

Summary Report
4th GEOSS Asia-Pacific Symposium
Towards a Global Earth Observation System of Systems that
supports the societal benefit areas of climate and biodiversity
Bali, Indonesia, 10-12 March 2010

The 4th GEOSS Asia-Pacific Symposium was held in Bali, Indonesia, from 10 to 12 March 2010. It was organized by the GEO Secretariat with the support of the governments of Indonesia and Japan. Approximately 220 participants from 26 countries assembled to exchange ideas and information and to enhance a common understanding of the Global Earth Observation System of Systems, or GEOSS. The theme of the symposium was "Towards a Global Earth Observation System of Systems that supports the societal benefit areas of climate and biodiversity".

The purpose of this symposium was to strengthen international networking among member countries in the region. It promoted national, regional, and international synergies for building and maintaining Earth observation networks that contribute to GEOSS. More specifically, it developed common views and recommendations from the Asia-Pacific region for transmittal to the 2010 GEO Ministerial Summit to be held in Beijing in November, advanced regional collaboration on biodiversity observations as a contribution to the Nagoya conference of the United Nations Convention on Biological Diversity and furthered forest carbon tracking and water resource management activities in the region.

The symposium was opened by H.E. Mr Suharna Surapranata, Minister of Research and Technology of the Republic of Indonesia. Keynote speeches were delivered by Mr. Rachmat Witoelar, Executive Chairman of the National Council on Climate Change, Indonesia, on the role of geospatial information to support a national agenda on climate change and by Dr Arjun Thapan, Special Senior Advisor for Infrastructure and Water, Office of the President, Asian Development Bank, about their endeavours in regional environmental issues. The GEO Secretariat Director, Dr José Achache, presented GEOSS Highlights and Priorities. Presentations were also made on GEOSS Architecture and Data Management and Greenhouse Gas tracking from Space. Representatives from GEO members in the region presented their activities related to GEOSS development.

To focus the discussions, parallel sessions on the following topics were organized:

- Asia-Pacific Climate Variability and Monitoring Capacity;
- Hydrometeorological-Related Disasters and Water Resources Management;
- Forest Carbon Tracking; and
- Asia-Pacific Biodiversity Observation Network (AP-BON).

The main outcomes of each parallel session are described below.

1 ASIA-PACIFIC CLIMATE VARIABILITY AND MONITORING CAPACITY

Climate is one of the nine GEOSS Social Benefit Areas. Its variability has been discussed at the past three Asia-Pacific symposia, mainly as concerns global warming on a centuries scale. However, climate variability ranges over a broader band of time scales that interact with each other. In

particular, shorter variability on interannual, annual, intraseasonal and diurnal time scales is a dominant feature of the Indonesian Maritime Continent (IMC) and its surrounding oceans, where the capacity to monitor the climate has been developed rapidly through GEOSS activities. Such climate variability is propagated globally and often affects the other GEOSS social benefit areas such as disasters, water, weather, health and agriculture. Therefore, in this session, we reviewed our understanding of such climate variability and addressed ways to work more closely together to enhance monitoring networks and predictive capacity for the citizens of the Asia-Pacific region.

Prediction of climate variability provides a pathway to socio-economic applications and relies strongly on observed data, which are necessary for generating appropriate initial conditions in prediction models. Apart from the El Niño – Southern Oscillation (ENSO) in the tropical Pacific, no other coupled ocean-atmosphere phenomena has greater socio-economic impacts in the Asia-Pacific region than the Indian Ocean Dipole (IOD), which is similar to ENSO but has a higher frequency in the Indian Ocean. The large population areas of Northeast Asia such as Tokyo, Seoul, Beijing and Shanghai are affected by temperature and precipitation variations. East Africa and Australia feel the effects with droughts and flooding; long-term precipitation patterns are experienced as far away as the western United States. While the Pacific and Atlantic basins have been monitored for years, until only very recently, the Indian Ocean had almost no instrumentation to help provide monitoring of the Indian Ocean Dipole which is much needed for improving our capacity to predict its cycle and its impacts. Today over fifty percent of the planned Research Moored Array for African-Asian-Australian Monsoon and Prediction (RAMA) has been implemented successfully in the true spirit of GEOSS, that is, based on strong science drivers with societal applications also in mind. As RAMA consists of approximately 50 tethered moorings spanning the basin from Indonesia to East Africa for atmospheric and oceanic measurements, no single nation, institute or organization is able to achieve full implementation on its own.

For Indian Ocean RAMA, the governments of Indonesia, Japan, China, India, South Africa, France and the United States have coordinated the sharing of resources to get the job done. When one partner sought increased skill in predicting monsoons and tropical cyclones, another provided such scientific expertise. When another needed days at sea on a ship to deploy its instruments, several others kindly provided that resource in exchange for training on how climate change would impact marine protected areas and for space on the moorings to make ecosystem measurements. Also, under the GO-SHIP international framework for ocean monitoring, three full repeat hydrographic sections are planned before 2012 – a vast improvement from the more traditional physical oceanographic observations of the past few decades. The free, open and timely dissemination of RAMA data provides the opportunity for even broader societal and economic applications in sectors where they perhaps have not yet been realized. It can be said with confidence that the building of RAMA is making the world more aware of the value of observations for society and is accelerating the implementation of GEOSS.

The participants in the session on Asia Pacific Climate Variability and Monitoring Capacity look forward to continuing to advance activities within the GEOSS structure to better monitor, understand and predict the social and economic impacts of climate variability and change in the Asia-Pacific region.

2 HYDROMETEOROLOGICAL-RELATED DISASTER AND WATER RESOURCES MANAGEMENT

Changes in water resources resulting from climate change in the Asia-Pacific region and arising from melting glaciers, increased floods, more severe droughts, and sea-level rise, amongst other impacts, will significantly impact national social and economic development as well as the environment in unprecedented ways. In response, numerous initiatives, programs and projects to promote climate change adaptation for water management were reported by 15 countries during the session.

Although climate change adaptation requires socially and economically efficient and sustainable management of the world's limited supplies of freshwater, this precious resource cannot be managed unless we know where the water is, its quantity and quality, and how its variability will change in the future. This knowledge base relies upon our ability to measure and monitor precipitation and water quantity and quality; our continued efforts to improve our physical, chemical, biological, and ecological understanding of the water cycle; and our capability for prediction and risk assessment.

Based on the reports and discussions at the symposium, the participants recognized the commonality in the region of water-related issues and socio-economic impacts caused by water-related problems associated with regional climate change. It was agreed that well-coordinated scientific research initiatives along with a combination of global Earth observations and integrated data provided by GEOSS are essential to adequately address these issues.

The GEOSS Asian Water Cycle Initiative (AWCI), including its four working groups on floods, droughts, water quality and climate change, has been building a regionally cooperative framework by involving experts from 20 countries. The focus is on sharing data, models, experiences and knowledge and on implementing capacity-development programs. Participants considered further convergence and harmonization of observational activities, analytical and down-scaling techniques, interoperability arrangements, and effective and comprehensive data management as the most fundamental elements for mobilizing the efforts by AWCI to create societal benefits.

The participants in the session on Hydrometeorological-Related Disaster and Water Resources Management requests the Beijing Ministerial Summit to recognize the direction and achievements of AWCI as one of the most effective regional approaches for climate change adaptation and to endorse its activities at the national and regional levels for improving the efficiency of operational water resources management.

3 FOREST CARBON TRACKING

Several excellent papers were presented during the working group meeting, which was attended by 47 delegates. Papers described the various activities associated with the implementation of Indonesia's National Carbon Accounting System (INCAS), as well as the characterization of carbon stocks contained in peatlands, approaches for ecosystem modeling, results from key carbon flux measurements via the AsiaFlux network, as well as updates on regional remote sensing activities and associated training programs. All of these are important elements demonstrating the breadth of actions under the GEO Forest Carbon Tracking (FCT) task.

Many Indonesian agencies and their international partners are involved in establishing INCAS. They are also participating in the FCT task's demonstration areas and verification sites in Borneo. We saw great progress in the implementation of INCAS, with remote-sensing data archives already being assembled, complimented with solid capacity-building activities, to create the necessary time-series of forest information for the last ten years. Several projects now underway are highly complimentary to the goals of the task, in particular regional observational networks relating to forest observations (carbon, biodiversity, carbon-fluxes, water, etc.).

3.1 Recommendations/Issues:

- The progress being made by FCT, linked to the INCAS program supported by the Indonesia-Australia Forest Carbon Partnership (IAFCP), as well as similar programs by Japan, and the willingness of Indonesia to openly share its experiences in establishing INCAS, leads to a proposal to use Borneo as one of the main regional showcases for the FCT task over coming years;
- The FCT task team and GEO as a whole are also requested to link the task's activities to other in-situ and remote-sensing programs, and in particular those underway in the Borneo

Island. These include AsiaFlux and associated carbon and ecological assessment activities such as the Kalimantan Forest Carbon Partnership – a REDD demonstration supported by the IAFCP. Additional programs by Japan and The Netherlands related to ALOS PALSAR data analysis and capacity-building also have good potential for collaborating with the GEO FCT. This was complimented by JAXA's offer to provide high-resolution PALSAR data for all of the FCT's verification sites world-wide, as well as 50 m wall-to-wall corrected mosaics for all National Demonstrators, including Borneo Island, as a start;

- The participants in the session on Forest Carbon Tracking also request the assistance of GEO in securing access to fundamental datasets such as high-resolution (30 m or better) Digital Elevation Models (DEMs) to all of the FCT task's demonstrator countries as a start;
- Expansion of routine forest monitoring efforts into Pacific countries is also recommended.

4 ASIA-PACIFIC BIODIVERSITY OBSERVATION NETWORK (AP-BON)

The year 2010 is the International Year of Biodiversity, and the Convention on Biological Diversity (CBD) is going to evaluate achievements for the internationally agreed biodiversity target of significantly decreasing the rate of biodiversity loss by 2010. The limited knowledge about, and data availability for, biodiversity loss has led to the growing awareness of the need for biodiversity observations and a network for coordinating them.

Against this background, the GEO Biodiversity Observation Network (GEO BON) was established in 2008 and a corresponding regional network in the Asia-Pacific region (AP-BON) emerged from the 3rd GEOSS Asia-Pacific Symposium held in February 2009. Serious biodiversity loss is continuing in the Asia-Pacific region, but we do not yet have any integrated observation system to monitor this loss. Two AP-BON workshops were held last year, and a network covering most countries of the Asia-Pacific region was established. It includes specialists in genes, species, and ecosystems, including terrestrial, freshwater and marine ecosystems. Standing on this achievement, the session participants discussed how we can develop further activities moving toward and then beyond the CBD conference being held in October in Nagoya.

Through a discussion among the 40 participants from seven countries, including representatives of key partners (ACB, LIPI, FRIM, CIFOR, DIWPA and ITER-EAP), we agreed (1) to share the two basic goals of i) monitoring biodiversity changes and ii) developing sustainable management in the Asia-Pacific region; (2) to organize eight working groups of AP-BON that correspond exactly to the eight GEO BON working groups that were organized at a GEO BON meeting last February; (3) to publish an AP-BON book in which various on-going biodiversity observation activities in the Asia-Pacific region will be documented as an early product toward the Nagoya conference; and (4) to document an implementation plan for activities from 2010 to 2015.

Draft implementation documents were distributed to the session participants, and proposals for AP-BON working groups on genetics/phylogenetics, terrestrial species monitoring, terrestrial ecosystem changes, freshwater ecosystem changes and marine ecosystem changes were discussed. Through a discussion on these documents, we agreed on the importance of developing interoperable databases that are useful not only as baseline data, but also for promoting assessments of biodiversity changes. Another key agreement emerged from the discussion is the importance of developing national BONs, such as an Indonesian BON and a Korean BON, in close coordination with GEO BON. In Indonesia, for example, approximately 2,000 forest plots have been established, but a coordination mechanism is still required to link all of the information collected from these plots. A national network for biodiversity observation will provide indispensable opportunities for such coordination at the national level and support existing regional cooperation on biodiversity. Also, developing national BONs will facilitate coordination of scientists working at various levels and on various types of ecosystem, and it

will support various international and regional networks. It will also provide stronger ties with Clearing House Mechanism of the CBD in each country and support GEO–CBD collaboration.

Finally, the session participants agreed to contribute to CBD activities beyond Nagoya by providing additional valuable information on biodiversity changes and ecosystem managements in the Asia-Pacific region to the Global Biodiversity Outlook 4 (GBO 4).

The participants agreed to collaborate at the national and regional levels to establish some biodiversity observation core sites in the Asia-Pacific region. We recommend that GEO develop core sites or “supersites” where studies and observations of biodiversity and ecosystems are combined with research and observation activities relating to other social benefit areas.

5 GENERAL RECOMMENDATIONS

In addition to the outcomes reached by the four parallel sessions, the symposium agreed on five additional general recommendations for the upcoming GEO Ministerial Summit in Beijing.

First, we recommend that pertinent GEO task leads consult with each other and try to develop cooperative studies that will leverage their ongoing work on the Borneo Island. This kind of coordination would generate synergies and strengthen data gathering and collection. Comprehensive, interlinked, high-quality, long-term and cross-cutting data sets on Borneo Island should be built for global carbon, forest carbon tracking, GEO BON, and climate and water resources. Other GEO societal benefit areas should also be engaged.

Second, GEO should ensure improved dissemination of and user access to these and other improved data sets. Based on the GEO data-sharing principles, the GEO community should further develop the GEO Portal and other community web portals to more effectively disseminate data. This may include the development of a portal for the Borneo Island supersite, where comprehensive data from multiple disciplines could be integrated and provided alongside software tools for analyzing and presenting the data. This supersite portal might also adopt as an organizing principle the development of a multi-disciplinary 2010 baseline against which to monitor future environmental change.

Third, it should be recognized that supersites and cross-cutting portals provide an excellent foundation for implementing GEOSS, providing information services for its nine societal benefit areas, and becoming an essential decision-support tool for addressing environmental change and supporting sustainable development in the Asia-Pacific region. Ministers should encourage GEO in developing this global framework for supporting policymakers and managers with science-based information and services.

Fourth, large scale atmospheric teleconnections linking climate phenomena, their regional expressions, and relevance for future regional climate change should be investigated more comprehensively.

Finally, the governments of the Asia-Pacific region should consider establishing mechanisms for coordinating their national inputs into GEOSS. Such mechanisms can also serve to expand awareness of and support for GEOSS throughout the various government ministries and departments. A number of such mechanisms already exist elsewhere and have been successful at advancing interagency cooperation and establishing interdisciplinary and interagency research projects.

These conclusions represent the common perspective of the participants at the 4th GEOSS Asia-Pacific Symposium. Earth observations and the further development of GEOSS were recognized as essential to tackling the critical issues of climate, water, carbon and biodiversity at the regional level. The symposium participants emphasized that regional collaboration should continue and, indeed, be accelerated in order to build GEOSS and achieve societal benefits. Participants endorse the conclusion of the symposium, agree to promote the collaborative activities described above, and plan to review the progress of their endeavors at the next symposium in early 2011.