Spatial coverage	Resolution	Reference Year	Dataset name	Rating	UN CSD- ISD Link
Road network length and characteristics	B	DMA, ONC	ESRI	vector	digital	global	1:1'000'000	1992	Digital Chart of the World	-	0
Road vehicle stocks (by fuel type/engine type)	A	RIVM	RIVM	statistical tables	digital	global (by region)	none	1900-1990	Hundred Year Data Base of the Global Environment (HYDE): no cars/Million persons	0	0
Road vehicle stocks (by fuel type/engine type)	A	IRF	IRF	statistical tables	digital, analog	global (by country)	none	1992	World Roads Statistics: vehicles in use (passenger, commercial cars), vehicle density, traffic volume	?	0
Road vehicle stocks (by fuel type/engine type)	A	ICAO, RTU ?									0
Road vehicle stocks (by fuel type/engine type)	A	AAMA	AAMA		digital	USA, others (?)					0
Passenger transport and traffic (by transport type/fuel type)	A	various	WRI	statistical tables	digital	global (by country)	none	1989	World Resources Database (1992): 100 million passenger-km traveled per year by car, bus (public/private), passenger train, commercial aircraft	?	0
Freight transport and traffic (by transport type/fuel type)	A	various	WRI	statistical tables	digital	global (by country)	none	1989	World Resources Database (1992): Freight moved per year by rail, road, waterway, air; millions tons/km	?	0

**BRIEF SUMMARY OF INDIVIDUAL AGENCY PRESENTATIONS MADE DURING THE OPENING SESSION OF THE IEA/GEO DWG MEETING**

UNEP (Ms. Veerle Vandeweerd) presented the background of and purpose for the Meeting. This can be summarised as the need to identify and agree upon a limited number of core data sets for IEA/GEO studies, as well as how to make these same data sets available to the major global data-producing and -reporting agencies and institutions, developing countries in general, and the GEO collaborating scientific institutes in particular. She further explained that there are four working groups for GEO: Scenarios (led by SEI); Modelling (led by RIVM); Policy, and this group, the Data Working Group, led by UNEP. Data also need too be made consistent for such projects as the Global Water Assessment. Within GEO, looking at the root causes of regional environmental problems and issues is very important. GEO will involve use of "business-as-usual" and other scenarios (best- and worst- case) and models, as well as international policy responses, to deal with these environmental problems. In any case, it is considered vital to agree on a process for coping with the data-related issues during the current DWG Meeting.

UNDPCSD (Ms. Mary Pat Williams Silveira) emphasized the increasing coordination taking place within the UN system as well as with other intergovernmental and non-governmental organizations, particularly in areas related to information about sustainable development. In this context Ms. Williams Silveira noted that the Working Group on Core Data Sets was the fourth meeting in a series of back-to-back meetings, organized in New York, by UNDP, UNDP and UNEP, that also included meetings on Development Watch, Earthwatch, and the establishment of Common Access to UN System Data Bases. By organizing these four meetings as a series, the organizers were able to achieve both greater efficiency and greater coherence among the discussions. UNDP's programme to coordinate international efforts to develop indicators of sustainable development on behalf of the UN Commission on Sustainable Development was also mentioned and linked directly to the need for good and common core data sets.

CIESIN (Mr. Vince Abreu) is involved in preparing information systems, which encompass both general meta-data and detailed "guides" to data sets. These are increasingly accessible via the World Wide Web (WWW), and e-mail for the developing world. They are also working on tools for data access, extraction and ordering, CD-ROM publication, interactive communications and feedback as well as recently starting work on Land Quality Indicators (LQI). CIESIN has also established a number of nodes in Central/Eastern Europe (especially the Baltics), and Asian countries including China. The purpose of these centres is to help identify and get access to key national data sets for the CIESIN Information Cooperative.

RIVM (Mr. Jaap Van Woerden) informed the meeting that RIVM is concentrating on EIA at national, regional and global levels, and is currently preparing the quantitative, model-based part of UNEP's GEO I (planned for early 1997). The integrated models need data going back into time several decades, and at various geographical resolutions (from 10 minute to country-level). By now, most of the proposed current data sets are available within RIVM, while extensive information systems for meta-data, on-line access, and data quality have been developed. This work, together with a GEO-data needs survey, has been used as input to the Core Data Matrix and Background Paper.

UN/ECE (Mr. Andreas Kahnert) observed that "core data sets" are only a small part of the total data needed for IEAs. Surrounding arrangements relating to data access, quality and updating are equally (if not more) critical, and corrections and improvements often need to be done to data sets (this is often complicated). The big issue is data quality, and knowing what the data mean. The current/future efforts of UN/ECE in the area of environmental information can best be described as "working for an integrated package". Developmental efforts are focussing on the countries-in-transition for which Environmental Performance Reviews (EPRs) will be undertaken,

## IDENTIFIED DATA GAPS AND SHORTCOMINGS

Data Variables ranked as 'A', but with no corresponding data sets or only data sets rated as "minus" or "zero" in terms of utility/quality :

Forest characteristics (Forest products)  
 Timber/wood production  
 Fish catches and stocks  
 Aquaculture (new)  
 Land management practices (new)  
 Soil types (prov'l. 0)  
 Drainage basins (prov'l 0)  
 Occurrence and distribution of biotopes (0)  
 Areas and locations of fragile ecosystems (0)  
 Area of (land under) protection (0)  
 Biodiversity (new)  
 Soil degradation (prov'l. -)  
 Fresh water quality (prov'l. 0) (latter includes ground water)  
 Demographics/population (+/-)  
 Land cover (-)  
 Transport (?)

Not/hardly discussed were the following Data Themes/Variables:

Economy  
 Energy  
 Industry

List Provided as a Viewgraph by RIVM's Jaap van Woerden

(some comments of DWG Meeting Participants are included)

Traffic (vehicle type, per engine/fuel type; JvW to contact AK for references)  
 Landfills and Waste - coarse-grained data only available;  
 Earthwatch Working Party also flagged this issue  
 Fish stocks - catch vs. sustainable yield? ICES, NOAA data?  
 Water use and discharges  
 Land use and cover - J.-L. Weber/IFEN for African data?  
 Population density and growth  
 Morbidity  
 Historic GDP



## POTENTIAL META-DATA ATTRIBUTES FOR CORE DATA SETS

(Prepared by Eric Rodenburg of WRI)

Outline of Metadata Requirements

- A Directory Entry (A Short Description)
- B Guidelines (a longer description, example follows)
- C Detailed Meta-data (as reported by the database provider; methods and sources)

Guidelines should include (items in parenthesis are examples, \* = most value added)

- 1 Database Name
- 2 Database Type (Master, Vector, Numeric)
- 3 Institution (Provider)
- 4 Address (e-mail, physical)
- 5 Contact Name
- 6 Motive (ongoing mandate, research project?)
- 7 Geographic coverage (map or city, province, nation, region)
- 8 If map, resolution
- \* 9 Topical Coverage/Methodology/Sources (General)
  - a Topic 1, definition (link to C)
  - b Topic 2, definition (link to C)
  - .. etc.
  - .. etc.
  - .. etc.
- 10 Temporal Coverage (1989 or 1950-94 ...)
- 11 Date Published
- 12 Lifetime (date of Next Update)
- \* 13 Strengths (why a core database)
- \* 14 Weaknesses (Quality Issues)
- \* 15 Constraints (Comparability Issues)
- \* 16 Other Databases w/short comparative statement
- 17 Bibliography.

POTENTIAL SOURCES OF DATA AND BACKGROUND INFORMATION

(Prepared by Paul Dyke, Texas A&M University)

UN Agencies

FAO (agriculture, fisheries, forestry, soils)  
UNEP/EAD/GEMS (fresh and coastal water quality)  
UNEP/EAD/GRID (human population density, land cover etc.)  
UNDP/? (economics)  
WMO (climate)  
IBRD (economics)  
DESIPA (DPCSD, UNPD, etc.) (population)  
UNESCO (literacy)  
WHO (mortality, life expectancy)

U.S. Federal Agencies

NOAA/NGDC and NCDC (climate)  
DMA (administrative boundaries & BASE)  
NCAR (air)  
NASA  
USGS(/EDC) (land cover)

Others

NCGIA (human population)  
RIVM(/ISC) (vehicles)  
WRI (transport, energy and waste)  
CIESIN (mortality)  
CDIAC (air)  
GRDC (runoff)