



***GEO Data Working Group
Meeting Report***

Geneva, 16-17 June 2003

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Acronyms

AEO	Africa Environment Outlook
AEIN	Africa Environment Information Network
A&P	Asia and the Pacific
AFEAS	Alternative Fluorocarbons Environmental Acceptability Study
AGEDI	Abu Dhabi Global Environmental Data Initiative
AMCEN	African Ministerial Conference on the Environment
CCs	Collaborating Centres
CEDARE	Centre for Environment and Development for the Arab Region and Europe
CDIAC	Carbon Dioxide Information Analysis Center
CIESIN	Center for International Earth Science Information Network
CRU	Climatic Research Unit
DWG	Data Working Group
EnVoc	Multilingual Thesaurus of Environmental Terms
ESRI	Environmental Systems Research Institute
FRA	Forest Resources Assessment
G3OS	Composite for GCOS, GOOS and GTOS
GCOS	Global Climate Observing System
GDP	Global Data Portal
GEMET	General Multilingual Environmental Thesaurus
GEMS	Global Environment Monitoring System
GFW	Global Forest Watch
GGIS	Global Groundwater Information System
GIS	Geographic Information System
GLASOD	Global Assessment of Human Induced Soil Degradation
GLCC	Global Land Cover Characterization
GOOS	Global Ocean Observing System
GPA	Global Programme of Action
GPW	Gridded Population of the World
GRID	Global Resource Information Database
GTAP	Global Trade Analysis Project
GTOS	Global Terrestrial Observing System
HMs	heavy metals



ICLARM	International Center for Living Aquatic Resources Management
ICRAF	International Center for Research in Agroforestry
IEA	Integrated Environmental Assessment
IFA	International Fertilizer Industry Association
IFPRI	International Food Policy Research Institute
IGBP/GEIA	International Geosphere-Biosphere Programme/Global Emissions Inventory Activity
IGRAC	International Groundwater Resources Assessment Centre
IISD	International Institute for Sustainable Development
ILRI	International Livestock Research Institute
IPCC	Intergovernmental Panel on Climate Change
ISDR	International Strategy for Disaster Reduction
ISRIC	International Soil and Reference Information Centre
IUCN	World Conservation Union
IWG	Information Working Group
IWMI	International Water Management Institute
JMP	Joint Monitoring Program
LAC	Latin America and the Caribbean
MDG	Millennium Development Goals
ODS	ozone depleting substances
OFDA/CRED	Office of US Foreign Disaster Assistance/Centre for Research on the Epidemiology of Disasters
PAHO	Pan American Health Organization
POPs	persistent organic pollutants
RDP	Regional Data Portal
RIVM	National Institute of Public Health and the Environment
SDIIS	Sustainable Development Indicator Information System
SOFO	State of World's Forests
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UNH/GRDC	University of New Hampshire/Global Runoff Data Centre
USGS/EDC	US Geological Survey/EROS Data Center
WCMC	World Conservation Monitoring Centre
WDPA	World Database on Protected Areas
WRI	World Resources Institute
WWF	World Wildlife Fund for Nature



Executive Summary

The meeting of the GEO Data Working Group (hereafter, DWG) took place at the International Environment House in Geneva on 16-17 June 2003.

The major purposes of the meeting were to:

- 1) come to a consensus and finalise the “core data sets-to-indicators” matrix for use by UNEP and DEWA in the GEO process and other integrated environmental assessments; and
- 2) examine regional needs and prepare a development strategy (if not detailed plans) for regional manifestations of the GEO (Global) Data Portal (GDP), including, inter alia, all related issues such as basic design, harmonisation and inter-operability with the GEO GDP.

Some of the more specific objectives for the meeting included the following:

- defining the data-to-indicators matrix as a “living document” which will evolve through time as needs/subject matter of GEO reporting change;
- identify responsible person(s) and/or sub-groups for each of the tasks to be completed;
- define the “technical issues” associated with work on the regional data portals (i.e., how will the basis of what is the GEO GDP be adapted in terms of skeleton, look-&-feel, functionality etc. for use in development of the regional data portals); and
- define the “practical issues” associated with the regional data portals.

The major outputs and results anticipated from the DWG meeting were as follows:

- 1) a ‘finalised’, consensus set of indicators for the GEO process and other UNEP assessments, in form of “core data sets - indicators - themes” matrix for GEO-4 and annual statements; and a list of priority data gaps & shortcomings to be addressed, and some practical solutions, or at least ideas and suggestions for dealing with the same;
- 2) a written recommendation to highest-level DEWA and UNEP management that they

- endorse / sign-off on and publish the same data-to-indicators matrix as a UNEP document;
- 3) a strategy for development of GEO Regional Data Portals (RDPs), and a series of plans for specific RDPs in Africa, Asia and the Pacific (A&P), Latin America and the Caribbean (LAC) and West Asia (or at least outline/procedures for developing same);
- 4) lists of “practical issues” and “technical issues” to be dealt with/resolved, for the Regional Data Portals’ development, along with proposed means and suggestions for addressing these; and
- 5) proposed division of labour and cost/time planning documents for all of the RDP work to be done.

Much progress was made on all the issues covered. Others were assigned to smaller groups to carry out in the coming months.

The overall and regional participation at the meeting was broad and comprehensive and included 10 of 11 persons involved in the GEO DWG meeting held in December 2001, as well as additional representatives from DEWA~Africa and GRID-Nairobi, GEMS-Water, UN Statistical Division (UNSD) and World Resources Institute (WRI), as well as new persons from DEWA~A&P and DEWA~LAC. Thus, there was both excellent continuity and a somewhat broader participation from close partners of UNEP/DEWA in the field of environmental data, which led to many rich exchanges among those present, and significant new ideas for the Data Working Group’s activities.

Two sub-groups were established: one to resolve practical/technical issues related to development of the RDPs, and the other to consider/revise the data-to-indicators matrix and suggest practical ways and means for addressing related data gaps and deficiencies in the near-to-medium timeframe.



Opening of the Meeting

The DEWA~Regional Coordinator for Europe (Mr Ron Witt) welcomed the participants to the GEO DWG Meeting and explained the goals, objective and anticipated outputs and results of the meeting. He mentioned that there was both excellent continuity from the previous meeting and significant new participation as well from other DEWA/GRID offices, and close partners of UNEP/DEWA such as GEMS-Water, UNSD, and WRI. The agenda and practical issues related to the Meeting were also described, including the roles of several participants as chairs of some sessions, rapporteurs, etc.

As part of the opening, the Meeting was also addressed by the DEWA Head of Global Environment Outlook Section, Ms. Marion Cheatle. She mentioned that the GEO process had been supported by the DWG since the mid-1990s, and that hopefully this sub-process will continue to produce relevant data sets and indicators. More and more reliable data are needed from contacts and partners, while attempts to assemble data are difficult but vital. The interval between comprehensive GEO reports will be increased to five years, to better identify change over a longer baseline, but annual GEO statements¹ will be produced to provide more regular reporting and a sharper focus. The two topics of this meeting were key for both the global and regional GEO processes.

Annex I to this meeting report contains the agenda and Annex II the full list of participants.

Plenary Session

Background on Core Data in GEOs 1-2-3

The GEO Data Coordinator (Mr. Jaap van Woerden, DEWA~Europe) gave a background presentation on

the history of core data as used in UNEP's IEA/GEO processes, past relevant meetings held beginning with Bangkok (in 1994) and New York (1996) until GEO-3 and the present (see figure 1). Essentially, this was to set the scene for the latest DWG meeting and make all of the participants aware that the current work is part of a long and ongoing process. Having started a broad activity with very many partners, with time the 'core data' work has focused more on the GEO process itself and become more effective and visible. A number of relevant data-related reports and other documents prepared in this context, as well as existing global and regional data tools were mentioned. Progress since the last DWG meeting was highlighted, with a particular focus on the global GEO (Global) Data Portal (see figure 2).

Regional and Partner Reports


During the second part of the first morning of the DWG Meeting, the regional participants from DEWAs~Africa, Asia & Pacific, Latin America and Caribbean and West Asia, and/or regional Collaborating Centres (CCs), particularly CEDARE, Central European University and the University of Costa Rica, all provided brief presentations² of their core data, indicators and related environmental assessment and reporting activities. It was emphasized that some regions have already made significant progress or have prior experience with the development of information or data portals (e.g., stemming from UNEP.Net and/or separate regional initiatives), particularly Africa and LAC. Other regions have not yet embarked on such work or have only recently begun.

¹ Now - GEO Year Book. The hard copy is available from *EarthPrint* (<http://www.earthprint.com/show.htm?url=http://www.earthprint.com/cgi-bin/ncommerce3/ProductDisplay?prfnbr=313486&prmenbr=27973>). The Web version is available at <http://www.unep.org/geo/yearbook/>.

² A full set of original presentations and other documents is available at the intranet website <http://www.grid.unep.ch/GEODWG/> Access to this site can be granted upon request to geo@grid.unep.ch



Division of Early Warning and Assessment (DEWA)



Global/Regional Data Portals and Data-to-Indicators meeting 16-17 June, UNEP, Geneva

Background IEA/GEO Core Data work

Meetings:

- 1994 Bangkok Core Data Needs Symposium (UNDP/UNEP, +others)
- 1996 New York IEA/GEO(1) Core Data Meeting (UNEP/CSD, +others)
- 1998 Budapest GEO2 Data/Illustrations Meeting (UNEP)
- 2000 Bangkok GEO3 Production Meeting (UNEP)
- 2001 Geneva GEO3 Ad-hoc data/indicator meeting (UNEP)
- 2001 Geneva Global/Regional Data Portals, Standards & Tools (UNEP)

Reports/papers:

- Meeting reports; incl. Dec'2001 MR plus Data-Indicator Matrix
- 'Data Issues GEO-2000' background report (TR99-3)
- GEO Data Strategy paper & Gameplan (April-May 2000)
- 'Setting the Environmental Data Agenda' draft report (2002-03)

Tools:

- GEO Data Portal
- GEO-LAC Data Toolbox
- GEO SDIIS Tool North Africa
- A&P SoE Database Framework & Guidelines
- UNEP/Net Portals





Figure 1. Milestones and outputs of the IEA/GEO data process.

Division of Early Warning and Assessment (DEWA)



Global/Regional Data Portals and Data-to-Indicators meeting 16-17 June, UNEP, Geneva

Data & Indicator activities since last DWG meeting (Dec 2001):

- ▶ GEO Data Portal matured to reference database for GEO and related environment assessment & reporting
- ▶ GEO Data Portal made part of UNEP/Net, serving other portals with provision of / access to 'real data'
- ▶ Need for regional GEO Data Portal versions, with workshop for LAC, Nov. 2002, Costa Rica; and initial discussions on Africa Data Portal
- ▶ Exploration of an indicator-based Human Environment Index (GEO-3)
- ▶ Project for Millennium Development Goals (8 goals, 18 targets, 48 indicators)
- ▶ (UNEP input for Ozone Prod/Cons, Protected Areas indicators)




Figure 2. GEO data and indicators activities between the GEO DWG meetings.





Africa (Mr Chris Ambala / Mr Ahmed Abdel Rahim) stressed the need for better data and indicators, and the capacity to develop and analyze data, as part of the Africa Environment Information Network (AEIN) in support of GEO and the Africa Environment Outlook (AEO). Existing tools were mentioned, including the CATISOE Data and Indicator tool for West Africa and the Sustainable Development Indicator Information System (SDIIS) for Northern Africa, while calling for UNEP to facilitate efficient collection and harmonization of data across the region.

Asia & Pacific (Mr Shankar Manandhar) highlighted progress in the area of SoE reporting at the national level and also pointed to observation activities in the region such as monitoring of air quality, and also of land use/cover based on satellite imagery.

Latin America & Caribbean (Ms Kakuko Nagatani-Yoshida / Mr Edgar Gutierrez) presented relevant activities in support of environmental assessments, management, decision-making and policy-setting, as required under GEO and the LAC Forum of Ministers of the Environment and Health. The need for regional and national baseline data and indicators was emphasized, examples of outputs given e.g. GEO-LAC Data Toolbox and Statistics report, and calling for a overall GEO Data Portal template for use in the regions to develop regional Data Portals within a harmonized framework.

West Asia (Mr Adel Farid Abdel-Kader) gave an update on the activities related to data/information portals, including a consultative meeting on a West Asia portal and the subsequent prototype information portal (UNEP.Net), and the Regional Collaborative Network on Environmental Information and Assessment. The need for national-level capacity building and portal development was underscored, while links with ongoing international initiatives were outlined such as the Millennium Ecosystem Assessment and the Abu Dhabi Global Environmental Data Initiative (AGEDI).

Polar regions (Mr Otto Simonett) mentioned the need for data on infrastructure development and information related to indigenous peoples. The

potential of remote sensing data was underlined, plus a possible role for the GEOkit application for IEA capacity building, and including regional perspectives.

Europe (Mr Ruben Mnatsakanian) made the point that this region has a lot of information, and the question is more how to structure and analyze information to make it more useful for assessment purposes. Reference was made to OECD efforts to analyze environmental and economic information in a meaningful way.

A GEO European Data Portal is not under consideration as such (similar to the situation in North America and Polar regions), but might be useful when structured differently than existing systems while at the same time making use of extensive ongoing efforts by key partners (EEA and others).

North America (Mr Gene Fosnight) announced problems with Landsat-7 which could yield discontinuity in data collection efforts. Links to providers of global-level information were underlined, while it was felt to be difficult to justify a separate North America Data Portal.

These regional presentations/summaries were followed by a number of additional interventions from other participants (GEMS-Water, IISD, UNSD and WRI), concerning their data, indicators and related assessment and reporting activities.

UNSD (Ms Tanja Sebrotnjak) stressed their willingness to support the GEO DWG work and encouraged cooperation in this field. Possible contributions include not only the further use of the UN Common Database, but also of other statistics (demographic, trade, economic) and cooperation/coordination with respect to the questionnaire on Environment Statistics. It was mentioned that the 2nd survey, with a focus on waste and water use, shows considerable improvement in the number of responses (see Annex III).

GEMS-Water (Mr Andy Frasier) presented the numerous global and regional data-related activities it is involved in and informed participants about the





renewed integration with UNEP/DEWA's programme. Various possibilities for better cooperation on data issues were outlined, and substantial support is foreseen with regard to improved data availability through the Data Portal or other means.

IISD (Mr Laszlo Pinter) underlined activities related to the use of information for policy-making and planning, in addition to capacity building. Building on GEO, the work is extended to decision-making and policy support, including cooperation at the national and sub-national level. IISD is also working with a number of Canadian provinces on sustainable development issues, which may be transferable.

WRI (Mr Dan Tunstall) updated participants on the Earthtrends data portal (which has certain similarities to the GEO Data Portal in terms of access to national statistics), related to mapping of poverty and on the Partnership for Principle 10 (PP10) effort together with UNEP and the World Bank. Ideas were outlined to include water quality and water stress indicators in river basin mapping, and to develop mapping of environmental governance. The GEO Data Portal was highly praised at the same time (see Annex IV).

DEWA-Africa (GRID-Nairobi) (Mr Johannes Akiwumi) informed participants on the new strategy for UNEP.Net, which is meant to develop the system into a more attractive and comprehensive environmental search engine or gateway ('a glorified Google'). UNEP funding will focus on the system's backbone, while various external partner agencies are to support specific themes, regions or applications. The network is to provide environmental data & information in support of DEWA and GEO, and thus making make it complementary to UNEP.org. Also, a new UNEP.Net management structure is being put in place, with the lead at DEWA-Nairobi and one technical staff per regional centre.

Global GEO Data Portal

After the regional updates and other interventions, the (global) GEO Data Portal was introduced and demonstrated by the GEO Data Coordinator and the GEO Data Consultant (Stefan Schwarzer). It was

stressed that the primary goal of the GDP is to strengthen the empirical base of GEO assessment and reporting, by making available global and regional core data sets to the GEO user community and providing basic tools to explore and analyse such data. In doing so, the GDP uses as much as possible primary data sources among UN and key data partners, and disseminates data mainly by using state-of-the-art Internet technology, but also through off-line products such as statistical compendia and CD-ROM versions.

Since the previous DWG meeting, much progress has been made by updating and adding data sets (now some 400 variables, plus dozens of maps), and improving various functions such as the mapping interface, help information, possibilities for making graphs and downloading data. Institutional arrangements with key data providers are being updated and formalized, giving them also more visibility in the GDP, while prototype versions of regional manifestations were developed to facilitate discussions or meetings on regional data portals (ref. GEO-LAC Data Portal workshop, Costa Rica, Nov. 2002). A document on guidelines for data portal development was circulated in early 2003, while recently a comprehensive CD-ROM version of the GEO GDP has been developed. Web statistics show an ever-increasing use of the GDP - although it is not given wide publicity outside the GEO community - with the main demand stemming from developed regions (Europe, North America) for national statistics related to socio-economic themes.

The demonstration showed the main steps to be taken for searching the GDP's database and display selected variables as maps, graphs or tables. Also shown were some of the possibilities to explore the data by means of statistical analysis, to read data documentation and to download the data in different file formats. Prototypes of regional versions for LAC and Africa were also briefly demonstrated, underscoring the possibilities to provide region-specific windows of the GEO GDP with additional functionality for, e.g., adding more detailed data for the region than already present in the GDP.





The discussion following the demonstration focused on the existing mapping interface, on resources and expertise in the regions and links with UNEP.Net. The GEO consultant informed the meeting that the map module will be replaced with a fully-fledged MapServer in the very near future, enabling interactive GIS functionality such as overlays on Internet. Currently, OpenSource software is being used, while certain regions/offices may wish to use other programmes such as ESRI's ArcInfo/IMS. In the event of the GDP broadening its horizons beyond serving GEO, then the links with UNEP.Net and the technology it uses, would become even more pertinent. Flexibility was also suggested with respect to database and interface software, as not every region has expertise to apply MySQL and PHP (instead, for example, MS-Access and HTML).

It has been estimated that developing, operating and maintaining a system such as the GEO GDP takes two-three persons, while developing and running a regional manifestation could probably be minimized to one person. The GDP uses the WHO global country map as the currently most up-to-date and readily available UN country map - pending ongoing efforts of UN Headquarters (Cartographic Section). It was also suggested to enable a search for additional data, directly from within GEO reports 1, 2, and 3, since not all data used in these past GEOs are yet included in the GDP. The need for public access to the data was underlined, to allow maximum use of information included in the GDP.

Regional Data Portals (RDPs)

The purpose of the session was to help develop a strategy and a series of regional plans for the RDPs. The following topics were proposed to facilitate and streamline the discussion:

- What are the regional needs/requirements and value-added of RDPs at regional level?
- How to deal with harmonization and interoperability questions; how to handle these so-called "technical issues"?
- How to deal with more practical issues, such as who does what, where and when (including

division of labour, cost and time planning, monitoring and review)?

- What are the "action items" stemming from each of the above, including a sub-group and/or a responsible person for each of the regions?

Based on the topics proposed, the following issues were actually discussed:

- regional needs, particular features and other specifications;
- a development strategy for regional manifestations harmonised with the global GDP strategy and regional implementation plans;
- how to adapt a conceptual and functional skeleton from the global GDP for setting up and/or further developing regional data portal manifestations;
- "technical issues" relating to harmonisation and "inter-operability" of the global and regional data portals, and possible mechanisms/procedures to resolve these technical issues;
- division of labour between DEWA-HQs, DEWA-Europe/GRID-Geneva and the other DEWA regional centres involved, along with implementing institutions (including selected GEO CCs);
- practical steps to be taken and responsibilities assigned, and how the process will be monitored, performance evaluated and corrective actions taken, in particular for Africa and LAC;
- anticipated costing for each regional data portal.

In the course of the discussion, the meeting agreed on further actions and measures to develop regional manifestations of the GEO Data Portal. The first regional data portal is planned to be developed in the LAC region (a revised project document was prepared by end of July), while colleagues in Africa will be using this project and other relevant documents as guidelines, and will start developing the GEO Africa Data Portal once existing funds are provided. A conceptual and functional skeleton of regional RDPs will be adapted from the GDP. It was agreed that the regions could modify the list of GEO themes/issues if so recommended by regional partners. Each DEWA regional centre should



nominate a person to be in charge and develop an implementation plan.

In terms of division of labour, it was agreed that DEWA-Europe will be responsible for:

- 1) further development of the GDP strategy (along with DEWA-Headquarters), improvement of methodology of data collection and presentation, and data quality control;
- 2) further development and improvement of the GDP operational platform;
- 3) providing guidance on technical issues to the regions as relevant; and
- 4) providing assistance for regional capacity building (mainly training).

Technical and Practical Issues

During the meeting, various technical issues were discussed as related to global-regional data portal development, ranging from overall guidelines, templates and definitions to more practical issues within the regions (some of these have already been mentioned above). To further streamline the activities, it was agreed to compile a provisional list of these technical & practical issues:

Technical issues:

- 1) Clear description of each and every data set (definition, metadata etc).
- 2) Need to harmonize understanding of terminology: what is a 'data set' an 'indicator' a 'theme', 'issue' etc.
- 3) Need to clearly define how indicators are created/developed (documentation).
- 4) Basic level of commonality for all RDPs (homepage, navigation etc).
- 5) How much can be borrowed from GDP to support development of RDPs (software code, menus, regional/national data etc).
- 6) Common data interchange file format to be used.
- 7) Standard international boundaries data set.
- 8) ISO codes for countries, metadata, other?
- 9) Potential data set discrepancies between global and regional levels ~ how to resolve and harmonize?

- 10) How to aggregate and disaggregate?
- 11) How to deal with error propagation in GIS and statistical data (if at all)?
- 12) Do we/will we need multiple definitions per data set or variable?
- 13) Entire question of data quality ratings ~ can we take this 'on board'?
- 14) How will the RDPs work in practice (both implementation and day-to-day operations)?
- 15) Issues/concerns about data dictionary, thesaurus, taxonomy ~ which structure and vocabulary is to be used, if any at all; e.g., EnVoc, GEMET, other or none?
- 16) Other issues not yet raised or elaborated.

Practical issues:

- 1) Division of labour between DEWA-Headquarters, DEWA-Europe and other DEWA regional centres (Africa, A&P, LAC, WA);
- 2) Development of regional implementation plans for RDPs;
- 3) Proposed time schedule for implementation, keeping in mind the need/objective of supporting, 1st GEO Annual Statement and more realistically, the GEO-4 reporting process;
- 4) Proposed costing for each RDP, including initial development and longer-term maintenance;
- 5) Performance monitoring and review ~ how are we progressing.

It was decided that a sub-group should review the above list and address all the issues mentioned within a six-month timeframe. This sub-group was named and consists of representatives from global and regional levels: C. Ambala, A. Farid Abdel-Kader, G. Fosnight, E. Gutierrez, S. Manadhar and S. Schwarzer, with general oversight by J. van Woerden.

From the subsequent discussion, it was clear that besides standard data management tasks and problems, each region has specific needs, requirements and opportunities. There are similar but not identical target groups in most regions; e.g., aside from the GEO user community, LAC also serves the Forum of Environmental Ministers, and Africa the AMCEN process and AEO/AEIN reporting work. Funding is another factor influencing the way RDPs are to be developed. For example, in LAC there is





already a system in place, while an inception meeting was held in Nov. 2002 which resulted in a proposal for a GEO-LAC Data Portal. West Asia would like to receive some assistance from GRID-Geneva to develop its regional GEO data Web portal, with a mirror site running in Europe if necessary. In Africa, advantage can be taken from certain technologies already in place like ArcIMS and Oracle.

A cross-cutting issue is how to harmonize global and regional data sources/values i.e. in cases where data or indicators differ; e.g., deforestation rate. In this respect, it is expected from the global GEO Data Portal to set overall standards, provide templates and harmonize content across GDP and RDPs, while regions can make use of the existing RDP project proposal prepared by LAC (to be circulated). The need for commonalities and interoperability was stressed, but likewise the requirements for flexibility, a modular and extendable approach and a regional flavour. It was concluded that all regions feel confident and capable to maintain RDPs, and expect DEWA~Europe and the GDP to provide strategy, guidance, technical assistance and capacity building. It was suggested to develop a broader and more scientific 'consultative group on data issues', an idea already put forward in the previous DWG meeting and which could to a certain extent coincide or overlap with the current DWG members.

Core data/indicator matrix

The list of GEO-related environmental themes, issues, indicators, data variables and data sources (the Core Data/Indicators matrix) was introduced by J. van Woerden and discussed among the group. The matrix follows various GEO-related data meetings and was first drawn up at the Beijing meeting in 1997. The matrix was updated in light of the GEO data strategy developed after the GEO meeting in Bangkok in 2000, and followed up in the DWG meeting of December 2001. It was stressed that the matrix is the result of a "learning-by-doing" process during GEOs 1, 2, and 3, and was never formally endorsed as a UNEP or GEO indicator list, at least not in the same way as those of CSD, EEA, OECD and others.

The meeting concluded that the current version provides a quite comprehensive basis for core environmental indicators for the GEO, however it requires further revision and refinement, with relatively minor changes and additions. The main purpose of such a matrix is to support and guide the (quantitative) GEO assessment process, and as such it serves as a basis for populating the Global and Regional Data Portals.

The proposed changes to the matrix include:

- Update and improve the entries related to water quality (GEMS-Water), groundwater, coastal degradation, (nuclear) waste and others;
- The theme 'Governance' is not a GEO theme and needs to be transferred to 'Issues';
- Although 'Health' is often regarded and taken as a separate theme, within the context of GEO it can stay under 'Socio-economic';
- There should be a clear distinction between data and indicators. Data are measured/collected and objective; indicators are derived and linked to a target/subjective. Both can be variables. It was proposed to change the headings to: (GEO) Theme - Issue - Potential Data Variable(s) - Proposed (Lead) Indicator(s) - Primary (Lead) Data Source(s);
- Cross-check the matrix with MDG indicators (Millennium Development Goals, with eight goals, 18 targets and 48 indicators) and possibly other existing, relevant indicator lists;
- Include or attach the list of definitions for each data variable, as was included in the original version of the matrix; and
- Consider adding information on data availability and frequency of update.

It was proposed that the matrix be updated and improved by JvW, after having been reviewed by the GEO Team, UNSD and GEMS-Water. It was also suggested that the matrix be sent to selected specialized institutions and /or organizations for feedback and review. A provisional updated version will be prepared for the DEWA planning meeting in early July (2003). The 'final' version will be presented to the GEO Team and possibly DEWA management for their consideration as a basic working document for GEO (DEWA?) assessment work (including GEO-4



and Annual Statements), realizing that this is a dynamic, evolving activity, and that it will need regular revision and updating. The latest, corrected and updated, version of the GEO Data-Indicators matrix is provided in Annex V.

Critical data gaps

The discussion on data gaps and shortcomings was introduced by J. van Woerden, using excerpts from the internal draft document on "Setting the Environmental Data Agenda: **UNEP GEO data needs, existing gaps & proposed ways forward** as a summary of experiences under GEOs 1, 2, and 3 in this area. "Data gaps" in this context are understood and generally defined as the difference between what is still needed for IEA/GEOs, and what is currently available/exists now as "core data".

A round of comments yielded very useful information on global and regional data issues, while an attempt was made to renew a short-list of major data gaps across the globe.

In **Africa**, data for coastal areas and oceans are particularly poor. Data gaps need to be identified at the national level, and could also be filled to a certain degree through collection efforts at that level.

LAC stressed the need for data on land quality and degradation, water and energy consumption for specific sectors (not only agriculture/industry/households, but also tourism etc.). Waste data are being collected by the Pan-American Health Organisation (PAHO). The need to take into account regional differences in definitions was emphasized; e.g., a global definition of forest (10% tree cover according to FAO) is not applicable for certain regions or countries (80% would be better).

West Asia noted particular shortcomings in data on land degradation, air quality, and response indicators, and emphasized the importance of data availability at the national level.

At the **global/general level**, attention was drawn to data gaps with respect to water quality of rivers, lakes and wetlands, groundwater resources, land degradation, soil quality, renewable energy,

population density (times series) and urban/rural split, water withdrawals, urban issues (air pollution, waste), acidification and eutrophication, environmental policies (and effectiveness), organic farming, glacier retreat, invasive species, coast and oceanic pollution and POPs. The possibilities to derive or extract data to fill gaps were underscored (as different from measuring/collecting). In terms of scale, the need for data on (natural) ecosystems was emphasized as opposed to administrative units (countries, regions). In addition to meeting partners (UNSD, GEMS-Water, WRI), suggestions for various additional potential data partners were given, including the global observing systems (G3OS: GTOS, GCOS, GOOS), International Groundwater Analysis Centre (IGRAC), WHO and IPCC.

From the discussion and background documents, a provisional 'top-10' list of up-to-date, general data gaps/shortcomings was drawn up as follows:

- Renewable energy
- Water quality and (ground-)water resources
- Waste (solid & water, disposal and treatment/management)
- Land degradation
- Oceans (reference data and pollution/health)
- Ecosystems health (biodiversity; natural capital, species richness etc.)
- Population density (times series, urban/rural split)
- Governance (environmental policies, conventions and their effectiveness)
- Air emissions/quality (countries, sectors, cities) and resulting impacts
- Exotic/invasive species

It was concluded that this list is by no means complete and cannot be used to set priorities. This issue instead needs to be further discussed within a small sub-group of the DWG. This group will consist of G. Fosnight (chair), A. Abdel-Rahim, A. Farid Abdel-Kader, J. Akiwumi and D. Tunstall. G. Fosnight will draw up terms-of-reference for this activity by July (draft version).

Closure, actions and next meeting

Noting that the agenda was very ambitious and that the time (two days) had been short, R. Witt stressed the excellent accomplishments and progress made,



and thanked all participants for their contributions and help, and in particular the two rapporteurs G. Fosnight and L. Pinter.

The "action items" and developments stemming from the 2nd DWG meeting are as follows:

- A sub-group on practical/"technical" issues was established and is to begin discussions by e-mail on all of the relevant issues identified (sub-group will be moderated by J. van Woerden/S. Schwarzer with support from C. Ambala);
- A second sub-group on data gaps and shortcomings, and methods and proposals to address/resolve these, was also established and is being led by G. Fosnight, who is also drawing up ToRs for the sub-group;

- LAC is to finalise and circulate their Regional Data Portal proposal (K. Nagatani);
- Data-to-indicators matrix to be provisionally updated by end of June, then to start review process before submission to GEO team and DEWA management for their endorsement (J. van Woerden); and
- Original data definition list from post-Beijing meeting also to be circulated again (J. van Woerden)

It was proposed that the next DWG meeting be scheduled for later in 2003 or early 2004.



Annex I

DWG Meeting Agenda

UNEP's GEO DATA WORKING GROUP (DWG) GLOBAL/REGIONAL DATA PORTALS and "DATA-to-INDICATORS" MEETING

Organised by UNEP/DEWA~Europe at the International Environment House
IEH/Geneva ~ 16-17 June 2003

Monday 16th, 9:00-12:30

- 09:00 Welcome and Introduction ~ Marion Cheatle, Head of GEO Section, followed by Ron
- 09:15 Brief background on "Core Data" in GEOs 1-2-3; GEO-3 DWG and its strategy paper; existing indicators matrix, and links to/relation with UNEP.Net ~ Jaap/Ron
- 09:30 Regional and 'core data' status report: Africa ~ Ahmed/Chris/Johannes
- 09:40 Regional and 'core data' status report: Asia & Pacific ~ Shankar
- 09:50 Regional and 'core data' status report: LAC ~ Edgar/Kakuko
- 10:00 Regional and 'core data' status report: West Asia ~ Adel
- 10:15 *Coffee/tea break*
- 10:30 Other regional interventions and/or agency participants' summaries (n.b. ~ if requested) (Europe / NA / Polar / GEMS-Water / IISD / UNSTAT / WRI)
- 11:30 Demonstration of global GEO Data Portal and its current status ~ Jaap/Stefan
- 12:00 Comments/questions and discussions on global GEO Data Portal (all)
- 12:15 Summary of morning session
- 12:30 *Lunch*

Monday 16th, 14:00-17:30

- 14:00 Regional GEO Data Portals: define regional needs and "value-added" (w. Africa and LAC as examples); "minimum standards" for data harmonisation and inter-operability, as well as similar "look-&-feel" with global Data Portal etc.
(see attached terms-of-reference and proposed outputs for this session)
- 16:15 *Coffee/tea break*
- 16:30 Discussion on above (cont'd.), including conclusions and proposals for action from mid-2003 through biennium of 2004-05 (see attached ToRs)
- 17:30 Close



Tuesday 17th, 09:00-12:30

- 09:00 Finalise discussion of previous day, including conclusions and proposals for action (strategy / "technical issues" / division of labor / costing / etc.) from mid-2003 through biennium of 2004-05 (see attached ToRs)
- 10:00 Core data-to-indicators matrix: present/discuss/review and "sign off" on existing GEO matrix of "themes-indicators-core data sets" (*from previous meeting*)
- 10:30 *Coffee/tea break*
- 11:00 Continue discussion on "core data-to-indicators" matrix
- 12:00 Update of critical data gaps and shortcomings, including comments/inputs from regional perspective (and existing documents); identify and prioritise these for 1st GEO "Annual Statement" in 2003-04 and GEO-4 (*at both global & regional levels*)
- 12:30 *Lunch*

Tuesday 17th, 14:00-17:30

- 14:00 Prepare general plan for addressing critical data gaps and improving existing data sets
- 15:30 *Coffee/tea break*
- 16:00 Continue planning to address critical data gaps and providing related data support for 1st GEO "Annual Statement" and GEO-4; address related funding issues etc.
- 17:00 Meeting Review, Summary and Conclusions
- 17:30 Closure of the Meeting



Annex II

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• [Marion Cheatle and Munyaradzi Chenje, DEWA/
 • Assessment Branch, GEO Section; Day One only]



Annex III

UNSD Status Report in Activities on Environment Statistics*

The Statistical Commission at its 34th Session in March 2003 discussed the Report of the Secretary-General on UNSD's activities in natural resources and environment statistics.

The report summarizes the results of the two international data collections of environmental data carried out by UNSD in 1999 and 2001 and draws conclusions with relevance to future work as well as outlines a work programme for the improvement of the regular data collection, compilation and dissemination of global environmental statistics.

The conclusions of the report are summarized in this paper. Areas of potential relevance for the UNEP GEO process and collaboration between UNSD and UNEP are also indicated.

- 1) There was a considerable improvement in the number and quality of responses from the first data collection to the second [replies increased from 64 to 84, the total response rate grew from 40% to 47% while the number of countries and territories covered in the second data collection rose from 168 to 177]. Despite this development, response rates, especially in terms of completeness, and data quality are still far from satisfactory. In particular this means that although UNSD has now established a regular biennial data collection, data contributions to the GEO process would still be limited as data coverage and quality are yet improving. While UNSD collects data on air pollution, land use and degradation, UNSD considers paying more focused attention to the areas of water resource statistics and information on waste generation, treatment and treatment facilities, which are important but at present and in the foreseeable future not covered by a UN agency. Aside from the UNSD common database and in addition to UNSD's environment statistics section, other UNSD branches have well-established data collections that may be able to contribute data to the GEO process such as demographic and social statistics, energy statistics, economic statistics, and trade statistics.
- 2) The improvement in reporting between 1999 and 2001 and feedback from countries participating in the data collection suggest that even though the questionnaire tables show gaps or low levels of completeness, it is important to continue international data collection.
- 3) Therefore, it is recommended that in the area of environment statistics continued priority be given to the improvement of regular reporting and dissemination of environment statistics, with a focus on statistics needed for environmental indicators. This objective should be achieved through the following actions:
 - a) *Continuation and strengthening of the biennial UNSD environmental data collection.* Further efforts have to be made to establish nominated focal points for data collection in the countries, both at the national statistical offices and in the environmental ministries. More work has to be done to facilitate collaboration between the institutions engaged in the production of environmental information at the national level. This could be done through a joint effort with UNEP. A regular discussion forum will be created to improve reporting and feedback.
 - b) *Regular revision of the UNSD Questionnaire on Environment Statistics.* The objective is to ensure the incorporation of current conceptual and methodological developments, suggestions from countries and new emerging data demands, and to maintain questionnaire compatibility, e.g. with OECD/Eurostat. Possibilities for developing a joint UNSD/UNEP questionnaire or incorporating special



- data needs of UNEP into the UNSD questionnaire could be explored.
- c) *Production of detailed compilation manuals for developing countries.* The aim of this is to facilitate the development of their environment statistics and standardized reporting. More standardized reporting formats will improve data and metadata quality for both data producers and data users.
- d) *Establishment of a flexible data dissemination system.* The biennial publication of environmental statistics and indicators (in print and via the Internet) will draw on UNSD's Environment Statistics database, which will gradually evolve into an online database as data quantity and quality improves. UNSD continues to develop its environment statistics database which major scope is to serve as a data repository for UNSD's environmental data collection, validation, analysis, and dissemination process. UNSD is interested in learning more about the architecture of the Global and Regional Data Portals to investigate possibilities for easy data and metadata exchange, validation, and publication.
- e) *Development of training material for use in regional and sub-regional training workshops with a focus on the UNSD Questionnaire on Environment Statistics.*
- f) *Organization of regular regional and sub-regional training workshops and other forms of training in environment statistics.* Preferably this should be accomplished through joint efforts with other international organizations. Opportunities for a coordinated approach between UNEP and UNSD to capacity building include the development of communication channels for the exchange of information on training projects, the joint organization of trainings and/or the reciprocal participation of experts in training seminars and workshops.
- g) *Continuous cooperation with the international organizations engaged in environmental data production and*

reporting as well as with the UN regional commissions. Such cooperation should be maintained in all the above-mentioned areas. UNSD is interested in more detailed discussions with UNEP on all aspects of environmental data production and dissemination. Areas of interest include strategies for coordinated follow-up in data quality assessment and quality control, data analysis, periodicity and content of data collections, the linking of networks of contacts in countries and regional institutions, and avoiding duplication in the collection of specific data.

- h) *Establishment of an Inter-agency working group.* The working group would deal with the coordinated and collaborative organization of activities in data collection, methodological work, training and capacity building in environment statistics. UNEP should have a role in this group according to its mandate, for example, through the participation of its Geneva Office or DEWA.

The Statistical Commission endorsed the work plan of UNSD in the area of natural resources and environment statistics while emphasizing the need for continuous strengthening of the data collection and its regular review with respect to data gaps, data quality, and response rates.

The Commission agreed on setting up an Inter-agency working group and the TOR for the group is to be developed in August/September and will be circulated to all relevant international organizations and institutions.



Annex IV

World Resources Institute Information Programme as of June, 2003



Programme Background

WRI's Information Programme seeks to change decision-making by opening the gates to the free flow of environmental information and engaging key policy audiences; creating the tools that people can use to analyze and disseminate this information; demonstrating its power and usefulness; and helping people act from knowledge rather than ignorance. To reach these goals we communicate global and international environmental and development information via the Internet and other means; analyze and promote new approaches to how natural resources and ecosystems and poverty are being monitored; develop new indicators and analytical tools; support the design and implementation of ecosystem assessments; and promote effective environmental information policies and institutions.

Information Working Group for Africa

Contact: Dan Tunstall/ dan@wri.org

The principal objectives of the IWG, jointly managed by WRI and the U.S. Agency for International Development, are to promote better environmental decision-making and more informed public debate by improving the development and use of environmental and development information. We work to remove the policy and legal constraints on the use of environmental information. WRI collaborates with many regional, sub-regional, and national partners including EIS-Africa, a pan-Africa NGO. See www.eis-Africa.org.

Watershed and Water Scarcity Indicators

Contact: Carmen Revenga/ carmen@wri.org

The Watershed and Water Scarcity Indicators Project works in close collaboration with partner institutions at the global, regional, and basin level to increase

public participation in decision-making with regard to water resources. To promote integrated water resources management, the project supports: development of better information at the basin level; development of indicators of water stress and ecosystem water requirements; indicators of freshwater biodiversity; indicators of freshwater fragmentation; increased public awareness of the issues; stakeholder participation in evaluating tradeoffs among different resource uses; new technologies and pricing arrangements; and proactive policies and institutional arrangements that allocate water to socially beneficial uses taking into account the needs of aquatic ecosystems. For the latest edition of *Watersheds of the World*, see www.iucn.org/themes/wani/eatlas/.

Drylands Indicators and Assessment

Contact: Robin White/ robinw@wri.org

The primary objective of the Drylands Indicators and Assessment Project is to create broader awareness of the importance of drylands and the people living in these ecosystems. The project is working to expand opportunities to more strongly align the UN Convention to Combat Desertification with other international conventions such as the CBD, Ramsar, and the UNFCCC. We work with partners to encourage regular and consistent monitoring of dryland ecosystem goods and services and to help establish timely reporting of conditions and trends at the country and sub-regional and regional levels. At present we are developing new indicators of dryland degradation and wetlands in drylands in collaboration with the Millennium Ecosystem Assessment and the UNCCD. And, staff are working with Argentina to develop a drylands ecosystem assessment for the country. See *Drylands, People, and Ecosystem Goods and Services: A Web-based Geospatial Analysis*. See http://forests.wri.org/pubs_description.cfm?PubID=3813.



Mapping Poverty and Ecosystems Goods and Services

Contact: Norbert Henninger/ norbert@wri.org

The principal objective of the Poverty Mapping project, which is being carried out in collaboration with the World Bank, UNEP/GRID-Arendal, and Columbia University's Earth Institute, is to promote the development and use of subnational maps of poverty to better target development and environmental resources. Poverty mapping at this level is also used as tool to empower local communities to sustain and gain value from their resources. Our intent is to help shape the agenda of major international environmental conventions and development organizations and assist them to better integrate environmental interests in poverty reduction strategies.

Research has also begun on the efforts to develop opportunities for poverty reduction through spatial analyses of ecosystem services. Case studies in Kenya and Uganda are being developed with local partners and the international research community including ILRI, ICRAF, IFPRI, and IWMI. See the recent publication, "Where are the Poor: Experiences with the Development and Use of Poverty Maps". See <http://population.wri.org/> and www.povertymap.net.

Earth Trends: The Environmental Portal

Contact: Christian Layke/ clayke@wri.org

EarthTrends (ET) provides a collection of timely, authoritative, internationally-comparable data, maps, and feature articles on environmentally sustainable development. ET represents a key part of WRI's commitment to guarantee public access to information and decisions regarding natural resources and the environment. The information available on EarthTrends includes a searchable database of 660 variables for 220 countries and all recent years, along with sources and technical notation. It also includes a set of data tables, country profiles, maps, and feature articles. Users may register to receive monthly updates. The full database is also available as a CD-ROM and

searchable by email and low bandwidth Internet. See <http://www.earthtrends.wri.org>.

Demystifying Fisheries

Contact: Carmen Revenga/ carmenr@wri.org

The principal objectives of the Demystifying Fisheries Project are to raise awareness of issues facing smallscale coastal fisheries, as well as the human populations dependent on these resources, provide easy access to credible information on underreported fisheries sub-sectors (small scale and artisanal fisheries) and general fisheries trends worldwide, and encourage private foundations, environmental organizations, and multilaterals to focus research, development activities, and policies on small-scale fishing. Better information on these critical resources will lead to more proactive policies to reverse the declining trends in fish catch in coastal areas.

Global Forest Cover

Contact: Emily Matthews/ emily@wri.org

The Global Forest Cover project is assessing the opportunity to upgrade global forest monitoring and assessment processes. Specifically, the project will aim to develop new global forest monitoring and assessment tools and practices, encourage regular and more consistent monitoring of global forest area, forest area change, and forest goods and services, and help establish accurate and timely reporting of global forest conditions and trends at global, regional, national and sub-national levels.

The final report, "Trees Without Borders: A New Approach to Monitoring the World's Forests" will be published later this year.

Regional Reefs at Risk

Contact: Laretta Burke/ lauretta@wri.org

The Regional Reefs at Risk project develops indicators of the potential threat to coral reefs at regional, national, and selectively, at local levels. The three



primary goals of Regional Reefs at Risk Project in the Caribbean are to develop valid tools for evaluating human impact on coral reefs, improve the information base available for prioritizing and managing coral reefs, and raise awareness about impacts of human activities on coral reefs and about the value of healthy coral reefs. Results from work in Southeast Asia can be found at <http://wri.igc.org/wri/marine/>.

Mining

Contact: Marta Miranda/ marta@wri.org or Stephen Menard/ smenard@wri.org

The Mining and Critical Ecosystems project provides an overall framework that can be used to identify potential “no go” areas for mining. Through the development of a spatial model the project exposes potential environmental and social impacts from mining which could affect communities. For decision-makers the global model should provide a first glimpse into areas where mining may be more problematic. On a national scale the model provides insight and a more detailed evaluation of the potential environmental and social impacts on local communities.

Global Forest Watch

Contact: Kristin Snyder/ Kristin@wri.org.

Global Forest Watch (GFW) is a sister programme of the Information Programme. GFW is an international network of non-governmental, academic, and research organizations that provides timely, reliable, and accurate information on forests and forest ecosystems to ensure public understanding and informed decision-making. It concentrates in mapping closed, often primary forests and the concessions areas opened for logging. The intent is to monitor activities in these concessions to ensure that logging is being carried out in accordance with national law and policy. GFW now operates in 12 countries. See <http://forests.wri.org/>.

World Database on Protected Areas (WDPA)

Contact: Robin White/ robinw@wri.org at WRI or members at WCMC or other NGOs.

The WDPA Consortium has been formed by NGOs and other organizations holding spatial data on protected areas. Members include UNEP/WCMC, Conservation International, WRI, The Nature Conservancy, World Wildlife Fund, and others. The primary goal for this year is to have the updated global database available on CD at the World Parks Congress and to have the core data freely accessible on the web. Data available in September 2003.

World Resources Report

The 2002-2004 edition of the WRR, “Decisions for the Earth: Balance, Voice, and Power” will be released in London and Washington on July 9 and 10. The WRR is a partnership of UNEP, UNDP, the World Bank, and WRI. This edition is focused on environmental governance and includes a number of new data tables measuring freedom, corruption, civil liberties, polity index, NGOs, freedom of the press, freedom of information legislation, and participation of countries in key multilateral agreements. See www.wri.org.



Annex V

GEO Data-Indicators Matrix

THEME	ISSUE	POTENTIAL DATA VARIABLES	PROPOSED KEY (LEAD) INDICATORS	UNITS	CURRENT PRIMARY (LEAD) DATA SOURCES
1	2	3	4	5	6
Land	Soil erosion	<ul style="list-style-type: none"> Water erosion Wind erosion 	<ul style="list-style-type: none"> Average annual soil erosion rate 	t/ha	<ul style="list-style-type: none"> • UNEP/FAO/ISRIC: GLASOD
	Desertification	<ul style="list-style-type: none"> Area affected by desertification: rainfed croplands, irrigated land, forest and woodlands Livestock levels per km² in dryland area Population living below poverty line in dryland areas 	<ul style="list-style-type: none"> Total land affected by desertification Population living below poverty line in dryland areas 	ha, % number, %	<ul style="list-style-type: none"> • UNEP/FAO/ISRIC: GLASOD
	Land salinization	<ul style="list-style-type: none"> Areas affected by salinization and waterlogging 	<ul style="list-style-type: none"> Total area affected by salinization 	ha, % p/y	<ul style="list-style-type: none"> • UNEP/FAO/ ISRIC: GLASOD
Forests	Forest loss, Forest resource management	<ul style="list-style-type: none"> Forest management fractions (% protected) Forest change / domestication by sector (to agric, urban) Forest area change (open, closed, natural forests) Deforestation rate (open, closed, natural forests) Reforestation, natural and total, % success Production & trade of forestry products (wood, paper) 	<ul style="list-style-type: none"> Intensity of forest use (harvest / growth) Area of forest and woodland Annual average change in forest area Exports of forestry products Protected forest area Regeneration/afforestation area 	% p/y total, per cap, % % % p/y % p/y	<ul style="list-style-type: none"> • FAO: FAOSTAT, FRA/SOFO
	Degradation of forest quality	<ul style="list-style-type: none"> Volume distribution by major tree species group within each biome (ha per each biome) Share of disturbed/ deteriorated forests in total forest area 	<ul style="list-style-type: none"> Share of affected forests 	% of total forest area	
Biodiversity	Loss of species	<ul style="list-style-type: none"> No. of species known (number) and threatened species (%) for vascular plants, mammals, birds, amphibians, reptiles, fresh water fishes 	<ul style="list-style-type: none"> Threatened plant species as % of total known plant species Threatened animal species as % of total known animal species 	% %	<ul style="list-style-type: none"> • IUCN/WCMC: Red List
	Loss of habitat	<ul style="list-style-type: none"> Recorded wildlife habitat by ecosystem, for forests (dry, moist, all forest), wetlands, mangroves, grassland/ savannah, deserts/ scrubland 	<ul style="list-style-type: none"> Total areas of wetlands/ marshes Total mangrove area Change in arable land area 	ha	<ul style="list-style-type: none"> • IUCN/WCMC: Protected Areas Database • USGS/EDC: Olson World Ecosys. • WWF: Ecoregions • FAO: FAOSTAT
	Wildlife Trade	<ul style="list-style-type: none"> Trade in flora & fauna (birds, reptiles, plants, mammals, butterflies, ornamental fish) 	<ul style="list-style-type: none"> Net trade in wildlife and captive-bred species 	million US\$	<ul style="list-style-type: none"> • CITES Secretariat



THEME	ISSUE	POTENTIAL DATA VARIABLES	PROPOSED KEY (LEAD) INDICATORS	UNITS	CURRENT PRIMARY (LEAD) DATA SOURCES
1	2	3	4	5	6
	Overfishing	<ul style="list-style-type: none"> Total inland, fresh water and marine fish catch, production, consumption and trade 	<ul style="list-style-type: none"> Total & per cap marine fish catch Total fish catch in inland waters (incl aquaculture) 	t/year	<ul style="list-style-type: none"> FAO: FAOSTAT, FishStat, State of World Fisheries
	Protected areas	<ul style="list-style-type: none"> National, international and local parks & protected areas: biosphere reserves (terrestrial and marine), wetlands of international importance, World Heritage sites 	<ul style="list-style-type: none"> Total protected areas (number, size) and % of total land 	number, km ² , %	<ul style="list-style-type: none"> IUCN/WCMC: Protected Areas Database UNESCO World Heritage List
Freshwater	Freshwater resources	<ul style="list-style-type: none"> Annual internal renewable water resources Annual river flows from/to other countries, by basin Annual consumption by sector (domestic, industry, agric) Annual groundwater recharge Annual groundwater withdrawals by sector 	<ul style="list-style-type: none"> Annual internal renewable water resources per cap Annual freshwater consumption per cap Population with water stress 	m ³ /cap m ³ /cap number, %	<ul style="list-style-type: none"> FAO: AquaStat WRI: World Resources Database UNESCO: World Water Resources UNH/GRDC: Runoff Fields Univ. of Kassel: WaterGap IGRAC (Int Groundwater Resources Ass. Centre) GGIS
	Water quality	<ul style="list-style-type: none"> River pH, concentrations of oxygen (DO, BOD), coliforms, particulates (TSS, TDS), nitrates (NO₃, NH₄, NP), phosphor (PO₄), metals (HMs), pesticides Fish biodiversity (reserves, specie no.) Ground water pH, concentrations of nitrates, TDS (salinity), iron, chlorides, sulphates Waste water treatment: % served, public expenditures 	<ul style="list-style-type: none"> BOD level of most important rivers Nitrate level of most important rivers Coliform count per 100 ml Pesticides concentrations in most important rivers 	mg/l mg/l no./100 ml µg/l	<ul style="list-style-type: none"> GEMS/Water: Atlas of Global Water Quality, others WRI: World Resource Database
Atmosphere	Climate change	<ul style="list-style-type: none"> Anthropogenic emission of CO₂, CH₄, N₂O, also HFCs, PFCs, SF₆, total and by sector Annual mean temperature, precipitation Fossil fuel supply (% and intensity) 	<ul style="list-style-type: none"> Annual CO₂ emissions per cap and per unit of economic output Global mean temperature Global mean concentration of CO₂ Fossil fuel consumption share Renewables consumption share 	t/cap, t/US\$1,000 °C ppm % %	<ul style="list-style-type: none"> CDIAC: Trends On-line UNFCCC: National Communications IEA: Energy Statistics and Balances IPCC/CRU: Mean Monthly Climatologies WMO: Climate Anomalies



THEME	ISSUE	POTENTIAL DATA VARIABLES	PROPOSED KEY (LEAD) INDICATORS	UNITS	CURRENT PRIMARY (LEAD) DATA SOURCES
1	2	3	4	5	6
	Air pollution	<ul style="list-style-type: none"> Emissions of precursors (NO_x, CO, NMVOC, CH₄), total and by sector Emissions of acidifying gases (NH₃, NO_x, SO₂), total and by sector Atmospheric concentration of CO, SO₂, NO_x, NH₃, PM, Pb, VOC, O₃ Rain water pH in selected areas Expenditures on air pollution abatement and control 	<ul style="list-style-type: none"> NO_x, SO₂ emissions per cap and per unit of economic output 	t/cap, t/US\$1,000	<ul style="list-style-type: none"> IGBP/GEIA/RIVM: EDGAR Database
	Stratospheric ozone depletion	<ul style="list-style-type: none"> Production, consumption, import & export of ODS Atmospheric ODS concentration over selected cities (parts per trillion) Ozone levels/total ozone column over selected cities (Dobson units) Ground level UV-B radiation over selected cities 	<ul style="list-style-type: none"> Total ODS production by compound Total ODS consumption per capita 	tonne of ozone depleting potential kg/cap	<ul style="list-style-type: none"> UNEP Ozone Secretariat World Ozone & Ultrav. Rad. Data Centre AFEAS Production, Sales and Emissions
Coastal and marine areas	Coastal & marine pollution	<ul style="list-style-type: none"> Average annual sediment load Average annual untreated waste disposal by sector Discharge of oil into coastal waters Concentrations of HMs (Hg, Pb, Cd, Cu, Fe, Mn, Ni, Co) Concentration of PCBs Industrial activities in coastal region Share of pollution caused by sector Coastal population (growth, urban share) Tourist arrival in coastal/marine areas Number of hotels/resorts in coastal areas 	<ul style="list-style-type: none"> Average annual sediment load Average annual untreated waste disposal by sector % of urban population living in coastal areas Area of Exclusive Economic Zone (EEZ) 	† † % %, km ²	<ul style="list-style-type: none"> UNEP Regional Seas Programme and Global Programme of Action (GPA) WCMC: Protected Areas Database IMO: Global Waste Survey UNSTAT: UN Common Database ICLARM: ReefBase, FishBase WRI: Reefs at Risk G3OS (GOOS, GTOS, GCOS)
Disasters	Natural disasters	<ul style="list-style-type: none"> Occurrences, financial damage and casualties (people affected, homeless, injured, killed) related to floods, droughts, cyclones, earthquakes, landslides, volcanic eruptions, forest fires 	<ul style="list-style-type: none"> Total number of natural disasters p/y Total number of people killed & affected by natural disasters Economic loss due to natural disasters 	number number million US\$	<ul style="list-style-type: none"> OFDA/CRED: EM-DAT Munich Re: Annual review of nat. dis. UN-OCHA: ReliefWeb UN-ISDR
	Human-induced disasters	<ul style="list-style-type: none"> Occurrences, financial damage and casualties (people affected, homeless, injured, killed) related to transport and industrial accidents 	<ul style="list-style-type: none"> Total number of technological accidents p/y Total number of people killed & affected by technological accidents Economic loss due to techn. accidents 	number number million US\$	<ul style="list-style-type: none"> OFDA/CRED: EM-DAT UN-ISDR



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1	2	3	4	5	6
Urban areas	Urbanization	<ul style="list-style-type: none"> •Urban population, total, growth rate •Number of cities with over 750,000 population 	<ul style="list-style-type: none"> •Average annual urban population growth rate 	%	<ul style="list-style-type: none"> •UNPD: World Urbanization Prospects
	Waste management	<ul style="list-style-type: none"> •Waste generation and disposal methods by sector: municipal, industrial, agricultural, hazardous 	<ul style="list-style-type: none"> •Municipal waste production per cap •Industrial waste generated per unit of economic output •Hazardous waste production per unit of economic output •Waste management fractions •Exposure to HMs, toxic chemicals •Share of recycled waste 	kg/capita kg/US\$1,000 kg/US\$1,000 %	<ul style="list-style-type: none"> •OECD: Data Compendium •UNSTAT: UN Common Database •WRI: World Resources Database •UNEP Chemicals, Basel Conv. Secr.
Socio-Economic (incl. health)	Population and social	<ul style="list-style-type: none"> •Population, total and growth rate •Total fertility rate •Adult literacy (%) by sex •Education enrolment, net and gross (primary, secondary, tertiary), by sex •Education expenditures (prim., sec., tert.) •Labour force total (% population), by sector (agric., ind., serv. and by sex) •Telephones (main lines and cellular per 100 people) •Daily newspapers (copies per 100 people) •Radios (number per 100 people) •Televisions (number per 100 people) •Computers (number per 100 people) •Internet connections (number per 10000 people) 	<ul style="list-style-type: none"> •Average annual population growth rate •Population density 	% inh/km ²	<ul style="list-style-type: none"> •UNPD: World Population Prospects •UNESCO: World Education Statistics •UNDP: Human Development Indicators •UNSTAT: UN Common Database •ILO: Laborsta Database, KILM indicators •World Bank: World Development Indicators
Economy		<ul style="list-style-type: none"> •Real GDP, total and per cap •Power Purchasing Parity (PPP) •Number of people in absolute poverty, rural and urban •Merchandise exports (value), total and by sector: manufactures, fuels/minerals/metals, services •Merchandise imports (value), total, food, fuels •Trade (% of GDP) •Terms of trade (1995=100) •Inflation, consumer prices (annual %) •Unemployment rate (%) •Total external debt total and % of GNP 	<ul style="list-style-type: none"> •GDP per capita •PPP per cap •Value added as % of GDP by sector 	const 1995 US\$ Intern. \$ %	<ul style="list-style-type: none"> •World Bank: World Development Indicators •Univ. of Purdue: GTAP •UNCTADWTO(ITC): COMTRADE •UNSTAT: UN Common Database



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1	2	3	4	5	6
		<ul style="list-style-type: none"> • Total debt service (as % of exports of goods and services) • Foreign direct investment, net inflows (% of GDP) • Official Development Assistance & Aid (ODA) 			
	Consumption and production	<ul style="list-style-type: none"> • Total commercial energy production, by sector: fossil fuels, hydro, nuclear, geothermal, biomass, solar, wind • Total commercial energy use, total and per cap • Traditional fuel use (% of total energy consumption) • Energy imports, net (% of energy consumption) • Renewable energy use (%) • Total electricity generation by sector: thermal, hydro, nuclear, non-hydro renewables • Total electricity consumption • % population with access to electricity • Value added by sector: agric., ind., manuf., services • Distribution of GDP by demand sector: government consumption, private consumption, gross domestic investment, gross domestic saving • Defense expenditures (% of GDP) 	<ul style="list-style-type: none"> • Total commercial energy production • Commercial energy consumption per capita 	tonne of oil equivalent	<ul style="list-style-type: none"> • IEA: Energy Statistics and Balances • World Bank: World Development Indicators
	Transport	<ul style="list-style-type: none"> • Motor vehicles in use (per 1,000 people), by type of engine • Total length of motor ways • Density of motor ways (km/10,000 km²) • Road traffic intensity per unit of GDP • Number of departures and arrivals (airports) • Energy consumption by road transport (% share of total consumption) 	<ul style="list-style-type: none"> • Road traffic intensity per unit of GDP 	vehicle km/US\$1,000	<ul style="list-style-type: none"> • World Bank: World Development Indicators • UNSTAT: UN Common Database
	Agriculture and Livestock	<ul style="list-style-type: none"> • Agricultural production index • Food production index • Pesticide consumption • Fertilizer use • Livestock units 	<ul style="list-style-type: none"> • Use of nitrogen on agric. land • Use of phosphate on agric. land • Use of pesticides on agric. land • Agricultural production value added 	<ul style="list-style-type: none"> † N/ha † P₂O₅/ha active kg/ha % of GDP 	<ul style="list-style-type: none"> • FAO: FAOSTAT • IFA: Fertilizers & their use



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1	2	3	4	5	6
	Human health and well-being	<ul style="list-style-type: none"> •Population below poverty line, urban and rural, by sex •% population with access to safe drinking water, urban and rural •% population with access to sanitation services, urban and rural •No. of people per physician, per hospital bed •No. of people with access to health services •Government expenditures on health services •Calories supply, total and from animal food •Available calories as % of requirement •Malnutrition in children under five years •Average life expectancy, by sex •Crude death rate •Infant mortality rate •Mortality incidence, by disease (malaria, respiratory infections, AIDS etc) •Burden of disease (DALYs) •Percent of population affected by noise •Percent of human population in noise prone areas •Level of noise in urbanized cities 	<ul style="list-style-type: none"> •% of total population access to safe drinking water •% of total population access to sanitation services •No. of people per physician •Infant mortality rate (per 1,000 births) •Caloric intake per cap •% of GDP spent for health services •Mortality caused by respiratory infections •Mortality caused by communicable diseases •Disability-Adjusted Life Years (DALYs) 	<ul style="list-style-type: none"> % % number number cal/day/pp % no. per 1000 no. per 1000 year 	<ul style="list-style-type: none"> •UNPD: World Population Prospects •WHO: WHOSIS, World Health Report, Global Burden of Disease •UNICEF: Childinfo.org •WHO/UNICEF Joint Monitoring Program (JMP)
	Governance	<ul style="list-style-type: none"> •Environmental institutions, policies in place •Environmental conventions signed •No. of conflicts, state failures 	<ul style="list-style-type: none"> •Signatories to major environmental conventions 		<ul style="list-style-type: none"> •UNEP/IUCN/FAO Ecolex •CIESIN: ENTRI •CIDCM SFTF Database •Worldbank Governance indicators •Transparency International: Corruption Index
Geography	Support data sets	<ul style="list-style-type: none"> •Admin boundaries (incl EEZ) •Infrastructure (roads, rivers, lakes) •Watershed boundaries •Cities (location, area) •Population density (time series) •Landcover & vegetation (time series) •Soil units and characteristics •Elevation & slopes 			<ul style="list-style-type: none"> •ESRI: ArcWorld, ArcAtlas •WHO: UN EIP admin boundaries •CIESIN: GPW •WRI: River basins •UNH/GRDC: Run-off Fields •GEMS-Water: Atlas of Global Water Quality •USGS/EDC: GLCC, HYDRO1k •FAO: Soil Map of the World •UN-Habitat: Urban Observatory



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