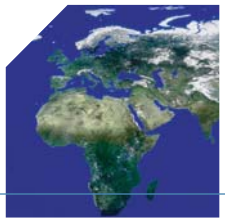
ICSU
International Council for Science

strengthening international science for the benefit of society

Workshop Report on Socioeconomic Data in Relation to the Integrated Global Observing Strategy Partnership (IGOS-P)



IGOS
Integrated Global Observing Strategy

About ICSU

Founded in 1931, the International Council for Science (ICSU) is a non-governmental organization representing a global membership that includes both national scientific bodies (101 members) and international scientific unions (27 members).

Through this international network, ICSU coordinates interdisciplinary research to address major issues of relevance to both science and society.
In addition, the Council actively advocates for freedom in the conduct of science, promotes equitable access to scientific data and information, and facilitates science education and capacity building.

The Council acts as a focus for the exchange of ideas, the communication of scientific information and the development of scientific standards. ICSU's members organize scientific conferences, congresses and symposia all around the world—in excess of 600 per year—and also produce a wide range of newsletters, handbooks, learned journals and proceedings.

ICSU also helps create international and regional networks of scientists with similar interests and maintains close working relationships with a number of intergovernmental and non-governmental organizations, especially UNESCO and the Third World Academy of Sciences (TWAS).

Because of its broad contact with thousands of scientists worldwide, ICSU is increasingly called upon to speak on behalf of the global scientific community and to act as an advisor in matters ranging from ethics to the environment.

Workshop Report on Socioeconomic Data in Relation to the Integrated Global Observing Strategy Partnership (IGOS-P)

Abstract

The International Council for Science (ICSU) in cooperation with the IGOS Co-Chairs organized a one-day meeting on the topic "Socioeconomic Data in Relation to IGOS-P" in September 2004; the recommendations of this meeting are presented in this report. The meeting was structured to respond to the Terms of Reference (ToR) approved at the IGOS-P-11 meeting (see Annex 1). The majority of the participants in the meeting were experts in environmental and socioeconomic data, but there was also representation from the Integrated Global Observations of the Land (IGOL) and the Integrated Global Water Cycle Observations (IGWCO) Themes and from the IGOS Secretariat (Annex 2). This report examines what is meant by socioeconomic data and how they are collected, the importance of socioeconomic data to IGOS and the broader community, and then concludes with recommendations to IGOS, governments, and data experts.

Introduction and context

Accurate information on both the state of the Earth system and the dynamics of change in the system is essential to improve scientists' ability to reduce uncertainties, assess impacts, and predict change. The capacity to quantify the physical environment of the Earth has increased dramatically with improved remote and *in situ* observations and advanced computational technologies. There is also a growing awareness in the scientific community of the importance of understanding anthropogenic influences on Earth's environment, both for scientific progress and for providing useful information to policy and decision makers. This recognition has occurred at the highest political level (*e.g.*, Millennium Development Goals of the United Nations and the Johannesburg Plan of Implementation, which was adopted in 2002 at the World Summit on Sustainable Development [WSSD]) and involves major scientific initiatives.

At the Forum on Science, Technology, and Innovation for Sustainable Development, which was held in parallel to the WSSD, IGOS (Annex 3) and the International Social Science Council (ISSC) jointly organized a session that explored the issue of integrating data on the natural environment with socioeconomic information for better decision making. It was entitled the "The Role of the Global Observing Systems in Sustainable Development". Participants in the session noted the gap between existing environmental observing systems and socioeconomic ones and concluded that there was a need for socioeconomic observations that provide data for integrated, coupled, human/geo-physical models at local, regional and global levels.[1]

[1] The complete report is available at : http://www.icsu.org/Gestion/img/ICSU_DOC_DOWNLOAD/72_DD_FILE_Vol11.pdf .

The Millennium Ecosystem Assessment (MA) has taken an integrated approach to the collection and analysis of natural and social sciences datasets. The MA conceptual framework links the direct and indirect human-induced drivers of change (*e.g.*, demographic, economic, socio-political, technological, behavioural, and land use) and natural drivers of change (*e.g.*, solar activity and volcanic eruptions) to changes in the environment (*e.g.*, climate change, air pollution, and degradation of ecosystems and their services) and human well-being and poverty alleviation (*e.g.*, health and environmental, cultural, and economic security). This framework should serve as a useful model to future integrated research projects.

In addition, ICSU has undertaken two strategic Priority Area Assessments (PAA) over the past two years. The first, published in 2003, examined ICSU's major environmental initiatives and their relation to sustainable development. [2] One of the recommendations of this report was the need for new multi-disciplinary scientific projects that fully incorporate the socioeconomic dimensions of environmental dynamics and change. The second PAA was focused on the subject of Scientific Data and Information and will be published by the end of 2004. It discusses generic issues related to data collection, management and dissemination and includes all types of scientific data, including socioeconomic data.

What is meant by socioeconomic data and how are these data collected?

Socioeconomic data cover a wide variety of themes (*e.g.,* health, governance, wealth), content (*e.g.,* political boundaries, demographic information and economic statistics), formats (*e.g.*, spatial, tabular, textual) and scales (*i.e.,* individual, household, enterprise, local, regional and global). Among the sources of these data are national censuses, sample surveys, vital registration systems, mapping agencies, transactional data sensors, and administrative agencies.

Socioeconomic observations and data are similar to those in the biogeophysical sciences in a number of ways. Monitoring and data collection priorities, appropriate design, calibration and coordination of socioeconomic "observing instruments" (often surveys or administrative reporting procedures) are critical to their success, and the collection, integration, quality control, and dissemination require special expertise and skills. To use these data in biogeophysical research, special methods must be devised for integrating databases; this is often be done through the use of geospatial information technologies that are common to both fields.

Greater coordination and analysis are needed to aggregate, link, and grid socioeconomic data collected at the local or national level to larger scales, including global datasets. Currently, the infrastructure and funding for this type of coordination and analysis is insufficient because socioeconomic data are generally applied to the purposes for which they were originally collected. The inadequacy of the institutional support for refining these observations further could have a significant impact on the development of socioeconomic data and observations that can be used in predictive models and scenarios related to the Earth system. The lack of global datasets is just one difficulty in integrating socioeconomic data with other types of Earth observations. Issues of

[2] http://www.icsu.org/Gestion/img/ICSU_DOC_DOWNLOAD/58_DD_FILE_ICSU_PAA_REPORT.pdf

resolution, confidentiality, comparability, standardization of collection procedures, and dissemination of these data must also be addressed.

Project-specific collaborations between social and biogeophysical scientists should be encouraged in order to identify data integration issues and find practical ways to solve them. One example of such a collaboration in research is the Land-Use and Land-Cover Change (LUCC) project of International Human Dimensions Programme on Global Change (IHDP) and International Geosphere-Biosphere Programme (IGBP). In addition, IGOL the newly developing IGOS Land Theme, will involve socioeconomic data.

Importance of socioeconomic data to IGOS and the broader community

Socioeconomic data could contribute significantly to a number of IGOS Themes. For example, IGOL cites land use, human settlement and population, and managed ecosystems as major important sub-themes. All are primarily or significantly socioeconomic in focus.

In addition, the IGOS Water Theme (IGWCO) recognizes that human alteration of the terrestrial water cycle has been significant. For example, humans appropriate more than 50% of the accessible renewable water resources globally. Unchecked human exploitation of the terrestrial water cycle has lead to water scarcity around the globe, due in large part to the fact that water is universally undervalued and overused. Therefore, incorporation of socioeconomic data and indicators by the IGWCO Theme is essential.

At the Earth Observation Summit II on 25 April 2004, a Framework document was adopted, which enumerates some of the societal benefits of comprehensive, coordinated and sustained Earth observations. To address these benefits adequately requires substantial improvement in observational and scientific understanding, including better integration of socioeconomic and natural science data. IGOS is positioned to contribute directly to several areas of societal benefit identified by the Group on Earth Observations:

• Reducing loss of life and property from natural and human-induced disasters (Geohazard Observations Theme);
• Understanding, assessing, predicting, mitigating, and adapting to climate variability and change (Atmospheric Chemistry Theme);
• Improving water resource management (IGWCO);
• Improving the management and protection of terrestrial, coastal, and marine ecosystems (IGOL, Coastal Observations Theme);
• Supporting sustainable agriculture and combating desertification (IGOL).

Recommendations

The recommendations from the meeting are focused on those areas where concerted action could result in significant scientific progress and yield societal benefits. Although emphasis should be placed on building on existing structures and optimizing resources, it is clear that new support opportunities should be explored to realize these recommendations.

The ToR requested that the September 2004 meeting make recommendations to IGOS and these are presented below. In addition, larger institutional changes will need to occur to better address the generic scientific challenges to integration of socioeconomic and biogeophysical data. Therefore, there are also recommendations to governments, and to data experts in various fields of science. They are numbered for ease of reference, rather than order of importance.

IGOS

In order for IGOS obtain the data needed by scientists to achieve its goals, IGOS Themes will need to include socioeconomic expertise and data and observations.

1. IGOS should improve its access to information about socioeconomic data in relevant Themes. This should take place with the appointment of individuals who are knowledgeable about socioeconomic data to specific Theme Teams. It is important that social scientists be encouraged to participate in IGOS to identify appropriate data and nominate individuals to participate in the development of new Themes. In addition, socioeconomic data experts should work with approved Themes when they come up for review to foster consideration of socioeconomic data related to the Theme. In the near-term, emphasis should be placed on socioeconomic contributions to the Land, Water, Coastal, and Geohazards Themes. As the Land Theme, although still in the scoping stage, has arguably made the most significant effort to incorporate socioeconomic components into its work, immediate priority should be given to this Theme. In the medium term, IGOS should develop a strategy for identifying ways to consider socioeconomic data within the other Themes.

2. There are a number of possible starting points for the incorporation of socioeconomic data and analysis into the IGOS Themes. To provide an example, one possible starting point is the development of databases that includes geo-referenced statistics on population distribution and/or economic activities (e.g., income/poverty) over time. As an initial step, IGOS could explore cooperation among space agencies, statistical agencies, and the academic sector to accomplish this. It could also promote the linkage of distributed databases in a virtual network. But whatever the focus and approach, the development of socioeconomic databases must be tied to a long-term IGOS strategy.

3. The IGOS Partnership should consider enlarging its membership to include organizations that are knowledgeable about socioeconomic data and could contribute to the use of and provide access to socioeconomic data in the IGOS Themes. Two possible candidates are IHDP and the World Health Organization. In addition, organizations such as the International Union for the Scientific Study of Population, the UN Statistical Division, the World Bank, the International Monetary Fund, the World Trade Organization, and the International Federation of Data Organizations for the Social Sciences could help in the development of socioeconomic databases and work with individual Themes, as appropriate.

4. IGOS should work closely with GEO and its successor, with national governments, and with multilateral organizations in order to implement these recommendations.

Governments
Integrating natural and socioeconomic observations will be critical to advancing the scientific understanding of the Earth system. The following are recommendations to national governments to help reach this goal:

5. Governments should commit to ensure full, open and equitable access to all scientific data, including socioeconomic data, for research and education.

6. Governments and others who collect socioeconomic data should release them for scientific research in a manner that allows them to be linked to other spatially explicit databases and preserves the confidentiality made to those who initially provide the information.

7. Governments should place special emphasis on providing long-term financial support for data collection, management, dissemination and preservation, including relevant socioeconomic data. This includes support for building capacity (*i.e.,* training in data collection/management and investment in infrastructure), which presents particular challenges in developing and transitional countries.

Data experts
In addition to IGOS and governments, the participants made recommendations to scientists who collect, analyze, manage, and disseminate socioeconomic data and observations that can be used in conjunction with biogeophysical data and observations.

8. International coordination and institutional support are needed for priority setting in data collection, data comparability within and across countries, widespread acceptance of open and equitable access to data, and integration of local-level or national monitoring with global monitoring.

9. Socioeconomic data specialists need to document the strengths and weakness of their databases via metadata in accordance with community-accepted standards. Comprehensive metadata catalogues should be maintained and made publicly available.

Capacity building is central to realizing these recommendations. It is important to train the next generation of researchers, not only for disciplinary-based research that requires an understanding of the role of anthropogenic forces in Earth and ecological systems, but also in the use of interdisciplinary data and methods. Indeed, in the future, scientists who require access to socioeconomic data and are capable of integrating natural and socioeconomic data will become the standard rather than the exception.

The participants in this meeting and the rapporteur, Leah Goldfarb, would like to extend their thanks to NSF for its support (GEO-0402845).

Annex 1

Context and Terms of Reference for the Socioeconomic Data in Relation to the IGOS-P Meeting

At the IGOS-P-10 Meeting in 2003, ICSU and the IGOS Co-Chairs were asked to "establish a socio-economic working group to look at generic socioeconomic issues common to each of the Themes before the IGOS-P 11 [Action 10-10]." However with the emergence of initiatives such as GEO, convening such a meeting was not feasible. As Action 10-10 was considered too broad to accomplish with one meeting, it was proposed to change the charge to this convening a meeting to look at generic socioeconomic issues relevant to IGOS without explicitly tasking the group to address each of the IGOS Themes. Then at the IGOS-P-10 Meeting in Rome on 27 May 2004 Action 11-11 tasked "ICSU, in cooperation with the IGOS Co-Chairs, to finalise their proposal for an IGOS-P workshop on socioeconomic issues". At the urging of the IGOS Co-Chairs, this meeting was organized and this report was prepared before the IGOS-P-11 bis meeting scheduled for 18 November 2004 in Beijing.

Terms of Reference

To produce a short report based upon discussion that addresses:

- What is meant by socioeconomic data (what variables are measured regularly on a global scale)?
- How these data are collected?
- Why is it important to for IGOS to use socioeconomic data?
- What are the initial socioeconomic data and methodological issues which should be of high priority for IGOS?
- What are the difficulties linking socioeconomic databases with remote sensing databases?
- What are the generic steps that IGOS would need to take to achieve these goals?

Annex 2

Meeting Participants

Chair: Roberta Balstad, Columbia University, USA, is Director of the Center for International Earth Science Information Network (CIESIN). She is currently Chair of the U.S. National Committee on Science and Technology Data (CODATA) and former Chair of the National Research Council's Steering Committee on Space Applications and Commercialization. Dr. Balstad previously headed the Division of Social and Economic Science of the National Science Foundation and was the founding Executive Director of the Consortium of Social Science Associations (COSSA). She has published widely on the human role in the environment, science and technology policy, and South African history.

Ellen Marie Douglas earned a earned a Ph.D. in Water Resources Engineering from Tufts University and was a Postdoctoral Fellow at Harvard University prior to joining the Water Systems Analysis Group at the University of New Hampshire in July 2002. Her interests lie in the investigation and modeling of macro-scale hydrologic processes and in evaluating the impact of climate variability and human activities on global freshwater resources. Specific interests include unsustainable water resource utilization; relationships between freshwater availability and human well-being and human vulnerability to hydrologic extremes (floods, droughts).

Leen Hordijk is currently Director of the International Institute for Applied Systems Analysis (IIASA), in Laxenburg, Austria. Prior to joining IIASA, he was Director of the Wageningen Institute for Environment and Climate Research (WIMEK) in the Netherlands and a faculty member in Environmental Systems Analysis at Wageningen Agricultural University. He was also Chairman of the Program Committee of the Netherlands Research Program on Climate Change and Global Air Pollution, and chairman of the Social Science Research Council of the Netherlands Organization for Scientific Research (NWO). He received his Ph.D. in econometrics from Vrije University, Amsterdam. Beginning in 1984, he pioneered the development of methods for linking environmental science and economics for integrated assessments of air pollution problems in Europe.

Chris Ikporukpo is a professor of Human Geography at the University of Ibadan, Nigeria. He obtained his BSc and PhD degrees from the University of Ibadan in June 1973 and January 1978 respectively. The environment, transport, regional development and political geography are his areas of research interest. He has published extensively in these areas and has been a Visiting Professor/Scholar to the University of Iowa, Iowa city, U.S.A. and the University of Port Harcourt, Nigeria. He has considerable consultancy experience with the oil industry and transportation sector in Nigeria. His recent research focuses on the political ecology of petroleum and environmental justice in Nigeria's Niger Delta region.

Ekkehard Mochmann is director of GESIS, the German Social Science Infrastructure Services and administrative director of the Central Archive for Empirical Social Research at the University of Cologne (ZA). Current research interests include methods of comparative research and computer aided content analysis of democracy concepts in

prominent speeches of world political leaders. Dr. Mochmann has been expert advisor to the European Science Foundation- Standing Committee for the Social Sciences (ESF-SCSS) on the European Data Base. Currently he is serving as President of the International Federation of Data Organization for the Social Sciences (IFDO). Project activities include ZA-EUROLAB, the European data laboratory for comparative social research and the Network of Economic and Social Science Infrastructure in Europe (NESSIE), funded by the European Commission.

Ronald R. Rindfuss is the Robert Paul Ziff Distinguished Professor of Sociology and Fellow at the Carolina Population Center University of North Carolina at Chapel Hill, USA. He is a sociologist-demographer with research interests in the population and environment area. He is a member of the Scientific Steering Committee of the Land Use Cover and Change (LUCC) project of IHDP and IGBP. With colleagues in the US and Thailand, he has a longitudinal research programme in Northeast Thailand. Rindfuss is also working to bring together land use change case studies to conduct cross-site methodological and substantive research.

Ashbindu Singh, Ashbindu Singh, is currently the Regional Coordinator of UNEP's Division of Early Warning and Assessment for North America based in Washington D.C. He has a strong multidisciplinary background with postgraduate degrees in physical and natural sciences and Ph.D. in environmental science. He has 25 years of work experience: 13 years working with the Indian Forest Service (1977-1990) in various capacities at local, provincial and national levels and 12 + years with UNEP. He has published over 100 papers on various environment and sustainable development related issues.

Brent Smith has served since June 1988 as Chief, International and Interagency Affairs, in the National Environmental Satellite, Data, and Information Service (NESDIS) of the United States National Oceanic and Atmospheric Administration (NOAA). He is active in negotiation and implementation of international cooperative agreements for spacecraft and instrument cooperation and for satellite data exchange. In addition he is a member of the Secretariats of the GEO, the Committee on Earth Observation Satellites (CEOS), and the IGOS-P . Smith holds both Ph.D. and *Artium Magister* degrees in Government from Harvard University, and a B.A. in Political Science and International Relations from Brigham Young University.

Annex 3

The IGOS initiative

The Integrated Global Observing Strategy (IGOS) seeks to provide a comprehensive framework to harmonize the common interests of the major space-based and *in situ* systems for global observation of the Earth. It has been developed as an over-arching strategy for conducting observations relating to climate and atmosphere, oceans and coasts, the land surface and the Earth's interior. IGOS strives to build upon the strategies of existing international global observing programmes, and upon current achievements. It seeks to improve observing capacity and deliver observations in a cost-effective and timely fashion. Additional efforts will be directed to those areas where satisfactory international arrangements and structures do not currently exist.

Overview of IGOS

IGOS is a strategic planning process, involving a number of partners, that links research, long-term monitoring and operational programmes, as well as data producers and users, in a structure that helps determine observation gaps and identify the resources to fill observation needs. IGOS is a framework for decisions and resource allocation by individual funding agencies, providing governments with improved understanding of the need for global observations through the presentation of an overarching view of current system capabilities and limitations - thereby helping to reduce unnecessary duplication of observations. The Strategy focuses primarily on the observing aspects of the process of providing environmental information for decision-making. It is intended to cover all forms of data collection concerning the physical, chemical, biological and human environment including the associated impacts. It is based on the recognition that data collection must be user driven, leading to results which will increase scientific understanding and guide early warning, policy-setting and decision-making for sustainable development and environmental protection. In addition, IGOS provides opportunities for capacity building and assisting countries to obtain maximum benefit from the total set of observations.

IGOS-P

The IGOS Partnership brings together the efforts of a number of international bodies concerned with the observational component of global environmental issues, both from a research and a long-term operational programme perspective. The IGOS Partnership was established in June 1998 by a formal exchange of letters among the 13 founding Partners for the definition, development and implementation of IGOS.

The principal objectives of the Strategy are to address how well user requirements are being met by the existing mix of observations, including those of the global observing systems, and how they could be met in the future through better integration and optimization of remote sensing (especially space-based) and *in situ* systems. IGOS serves as guidance to those responsible for defining and implementing individual observing systems. Implementation of the Strategy, i.e. the establishment and maintenance of the components of an integrated global observing system, lies with those governments and organizations that have made relevant commitments, for example, within the governing councils of the observing systems' sponsors. To aid the development of the Strategy, the Partners have adopted an incremental "Themes" approach based on perceived priorities.

The current Partners are Committee on Earth Observation Satellites (CEOS), Food and Agriculture Organization (FAO) of the United Nations, Global Climate Observing System (GCOS), Global Ocean Observing System (GOOS), Global Observing System/ Global Atmosphere Watch of WMO (GOS/GAW), Global Terrestrial Observing System (GTOS), International Council for Science (ICSU), International Geosphere-Biosphere Programme (IGBP), International Group of Funding Agencies for Global Change Research (IGFA), Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO), United Nations Environment Programme (UNEP), UNESCO, World Climate Research Programme (WMO), World Meteorological Organization (WMO).

A new Partner may be proposed by two existing Partners. This proposal should be submitted through the IGOS-P Secretariat to the IGOS-P Co-Chairs, for consideration at the next IGOS-P meeting, where the decision will be made by consensus. Partners' delegations to IGOS-P can, at their discretion, include non-Partners, as the participation in specific activities of IGOS-P (such as the Themes) is open to non-Partners.

IGOS Themes

The overall goal of IGOS is to produce comprehensive global, regional and national data and information to satisfy the environmental information needs of policy-makers, and so support scientific and operational environmental programmes. It is not practical to attempt to define a comprehensive global system that would in a single step satisfy all the needs for environmental information. IGOS has therefore adopted a series of Themes in which observations are made for selected fields of common interest among a group of partners.

Many IGOS Themes have an abbreviated and full name (if a particular Theme has the latter, it is given in parentheses). The approved IGOS Themes are: Carbon (Integrated Global Carbon Observations), Water (Integrated Global Water Cycle Observations), Ocean, Geohazards (Geohazards Observations), Coral Reefs sub-Theme, and Atmospheric Chemistry (Integrated Global Atmospheric Chemistry Observations). Themes under consideration or development are: Coastal (Coastal Observations), Land Cover (Integrated Global Observation of the Land), and Cryosphere. A proposal for a Dynamic Earth Theme is under investigation either as a stand-alone Theme or to be pursued in combination with existing Themes.

ICSU

International Council for Science

ICSU Mission Statement

In order to strengthen international science for the benefit of society, ICSU mobilizes the knowledge and resources of the international science community to:

- Identify and address major issues of importance to science and society.
- Facilitate interaction amongst scientists across all disciplines and from all countries.
- Promote the participation of all scientists–regardless of race, citizenship, language, political stance, or gender–in the international scientific endeavour.
- Provide independent, authoritative advice to stimulate constructive dialogue between the scientific community and governments, civil society, and the private sector.

51, boulevard de Montmorency
75016 Paris, France
Tel: +33 (0) 1 45 25 03 29
Fax: +33 (0) 1 42 88 94 31
Email: secretariat@icsu.org
www.icsu.org