

GSeS

GMES SOCIO-ECONOMIC STUDY

DIGEST OF THE DRAFT FINAL REPORT: SUMMARY AND KEY FINDINGS

The following digest highlights the key findings from each of the four parts of the socio-economic component of the GSeS study and is the final chapter in the GSeS Deliverable D4 entitled 'GSeS Socio-economic Impacts Report'.

IMPACTS – PRELIMINARY ASSESSMENT STATEMENT AND EXTENDED IMPACT ASSESSMENT

Appendix A includes the working version of the PAS, which has been distributed to various GMES groups and interested parties. The socio-economic elements of the GSeS study have confirmed that the problem to be tackled by GMES can be summarised as the fact that:

European policies on the environment and security suffer by having to rely on information that is fragmentary and of uneven quality and value.

and that:

there are three interrelated causes behind the problem of inadequate information:

- _ The many organisations involved in data collection and information production in Europe do not sufficiently co-ordinate their activities.
- _ The numerous technical infrastructures produce data and information that are often incomplete, not comparable from one place to another and over time and are in general difficult to access.
- _ The dialogue between information users and the many information providers is contorted and inefficient.

The main impacts of this are seen to be:

- ◆ Economic Impact/Trends:
 - _ Inefficient use of budgets resulting in monetary wastage.
 - _ Inefficient use of budgets resulting in resource wastage.
- ◆ Social Impact/Trends:
 - _ Lack of access to information at various levels – international organisations, stakeholders, citizens, etc.
 - _ Dependence on data and information providers outside Europe (e.g. USA).
 - _ Consultation with stakeholders and public participation hampered by inadequate information.
 - _ Research and education hampered by lack of availability of data.
 - _ Interdisciplinary work hampered by incompatibilities between sectoral data sets.

- ◆ Environmental Impact/Trends:
 - _ Lack of long-term monitoring undermining decisions on sustainable development.
 - _ Difficulties providing valuable inputs to global/international programmes.
 - _ Decisions taken in the absence of definitive environmental understanding.
 - _ Action not taken quickly enough, or not at all.
 - _ Inconsistent environmental assessment and reporting across Europe.

The key benefits of GMES are anticipated to be:

- ◆ Positive Economic Impacts:
- ◆ Co-ordinated collection of new data/information (in addition to INSPIRE) resulting in cost savings through avoiding duplication, etc.
 - _ More efficient co-ordination (e.g. coordinated planning, sharing of data, information and tasks, pooling of resources, consolidation of user needs, streamlined reporting, etc.) resulting in cost savings through avoiding duplication, etc.
 - _ On public sector regulatory budgets.
 - _ On decisions regarding institutional funding for long-term environmental monitoring – through support from the availability of data and services.
 - _ On market growth with better use of information leading to improved environmental conditions.
- ◆ Positive Social Impacts:
 - _ The strategic value of European autonomy in environmental monitoring.
 - _ On governance/participation – stakeholder involvement, dialogue, transparency, accountability, empowerment of local and regional actors, citizens rights.
 - _ By ensuring users' needs, including EU policy makers, are met and integrated within new programme definitions.
 - _ On public access to quality data and information (improving social cohesion through Europe-wide access supporting local decision making capacity development and new socio-economic activities).
 - _ On international and regional co-operative agreements, by assisting their smooth implementation.
 - _ On the provision of improved civil protection and services.
 - _ Through improved quality of life (including health) – better information leading to environmental amelioration.
 - _ Growth in demands for skilled professionals and technicians in information services.
- ◆ Positive Environmental Impacts:
 - _ Facilitation, through improved environmental information, of the environmental policy process in its four main aspects: policy implementation, evaluation of impact of policy measures, further development of policy, forward looking.
 - _ On the sustainability of operational environmental monitoring.
 - _ On decision-making and state of the environment reporting.
 - _ On contributions from Europe to global programmes and conventions.

- _ By proactively influencing relevant policies.
- _ Through policing controls in Europe, the accession countries and others.
- _ In the monitoring of individual environmental programmes (by follow-up impact evaluation).

These are quite sweeping statements as would be expected from an overview statement to cover the entire GMES activity, but what has become clear are the major differences between environmental topics and that not all of the above are relevant to all cases/themes. Each GMES topic will require a full assessment.

The correction of the economic impacts outlined above will produce benefits at the European level, but often with costs at the national level. In addition these economic benefits will be of a smaller magnitude than the economic benefits anticipated from positive social and environmental impacts (the bigger picture), i.e. the social and economic benefits of assisting in the provision of improved civil protection and services, quality of life changes, sustainable environmental monitoring, contributions to global programmes and conventions and an understanding of climate change and global environmental change.

The Extended Impact Assessment methodology involves more than a cost-benefit analysis. It looks, equally, at social, economic and environmental impacts that can be positive (benefits) or negative (costs). As such it involves techniques that are more sophisticated than CBA and presents a balance between quantitative information (where impacts are assigned an economic value) and more qualitative information, which is either transferred to an economic value using a standard or agreed conversion factor or remains as qualitative data and presented through some form of multi-criteria analysis. The only type of analysis that has been performed in the GSeS study relates to economic valuations and as such does not truly represent social and environmental costs and benefits that are best represented in some qualitative form.

CHARACTERISTICS OF SUSTAINABLE ENVIRONMENTAL PROGRAMMES

The Case Studies in Appendix C and briefly described in Chapter 3 indicate a number of consistent themes related to sustainability at the various operational levels. In summary form these themes are listed below.

- ◆ National Level
 - _ Initiation by a forceful individual or small group to carry the organisation through difficult start up stages – champion.
 - _ Provision of information perceived as critical or useful to an important or large group of users.
 - _ Funded by non-discretionary customers (primary users).
 - _ Operations often governed by legislation and standards.
 - _ Work focused on answering specific questions or decision makers / citizen needs.
 - _ Close linkages with research or academic communities (including societies).
 - _ Often based in public sector or academic research organisations, i.e. within a sustainable organisation.
 - _ Frequent reliance on auxiliary and voluntary observers.

- Ability to change, as requirements are modified and new technology introduced - extending services into new areas.
 - Remaining valid or becoming increasingly applicable to the general public.
 - Providing easy to use Internet and other services.
 - Emphasis on publicising, managing and publishing work or results of surveys.
- ◆ Regional Level
- Often government research organisations with long-term funding budgets for key activities.
 - Most powerful where existence subject to legislation, conventions, declarations, action programmes.
 - Most successful with ministerial level connections.
 - Formal structures based on contracting parties, councils, supported by secretariats, consists of subsidiary bodies (research themes) and implementation bodies. Chairmanship may rotate between the contracting parties. Preferably structure also includes other government representatives, development banks, financial organisations, user bodies or representatives.
 - Actively participate with national and international organisations.
 - Specific projects receive funding from various government and private sector organisations.
 - Public service information is available through an easy to use website.
- ◆ European Level
- Intergovernmental organisations created through international conventions.
 - Councils composed of one representative from each member and supported by several subsidiary delegate bodies addressing such issues as policy, science/technology, administration, finance, data policy. Day-to-day work carried out by Secretariat.
 - Principal users or member states fund the organisation and its work with contributions calculated as pro-rata of an appropriate economic index.
 - Core programmes that are undertaken by and benefit all members and optional programmes, which are undertaken by a group of members.
 - Wide-ranging programme of internal research and development, with links to research communities.
 - Short, medium and long-term strategic plans – both organisational and scientific.
 - Work of public interest or public good.
 - Remit that is flexible to new concerns.
 - Datasets available for wide use by researchers and for awareness/educational and commercial purposes.

Summary and general points of interest include:

- ◆ It would appear to be more difficult to sustain programmes and schemes at the regional and European level, than at the national and in some cases international level.
- ◆ It would appear to be particularly difficult to maintain sustainability in the case of long-term episodic (change) monitoring requirements. However, there are

successful examples, where different mechanisms to those used for short-term continuous monitoring schemes are used.

- ◆ There is an important requirement to provide archives for the results, research findings and derived data sets from completed projects.
- ◆ Some topics have very clear national, European and international networks (e.g. seismic, air quality), while others appear to have considerable duplication (e.g. ocean, climate change) and others are struggling to become sustainable (e.g. biodiversity).

CHARACTERISTICS OF ENVIRONMENTAL FACILITIES AND AUTHORITIES

The Case Studies in Appendix D and briefly described in Chapter 4 indicate a number of consistent themes (in addition to those identified under Section 10.2) related to sustainability of functional and organisation entities. The key findings were:

- ◆ Gateways and portals that do not have the responsibility for the data and information they hold but simply point to other web sites are not particularly useful, are often out-of-date and add to the confusion of networks.
- ◆ There is a myriad of organisations involved in environmental themes at all levels – it will require a concerted effort to establish GMES networks.
- ◆ There are a lot of organisations and networks undertaking similar work at European and international levels. Each GMES ‘theme’ will require a detailed assessment to elucidate the relationships and ascertain relevant involvement to reduce duplication and fill gaps.
- ◆ There are a number of examples from which lessons can be learned for the development and implementation of ESIS.
- ◆ The relatively short-term nature of contracts for the EEA’s European Topic Centres leads to centres (and websites) that have not yet become mature and do not offer the level of service that is available at many national and international organisations.
- ◆ There are some world-leading European centres (and websites), e.g. the Centre for Research on the Epidemiology of Disasters, the World Conservation Monitoring Centre, the European Mediterranean Seismological Centre.
- ◆ The interconnections between the various international programmes (GCOS, GOOS, GTOS, IGOS, IGBP, IDHP, WCRP, etc.) and their webs of contributing partners are becoming increasingly complex and confusing. How GMES interfaces with this level of organisation will be critical.
- ◆ A number of organisations operate networks within individual fields or environmental themes, which have the same objectives as GMES.

CHARACTERISTICS OF THE SOCIO-ECONOMIC ANALYSIS CASE STUDIES

This section pulls together some of the key characteristics and factors of each of the case studies and the natural disasters risk reduction theme in the terms of a GMES framework.

Geohazards

The key characteristics related to geohazards are:

- ◆ Earthquakes are by far the most destructive natural disasters and they are one of the main natural hazards in Europe.
- ◆ A third of the world's population lives in areas considered to be at risk from geohazards, thus the potential for significant losses increases with population growth, urban expansion and densification and the spread of industrial and infrastructure development.
- ◆ The social and economic costs from longer-term consequences of geohazards often outweigh the immediate and more direct effects.
- ◆ It is a theme of high importance in terms of civil security and humanitarian aid.
- ◆ Major volcanic eruptions do not occur spontaneously and are preceded by a variety of physical, geological and chemical changes. The monitoring and measurement of these changes with well-established scientific techniques provide the best opportunity to develop a warning system.
- ◆ Recent volcanic disasters show that the cost of monitoring volcanic activity and pre-disaster planning is very small when compared to the potential losses.
- ◆ All European countries have operational seismic networks and services.
- ◆ Much of the European network is reported as being outdated and, having evolved over a relatively long period of time, may not now represent the best network for European countries working together. In addition it is known that there are major gaps in the network.
- ◆ Mobile networks exist to fill gaps in short-term.
- ◆ There is effective organisational networking at the European and international levels.
- ◆ Dialogue mechanisms between engineers, planners, politicians, the insurance industry and the scientific community are required.
- ◆ Effective alerting systems are being introduced.
- ◆ There are a number of key European organisations on the science side, including the European Seismological Commission (ESC), the European-Mediterranean Seismological Centre (EMSC or CSEM), and the Observatories and Research Facilities for European Seismology (ORFEUS).
- ◆ There are a number of key European organisations on the humanitarian side, including ECHO and the Centre Européen de Prévention des Risques (CEPR), France.
- ◆ A number of specialist agencies exist, e.g. the European Laboratory for Structural Assessment (ELSA)
- ◆ A number of the separate elements for seismic hazard monitoring exist, but the topic will benefit considerably from integrated efforts and an overarching organisation along the lines of the U.S. Federal Emergency Management Agency.
- ◆ There is a wealth of past projects and good links to key FP6 areas would benefit from inclusion in permanent project archives.

- ◆ The IGOS Geohazards Theme has undertaken excellent foundation work – the theme has a strong European commitment.
- ◆ A unique role can be played by satellite data, including sensors and techniques that have been pioneered on European satellites.
- ◆ Proposals for specialist satellites exist.
- ◆ A dedicated InSAR mission in the next 10 years, and perhaps a constellation of Earth monitoring satellites in the next 25 years, will lead to a vastly improved understanding of the physics of the earthquake cycle, a complete time-varying map of the Earth's strain and reliable earthquake forecasts that will save lives.
- ◆ This is an environmental theme that is not yet receiving full funding support in the USA.

Oil Spill Detection

The key characteristics related to oil spill detection are:

- ◆ More oil enters the sea from land-based sources than tanker transportation and accidents.
- ◆ Marine oil pollution is declining and single-hulled oil tankers should all be decommissioned by 2015
- ◆ Large economically important spills are relatively rare.
- ◆ Regulations are leading to global decline in oil pollution inputs to marine environment.
- ◆ Difficulties exist in applying the polluter pays principle and effective prosecution of illegal discharges requires changes in national and European laws.
- ◆ Marine pollution control budgets in Europe are not large.
- ◆ Two (pre) operational monitoring services exist in Europe.
- ◆ Insurance generally covers clean-up expenditure and compensation;
- ◆ Integration networks at the spill detection stage are limited, although at the spill clean-up stage are more extensive.
- ◆ The European Maritime Safety Agency exists to provide objective, reliable and comparable information and data on maritime safety and on ship pollution.

It is difficult to identify substantial economic or social benefits that would result from an enhanced investment in oil spill detection monitoring services. Following a spill there are clear logistical roles that the techniques can offer in modelling the spill, targeting spraying, etc. However, this would be covered by a disaster risk reduction activity rather than a detection monitoring service.

Ocean Monitoring

The key characteristics related to ocean monitoring are:

- ◆ A significant proportion of world economic activity and a wide range of services, amenities and social benefits depend on wise use of the sea.

- ◆ The ocean plays a crucial role in sustaining life on Earth and is a key element in climate change.
- ◆ In the short-term better and more systematic observations of the ocean will enable us to forecast imminent disasters from storms, floods and drought and mitigate their effects, by warning the populations at risk.
- ◆ The current ocean observation system exists in scattered pieces. Observations are often taken from “platforms of convenience” which may be ships at sea or old lighthouses. The former provide observations that are not sustained, while the latter take place at locations that may or may not be important from an oceanographic perspective. Data from many sources are rarely brought together. And large expanses of the ocean remain unobserved for substantial periods of time.
- ◆ The topic has a high need for data, information, research and monitoring to improve environmental understanding. This will improve short-term weather forecasts, seasonal weather forecasts, marine forecasts, ocean statistics, and basic research, thereby producing benefits for people and businesses.
- ◆ The activities of EuroGOOS and MedGOOS are well respected and highly relevant to GMES.
- ◆ There is an extensive oceanographic research base in Europe and significant budgets are available for oceanographic research and operational services.
- ◆ A number of national networks, such as UK’s Marine Environmental Data Network are being developed.
- ◆ Activities are underway by 16 European partners, from 14 coastal states, to update their national European Directory of Marine Environmental Data (EDMED) entries and to develop and install an innovative infrastructure for updating the EDMED database by means of the Internet.
- ◆ The Sea-Search Network (a Concerted Action) has been set up to provide an effective navigation tool to data and information sources in Europe and to centres in Europe with expertise and skills in oceanographic and marine data and information management
- ◆ Particularly with regard to data and information systems there would appear that there is considerable duplication of effort (real or apparent) at the international level and may be confusion for potential users. A bewildering web of organisations and networks exist at the international level.

Air Quality Monitoring

The key characteristics related to air quality monitoring are:

- ◆ Air pollution is a major environmental health problem affecting developed and developing countries alike.
- ◆ An estimated 3 million people die each year because of air pollution; this figure represents about 5% of the total 55 million deaths that occur annually in the world.
- ◆ Air pollution damages plant and animal life and contaminates water sources, threatening economic and social welfare as well as health.
- ◆ Various EU directives and conventions exist of relevance to air quality.

- ◆ The number of air pollution monitoring sites in Europe is very large, but it is reported for several countries that the number of sites is being reduced as budget become more tightly controlled.
- ◆ Re-consideration of the network at the European level would lead to more optimal coverage.
- ◆ Gaps in the national monitoring networks are most obvious in the accession countries.
- ◆ There is a vast array of EC projects in varying categories – science-based, health-based, EO and technology, databases and networks and the beginning of projects or a more integrated nature.
- ◆ The CAFÉ (Clean Air for Europe) programme aims to strengthen the air pollution policy, based on the best available science and to enable a broad, open and transparent dialogue with the scientific community, as well as the public and the stakeholders.
- ◆ There is a European Topic Centre on Air Quality and Climate Change. Its strengths and weaknesses would require assessment.
- ◆ Airbase – the air quality information system of the EEA contains a database carrying information submitted by participating countries from across Europe. However, this database is not easy to use and it would appear that much of the European level air quality data is out-of-date in comparison to national level data in many European countries. For example the most recent report on the state of air quality monitoring in Europe that is presented through a simple search of EIONET was published in 1999 on information collected for 1996. It is possible that more recent data is available to registered users.
- ◆ There are a number of interesting initiatives including Airnet - a framework to interpret findings from studies on air pollution and health in a policy-relevant way and ICAROS NET (a JRC RTD project) that aims at the development and demonstration of a networked interactive computational environment to allow the integration and fusion of environmental information from remote sensing observations, ground air quality measurements, and pollution transport models in order to minimise uncertainty in decision-making regarding operational air pollution control and abatement.
- ◆ There is a wealth of past projects and good links to key FP6 areas and the CAFÉ programme, which would benefit from inclusion in permanent project archives.
- ◆ Some of the projects are pilot schemes, which if successful will be appropriate for European wide application.
- ◆ A number of organisations and networks exist at the international level (or European regional reporting level to international organisations such as the WMO, the WHO and the United Nations).
- ◆ There are a number of important international and European programmes, including the Convention on Long-Range Transboundary Air Pollution (CLRTAP) and European Monitoring and Evaluation Programme.
- ◆ The World Data Center for Remote Sensing of the Atmosphere (WDC-RSAT) is hosted at the German Aerospace Center.
- ◆ Europe leads various satellite measurements and global networks initiatives.
- ◆ There is a strong link to climate change research.

Climate Change

The key characteristics related to climate change research are:

- ◆ The transformation of the global climate system represents one of the greatest challenges so far in the history of mankind.
- ◆ There most significant impacts (and opportunities) in Europe that will require greatest attention with respect to policies of response will be:
 - _ The high vulnerability to climate change in the south of Europe and in the European Arctic.
 - _ The risk of water shortage in southern Europe.
 - _ Flood hazard is likely to increase across much of Europe.
 - _ The risk of fires will increase in southern Europe.
 - _ Some agricultural production systems in southern Europe may be threatened by increasing drought conditions
 - _ The insurance industry faces potentially costly climate change impacts through property damage, but there is great scope for adaptive measures if initiatives are taken soon.
 - _ Transport, energy, and other industries will face changing demand and market opportunities.
 - _ Developments on the coasts will be exposed to sea-level rise and extreme events, necessitating protection or removal.
- ◆ This is a high profile topic with the EU Council of Environment Ministers, which led to the launching of European Climate Change Programme.
- ◆ This topic has the most to gain most from combining research capacities at the European level.
- ◆ Initiatives at European level include: European Climate Support Network, European Climate Forum, and European Climate Computer Network.
- ◆ There are numerous EU projects that would benefit from being within the GMES framework and benefiting from inclusion in permanent project archives.
- ◆ The key requirements are integrated information assimilation and primary research.
- ◆ The U.S. leads the world in research on climate and other global environmental changes, spending more than the combined contributions of EU15 and Japan.
- ◆ The USGCRP relies on the involvement of some 1,200 scientists and stakeholders and representatives of over 35 countries.
- ◆ There are clear international responsibilities and networks of organisations.
- ◆ Proposals exist for creating network of excellence within the climate change topic.

Natural Disasters Risk Reduction

The key factors related to the risk reduction of natural disasters are:

- ◆ Between the 1970s and 1990s, deaths from natural disasters fell from 2 million to under 800,000. But the numbers affected tripled to 2 billion.
- ◆ Economic losses multiplied five times, to \$629 billion in the 1990s. Disasters devastate the development of poorer nations.
- ◆ Disasters are complex problems, which demand complex responses. Since risk reduction goes to the heart of the development process, the challenge is well beyond the capacity of disaster managers alone. It requires cooperation between development agencies, governments, NGOs, businesses, scientists and vulnerable communities.
- ◆ One factor increasing vulnerability is the absence of effective disaster preparedness and mitigation measures (e.g. early warning systems; identification of evacuation routes and location for shelters, relief stockpiles, etc.; disaster response teams; public awareness).
- ◆ There are many documented success stories which prove that mitigation and preparedness pay.
- ◆ There is no coherent risk reduction 'community' as professionals trying to mitigate disaster impacts (as in FEMA in the USA) are fragmented along institutional and national boundaries.
- ◆ Policy-makers lack adequate information. More international and regional commitment is needed.
- ◆ Data on disaster occurrence, its effect upon people and its cost to countries remain, at best, patchy. No single institution has taken on the role of prime providers of verified data, although the Centre for Research on the Epidemiology of Disasters (CRED) is a leader in this role.
- ◆ The NEDIES (Natural and Environmental Disaster Information Exchange System) pilot project at JRC provides an interesting concept and foundation.
- ◆ In summary risk reduction management has the following key characteristics:
 - _ Strategic Importance
 - _ would benefit from Improved Access to Vital Information
 - _ needs More Effective Data Use
 - _ needs More Effective Networks and Partnerships
 - _ needs more Efficient Coordination and Collaboration

KEY FINDINGS

With reference the case studies and topics evaluated during the GSeS study the key socio-economic benefits of GMES will result from the following aspects.

- ◆ The environmental and civil security issues with the highest economic and social importance in Europe are:
 - _ air quality, flooding, earthquakes, wind storms, droughts, storms.
- ◆ The issues beyond the economic scope of an individual Member State are:
 - _ comprehensive/integrated climate change research and global environmental change research.
- ◆ The topics to provide the most benefit from integrated assessment (addressing the big, complex questions of our time) are:

- _ hazard/disaster mitigation and prevention, climate change research, ocean monitoring, improved weather forecasting, global environmental change.
- ◆ The issues of a multi-disciplinary nature beyond the scope of individual Member States that would provide the most benefit to Europe are :
 - _ health response systems (e.g. linking air quality and disease-response studies at the European level), climate change, input of ocean monitoring and atmospheric studies into climate change, global environmental change monitoring, hazard/disaster mitigation and prevention.

Other issues that were noted during the course of the study were:

- ◆ An international move to address environmental issues from a human-oriented perspective (which are often also policy driven)

Not what indicators of air quality can we measure; but what monitoring do we need to change (improve) in the air we breathe or not how can we monitor volcanoes but how do we predict the action of volcanoes to (reduce) the threat to people, goods and environment. Key questions are:

 - _ How is 'our world' changing?
 - _ What are the primary drivers?
 - _ How does 'our world' respond to natural and human-induced changes?
 - _ What are the consequences of change for us?
 - _ How well can we predict future changes?
- ◆ The close link between continuous adaptive and applied research (both science and social based) and the ability to answer key questions related to environmental policies and human needs.
- ◆ The long periods of time needed to operationalise environmental services and the frequent need for continuous public sector support in some topics.
- ◆ The USA is making major moves in investments, vision and strategy in the fields of climate change research and ocean monitoring towards integrated global environmental change services.