AP-BON Draft Implementation Plan, version 2

December 2, 2011

Brief history of AP-BON

AP-BON (Asia-Pacific Biodiversity Observation Network) is a regional network of biodiversity observation that is organized with a specific interest to collaborate with a global network, GEO BON (Group on Erath Observation Biodiversity Observation Network; http://www.earthobservations.org/geobon.shtml). After GEO BON was organized in 2008 and its concept document was released, 3rd GEOSS-AP symposium (http://www.aprsaf.org/feature/feature_82.html) was held from February 4-6, 2009 in Kyoto and the participants of WG3 (Monitoring changes in ecosystems, biodiversity and ecosystem services) agreed to organize J-BON (Japanese Biodiversity Observation Network) as a voluntary network of Japanese scientists who are working in biodiversity observations not only of Japan but also of the Asia-Pacific region.

The first J-BON workshop was held from May 8-10 in Tokyo and the participants of this workshop agreed to organize AP-BON by inviting scientists in the Asia-Pacific region. Through negotiation with the Ministry of Environment, Japan, it is decided that AP-BON is officially supported by the Ministry of Environment, Japan. Subsequently, the first AP-BON workshop (July 21-22, 2009) was held under the support of the Ministry of Environment, Japan.

The second AP-BON workshop held from December 10-11, 2009 in Tokyo resulted in further progress, summarized in the short document "Summary of Outcomes" as below.

1. The presentations gave participants an improved understanding of the observations and research of the region.
2. Off-line discussions were useful for team-building and additional exchange of ideas.
3. An interim Steering Committee was formed, consisting of Tet Yahara and Rod Fuentes as co-chairs, plus Keping Ma, Toru Nakashizuka, Dedy Darnaedi, Eun-Shik Kim and Yoshihisa Shirayama.
4. Candidate products were discussed and a preliminary list was created
5. For the purposes of AP-BON, the initial AP boundaries were defined: On the east, bounded by the scope of PBIF, and excluding Russia, New Zealand, and Australia. In practice, these boundaries can be a bit fuzzy, depending on what is appropriate for biodiversity studies.
6. The book was discussed and the plan for generating it updated

Action Items:

1. Send out GEO BON Concept Document to all participants.
2. Read GEO BON Concept Document. This will provide a good sense of what AP BON might be, as well as a clearer understanding of GEO BON.

3. Create a plan and schedule for writing and coordinating the book chapters.

In 2010, the year of CBD COP10, some important meetings relevant to AP-BON activities were held. A GEO BON meeting to discuss about detail implementation was held from February 23-25 in Asilomar, California, USA and the GEO BON detail implementation plan was released in May. Fourth GEOSS-AP symposium was held from March 9-11 in Dempasar, Bali, Indonesia. In this symposium, we had an AP-BON session as one of four parallel sessions and discussed about needs of AP-BON draft implementation as a response to the Asilomar meeting of GEO BON. CBD COP10 preconference was held from March 21-22 in Nagoya to discuss about post-2010 biodiversity targets, and the third AP-BON workshop was held subsequently on March 23. In this workshop, AP-BON draft implementation version 1 was distributed and preliminary discussion on this draft was held; then, participants agreed to revise AP-BON draft implementation until the forth workshop. Participants agreed to organize the following five working groups in AP-BON.

Working Group 1: Genetics/phylogenetic diversity
Working Group 2: Terrestrial species monitoring
Working Group 3: Terrestrial ecosystem change
Working Group 4: Freshwater ecosystem change
Working Group 5: Marine ecosystem change

In CBD COP10, we had a side-event of AP-BON and the first meeting of AP-BON interim Steering Committee. In this SC meeting, an institutional issue (how each person/institute can be a member of AP-BON) was addressed and needs to have memoranda with key institutes/individuals for data sharing etc were discussed in order to formalize the relationship of institutes/individuals to AP-BON.

Through discussion in the meetings described above, we agreed about the following AP-BON visions that are slightly modified from GEO BON visions.

- To establish a coordinated Asian Network that gathers and shares information on biodiversity and ecosystem services,
- To provide tools for data collection, sharing/exchange, analysis, and synthesis/integration, and
- To contribute to improving ecosystem management, sustainable use of biodiversity and human well-being.

We also agreed about the following AP-BON missions.

- Observing and analyzing changes in biodiversity over time.
- Improving delivery of biodiversity information and services to users, particularly decision-makers.
- Facilitating linkages among many countries, organizations and individuals contributing to biodiversity observations.
- Identifying gaps between existing biodiversity observation systems and promoting mechanisms/projects to fill them.

The forth AP-BON workshop was planned to be held from March 14-15, 2011 in Tokyo, back-to-back with the fifth

GEOSS-AP symposium from March 16-17. However, both meetings were canceled due to the crash of Fukushima nuclear power station.

In July 2011, a Japanese project on “Integrative Observations and Assessments of Asian Biodiversity” was got started. This project is the ninth strategic project (S9) of the Ministry of the Environment, Japan and is supported by the Environment Research and Technology Development Fund for the term from 2011 to 2015. It is expected that this project contributes to the development of AP-BON activities. This project has five themes (modeling and integration, species/genetic diversity, terrestrial ecosystem, freshwater biodiversity, and marine biodiversity) under which approximately 100 researchers are organized.

Now, it is needed to finalize an implementation plan to develop AP-BON as an active network. Because Japanese biodiversity scientists have developed a series of project designs for “Integrative Observations and Assessments of Asian Biodiversity” (S9), it is desirable for us to use this project as an opportunity to develop AP-BON activities. However, the S9 project is one of many projects going on in the Asia-Pacific region and a key vision of AP-BON is to establish a network by coordinating many projects that have been mostly isolated from each other. The following is a list of key institutes and networks that have been represented in previous workshops. It is important to develop plans to network the activities of these institutes and networks.

ACB (ASEAN Center for Biodiversity)
Biodiversity Center of MoE, Japan
CAS (Chinese Academy of Science), China
CiFOR
FRIM (Forest Research Institute of Malaysia)
Indian Institute of Remote Sensing
Indomer Costal Hydraulics, India
ITBC (Institute for Tropical Biodiversity and Conservation), Universiti Malaysia Sabah
IMER (Institute of Marine Environment and Resources), Vietnam
Kasesart University, Thailand
LIPI (Indonesia Institute of Sciences), Indonesia
NAFRI, Lao
Nanjing Institute of Environmental Sciences, China
NIBR (National Institute of Biological Resources), Korea
NIER (National Institute of Environmental Research), Korea
National University of Mongolia
PICRC (Palau International Coral Reef Center)
Phuket Marine Biological Center, Department of Marine and Coastal Resources, Thailand
Singapore National University
Swire Institute of Marine Science, The University of Hong Kong

Taiwan Forestry Research Institute
Thai Long-Term Forest Ecological Research; National Parks, Wildlife and Plant Conservation Department, Thailand
University of the Philippines, Los Baños
University of the South Pacific, Fiji
WFC (World Fish Center), Cambodia and Philippines

AsiaFlux
CERN
DIWPA (Diversitas in Western Pacific and Asia)
FLMMA (Fiji Locally Managed Marine Area Network)
NaGISA (Natural Geography In Shore Areas)
GBIF
LTER-Asia
PACINET

On the other hand, there remain many other institutes, local networks, and projects in the Asia-Pacific region that have been less represented in AP-BON. In our implementation, it is important to develop plans to extend our network to cover more institutes, networks and projects.

AP-BON book as a key achievement

As the first step to develop a coordinated network for observations, assessments, research and management of biodiversity in the Asia-Pacific region, we edited an AP-BON book entitled "The Biodiversity Observation Network in the Asia-Pacific Region: Toward Further Development of Monitoring" that will be published March 2012 by Springer. The following chapters will be compiled in this book, providing a common gateway to access previously isolated information and activities relevant to biodiversity in the Asia-Pacific region.

Part 1 GENERAL INTRODUCTION

- Strategies to observe and assess changes of terrestrial biodiversity in the Asia-Pacific Regions (Tetsukazu Yahara, Munemitsu Akasaka, Hiroyuki Hirayama, Ryuji Ichihashi, Shuichiro Tagane, Hironori Toyama, Ryo Tsujino)
- Biodiversity outlook in the Southeast Asia: Challenges and prospects for the next decade (Rodrigo U. Fuentes, Inciong, Rolando, and Jose-Castillo, Leslie Ann)
- The Economics and Economic Valuation of Ecosystems and Biodiversity in Japan (Kentaro Yoshida, Kiichiro Hayashi)

Part 2 NETWORKS OF MONITORING AND RESEARCH ON BIODIVERSITY IN ASIA-PACIFIC REGION

- Plant Diversity in Two Philippine LTER Sites (Amoroso)
- Biodiversity Observation and Monitoring in Thailand (Dokrak Marod and Utis Kutintara)
- Introduction to Ecological and Biodiversity Monitoring in China (Haigen Xu, Hui Ding, Jun Wu)
- A note on some vegetation types which were studied with the same methodology in Indonesia (Herwint Simbolon, Eizi Suzuki, Ruliyana Susanti)
- Biodiversity issues in Indonesia, with special reference to biodiversity in human-dominated landscapes (Parikesit, Satoru Okubo, Teguh Husodo, Kazuhiko Takeuchi, Dendi Muhamad)
- International Long-Term Ecological Research Network activities in the East Asia-Pacific Region and Biodiversity Monitoring (Eun-Sik Kim)
- The status of biodiversity loss in lakes and ponds in Japan (Noriko Takamura)
- Fish biodiversity research in the Mekong Basin (Eric Baran, Bin Kang, Chum Nith, Michio Fukushima, Tuantong Jutagate, Taber Hand, Kent G. Hortle)
- Monitoring fish biodiversity in the Yangtze River, China (Huanzhang Liu, Xing Gao)
- Fish biodiversity monitoring in rivers of S. Korea (Ju-Duk Yoon, Min-Ho Jang, Hyun-Woo Kim, Gea-Jae Joo)

Part 3 ESTABLICHING BIODIVERSITY DATABASE

- Data discovery mechanisms for biodiversity resources in the Asia-Pacific region (Utsugi Jinbo, Motomi Ito)
- ILTER and JaLTER: Their Missions and Linkage to Database Development in the Asia-Pacific Region (Nobuhito Ohte, Masahiro Nakaoka and Hideaki Shibata)
- Long-term monitoring of natural forests and its database (Forest dynamics database: FDDB) constructed by Forestry and Forest Products Research Institute (FFPRI), Japan (Kaoru Niiyama, Masaaki Takyu, Satoko Kawarasaki, Mifuyu Ogawa, Tamotsu Sato, Takashi Masaki)
- Current status and nationwide database of river and floodplain ecosystem in Japan (Futoshi Nakamura)
- BISMaL: Biological Information System for Marine Life and Role for Biodiversity Research (Hiroyuki Yamamoto, Katsuhiko Tanaka, Katsunori Fujikura, Tadashi Maruyama)

Part 4 NEW METHODS & ANALYSES FOR BIODIVERSITY STUDIES

- DNA barcoding: a novel tool for observation of biodiversity (Toshihide Kato, Utusgi Jinbo and Motomi Ito)
- Development of threatened species portal in the Asia-Pacific region (Osamu Kurashima, Utsugi Jinbo, Motomi Ito)
- Linking remote sensing and in situ ecosystem / biodiversity observations by “Satellite Ecology”. In situ/remote sensing integration working group of J-BON (Hiroyuki Muraoka, Reiichiro Ishii, Shin Nagai, Rikie Suzuki, Takeshi Motohka, Hibiki Noda, Mitsuru Hirota, Kenlo N. Nasahara, Hiroyuki Oguma, Kanako Muramatsu)
- Long-term Monitoring and Prediction of Ecosystem using Remote Sensing and CLUE-S Model: Sakaerat Environmental Research Station (Yongyut Trisurat)

- East and Southeast Asian pteridophyte flora and DNA barcoding (Atsushi Ebihara, Li-Yaung Kuo)
- Spatially-explicit models for freshwater fishes for their conservation planning (Michio Fukushima)

Part 5 BIODIVERSITY AND ECOSYSTEM SERVICES

- Sensing/monitoring networks on carbon balance and biodiversity in tropical peatland (Mitsuru Osaki, Takashi Hirano, Gen Inoue, Toshihisa Honma, Hidenori Takahashi, Noriyuki Kobayashi, Muhammad Evri, Takashi Kohyama, Akihiko Ito, Bambang Setiadi, Hozuma Sekine and Kazuyo Hirose)
- Biodiversity Research for the Development of Indicator Organisms in Environment-Preserving Agriculture (Koichi Tanaka, Fumio Ihara)
- Biodiversity of invertebrates and plant in Korea paddy fields (Hea-Son Bang, Min-Su Han, Kee-Kyung Kang, Myung-Hyun Kim, Young-Eun Na, Jeong-Tak Lee, Deog-Bae Lee)
- Agrobiodiversity in Sri Lanka: A Case in Village Tank Systems (Buddhi Marambe, Gamini Pushpakumara and Pradeepa Silva)
- Biodiversity of freshwater fishes in Japan in relation to inland fisheries (Osamu Katano, Shin-ichiro S. Matsuzaki)
- Conservation and restoration of lakeshore vegetation in Lake Kasumigaura, Japan (Jun Nishihiro)
- Capacity Building for Fish Taxonomy in Southeast Asia (Keiichi Matsuura)

Major activities for 2012-2015

In the 4th AP-BON workshop, major activities of AP-BON for 2012-2015 will be (>was; after the workshop) identified. [This part should be revised and expanded through discussion in the workshop].

(1) Editing and networking national biodiversity outlook

It is important for each country to develop a national network of biodiversity scientists and edit a national biodiversity outlook. Toward CBD COP10 held in 2010, a national biodiversity outlook was edited in Japan and a regional biodiversity outlook by ACB. Similar efforts in other countries are needed to document states and trends of biodiversity. AP-BON will help activities in AP countries to fill this gap. This work would be promoted by organizing a national BON in each country.

(2) Publication of additional AP-BON books

AP-BON book entitled “The Biodiversity Observation Network in the Asia-Pacific Region: Toward Further Development of Monitoring” will provide a very helpful overview for various biodiversity observations that have been mostly isolated from each other. However, this book could cover only a limited proportion of activities going on in the Asia-Pacific region. First, it includes few chapters on coastal and marine biodiversity. Second, a large amount of works going on in forest plots in AP-region are not reviewed. We will publish the second volume of AP-BON book by filling these gaps. The title could be “The Biodiversity Observation Network in the Asia-Pacific Region 2: Linking monitoring across various ecosystems”.

(3) Promotion of collaborative projects using S9 as a leverage

The Japanese project "Integrative Observations and Assessments of Asian Biodiversity" (S9) could be used as a leverage to develop collaborative projects in five working groups. This possibility will be [was; after the workshop] discussed in the workshop and implementation of each working group will be [was] developed as below.

(4) Development of shared database

Data sharing/exchange, analysis and synthesis/integration are one of key missions of AP-BON. GBIF Darwin core and its extension provide a basic tool for this mission as for distribution records and other data associated with a taxon name and a GPS record. On the other hand, EML provides a basic tool to database metadata of various ecological observations. DNA database has been well developed for DNA sequence data. Satellite images have been accumulated in some key institutes responsible for satellite observations in each country. However, linkages of these databases remain to be developed. This is a critical challenge for AP-BON.

(5) Capacity building

Many tools are available for biodiversity observations, but it is not always easy to learn them personally or to develop capacity in individual institutes. Thus, AP-BON will provide opportunities of capacity building for such tools as DNA barcoding, distribution modeling, plot data analyses etc.

Genetic/Phylogenetic Monitoring WG of AP-BON

Tetsukazu Yahara (Kyushu University, Japan)

Introduction

This working group focuses on monitoring of genetic/phylogenetic biodiversity. Thus, the activities of this WG are corresponding to the activities of GEO BON WG1.

Concepts to be implemented

The GEO BON Concept Document defined three concepts that should be implemented for monitoring of genetic/phylogenetic diversity: (a) direct observation of specific genetic or phylogenetic components in selected target species or taxonomic groups, (b) observation of other biodiversity components, such as range extents for a representative set of species, that are then integrated with models to infer genetic diversity, and (3) observations of ecosystem condition integrated with spatial genetic/phylogenetic variation models that support large scale inferences about changes at the genetic level that are difficult to obtain directly.

Below, genetic diversity is defined as diversity in the levels of genes, species and ecosystems monitored by genetic approaches. Thus, genetic diversity includes gene diversity, phylogenetic diversity and trait diversity.

Activities

The GEO BON Detailed Implementation Document will propose the following activities.

Within-species level:

- Ubiquitous Genotyping of Critically Endangered Species
- Gene diversity loss in selected species
- Abundance to predict genetic diversity
- Contemporary evolution of invasive species

Above-species level

- Genetic/phylogenetic diversity in some core sites
- Loss of evolutionary history - EDGE
- PD mapping in selected groups
- Microbial metagenomic diversity study
- Microbial 16 S diversity study - GDM Mapping
- MIENS and database integration

Cross-cutting

- Reviews and partnerships

In most countries of the Asia-Pacific area, however, it is difficult to carry out these activities soon because taxonomic inventory remains a primary need. Thus, we will start our project by monitoring genetic diversity in some "Biodiversity Observation Core Sites" (see GEO BON WG1 detail implementation) where integrated research projects are going on, and also some threats to biodiversity are emerging.

Tai-hu and Xiao-si, China: Tai-hu is a big lake locating in the west of Shang-hai city, and Xhai-si is a river flowing into Tai-hu. While rich biodiversity still remains there, serious eutrophication and rapid biodiversity loss is going on. We will monitor changes of diversity for aquatic plants and freshwater fish using genetic approaches. A collaborative project of Tonji University, China and Kyushu university, Japan is going on for diversity of fish and aquatic plants.

Tropical lowland forests in Cambodia: In Cambodia, large areas of lowland tropical forests are still remaining but are decreasing under rapid growth of economy and human population. More than 30 permanent sample plots for forest inventory are developed and maintained by Forest Administration. We will monitor changes of diversity for plants and some insects using genetic approaches including DNA barcoding.

Yaku-shima, Japan: Yakushima is a small island with a highest peak of 1986 m. Forest vegetation including conifer forest dominated by Cryptomeria japonica is protected in the World Natural Heritage area. However, biodiversity in the protected forest, including many endemic plant species, is seriously threatened by rapid increase of wild deer. We will monitor changes of both deer population and plant diversity using genetic approaches.

Deliverables

Spatial models of species, phylogenetic and trait diversity in core sites.

Terrestrial Species Monitoring WG of AP-BON

Tetsukazu Yahara (Kyushu University, Japan)

Introduction

This working group focuses on monitoring terrestrial biodiversity at the species level. Thus, the activities of this WG are corresponding to the activities of GEO BON WG2.

Concepts to be implemented

The GEO BON Concept Document defined two concepts that should be implemented for monitoring of biodiversity at species level: (a) changes in species distribution and abundance; (b) distribution range maps for a large number of species. Surveys of national flora and fauna provide are required as a basis of this monitoring. However, national flora and fauna remain to be compiled in Asian countries except for China, Japan, Korea, and Singapore. Projects such as Flora Malesiana, Flora of Thailand and Flore du Cambodge, du Laos et du Vietnam have never been completed. Thus, we need to develop two different strategies.

For China, Japan, Korea, and Malay Peninsula, (a) and (b) stated above are feasible, and a proposed deliverable would be a Red Data Book of each country/area with distribution range maps. In Japan, this goal is already achieved and a revision of RDB is going on. For other countries, we need to work in representative groups with a distinction of endemics and non-endemics. Then, we need to edit a RDB of each country by qualifying range size, threat of habitat loss and others affecting extinction risks (see IUCN Red List Categories).

Below, we focus on monitoring in the later countries. For China, Japan, Korea, and Malay Peninsula, national monitoring activities will be self-organized. It is expected that scientists and research councils will support monitoring activities in the latter countries.

We will organize monitoring groups for flowering plants, ferns and fern allies, ants and bees. For mammals, birds, reptiles, amphibians, and butterflies, global monitoring activities are planned in GEO BON WG2, but corresponding activities in AP BON remain to be organized and networked.

Activities

For vascular plants, we will employ three approaches; specimen-based approach for some selected groups (Fabaceae, Fagaceae, Dipterocarpaceae, ferns etc), plot-based approach and transect-based approach for some hotspots. Ideas of these approaches are described by Yahara et al (AP-BON Book, Chapter 1) and will be discussed in the workshop.

Deliverables

(1) Regional assessments on states and trends of some representative plant groups (Fabaceae, Fagaceae, Dipterocarpaceae, ferns etc) and some insect groups (ants, bees). These include projections of distribution changes under climate change scenarios and also contribution to IUCN and national red lists.
(2) Integrated database of species diversity in forest plots with pictured guides for vascular species in the plots
(3) Detail distribution records of vascular plants along altitudinal gradients in some high mountains of AP with pictured guides and distribution models for vascular species.

Terrestrial Ecosystem Change WG of AP-BON

Tohru Nalashizuka (Tohoku University, Japan)

Introduction

The activities of Terrestrial Ecosystem Change in the Asia-Pacific region mostly follow the detailed implementation plan of GEO-BON, though it rather has cross-cutting approach on terrestrial ecosystem change. This WG includes the activities of GEO-BON WG3, together with the perspectives of WG6 (ecosystem services) and the methodology of WG7 (in-situ / remote-sensing integration). This is more practical approach considering the limitation of human resources and funding for scientific projects in this region.

Concepts to be implemented

The final goal is to draw maps on biodiversity and ecosystem services covering this region and to establish the persistent monitoring system. Particular focus is put for forests and related human land use, since the potential vegetations in this region are mostly forests. To enable this, we plan to have 3 working groups.

1) Establishing in-situ monitoring network of terrestrial ecosystems
2) Database on function and services of terrestrial ecosystems
3) Mapping of biodiversity, function and ecosystem services

The first WG tries to link existing network activities in this region to establish the effective collaboration and database about biodiversity and forest function, including human impacts. The second groups are to collect data on functional aspects of forest biodiversity, in particular on three aspects, leaf function of woody species, primary productivity, and pollination.

Activities

1) Establishing networks of in-situ monitoring and database on terrestrial ecosystems

There are several international networks which can potentially work to provide monitoring data on biodiversity, function and services of terrestrial ecosystems, such as DIWPA, ILTER-EAP as well as many domestic networks of biodiversity observation in each country and area. This WG tries to establish the network among these existing networks, and to increase the inter-operability of their database. First mission is to establish the meta-database of these monitoring activities/sites, and then, develop devices and systems to increase interoperability of these datasets.

2) Database on function and services of terrestrial ecosystems

This WG tries to create new dataset or database and develop background necessary for the mapping on biodiversity, function, and services of forest ecosystems. The procedure to make mapping requires the information not only on distributions of organisms and ecosystems, but also, climatic and landuse of around the observation sites. Here, we wants to have 3 sub-WGs; (1) biomass census, (2) plant trait, and (3) biological interaction.

(1) Biomass census

This sub-WG works to evaluate the relationships between biomass, primary productivity and plant diversity in this region. There could be many observation sites on tree enumeration, forest growth and forest dynamics. Also, there could be some data on biomass on agriculture and other ecosystems. By utilizing the network and database established in the WG1, analyses necessary for mapping on primary productivity, carbon sequestration, and other ecosystem services related to forest biomass and productivity will be made.

(2) Plant traits

There have been considerable data sets about various plant traits in this region. For instance, the eco-physiological traits of leaves, such as photosynthetic ability, and decaying rate, as well as nitrogen contents, phenol contents, which are related to those functional characteristics, are principally important for functions and services of ecosystems. Also, ecological traits, such as growth rate, maximum size, and those on reproduction have been studied in this region, though they are not really sufficient or convenient to integrate. These parameters are largely dependent on species, though the data are not sufficiently available in regional scale. Thus, this sub-working group is specifically work to make database on plant traits together with geographical distribution and its phylogeny. This information will link biodiversity and function and services of ecosystem.

(3) Biological interactions

Diversity of biological interaction is the basis of regulating services of ecosystem, and it is necessary to elucidate the mechanisms of biological interactions to obtain clearer figure between biodiversity and functions and services of ecosystems. Among ecosystem services that have strong links with biodiversity, we select pollination and biological control as pilot examples to show the geographical mapping of services. With collaboration with WG1, the group concentrates its activities to collect the data on diversity of some potential pollinators for crops and mechanisms controlling pests and disease for crops in dominant forest types. This group also analyse the relationship between pollinator, pests and disease and biological diversity, climate, landuse, and other information which is able to detect in landscape or larger scales with the collaboration with WG 3. These analyses will help to develop the algorisms to map ecosystem services in larger spatial scales.

3) Mapping of biodiversity, function and ecosystem services

This WG works mainly to develop the algorism for mapping biodiversity and ecosystem services in collaboration with WGs 1 and 2. Linking in situ observation data with the spatial information in various scales obtained by satellite and other sources, this WG tries to make maps on biodiversity and ecosystem services. It also aims to establish the scheme of biodiversity monitoring in large spatial scale.

Deliverables

1) Meta data base of working networks, observation sites

2) Database on plant traits

3) Database on plant-animal interactions

4) Maps of biodiversity, function and services of forest ecosystems (potential productivity, carbon sequestration, pollination service, natural enemies of pests, and so on).

Schedule

1) Meta database of networks, monitoring sites, and collected data will be prepared by 2011.

2) Database of plant traits, biological interactions will be established by 2012, and its contents will be enhanced in the following years.

3) Mapping of primary production, carbon sequestration, and the service on pollination and biological control linking with in situ observation will be provided by 2015.

4) Schemes for biodiversity monitoring in large spatial scales will be established by 2015.

Freshwater Ecosystem Change WG of AP-BON

Shin-ichi Nakano (Kyoto University, Japan)
Futoshi Nakamura (Hokkaido University, Japan)
Noriko Takamura (NIES, Japan)
Yumiko Kura (WorldFish Center, Cambodia)
Dede Irving Hartoto (Research Center for Limnology, LIPI, Indonesia)
Wataru Makino (Tohoku University, Japan)
Shinji Fujii (University of Human Environments, Japan)
Noboru Okuda (Kyoto University, Japan)
Shin-ichiro Matsuzaki (University of Tokyo, Japan)
Huanzhang Liu (Institute of Hydrobiology, Chinese Academy of Science, China)

Introduction

This working group, AP BON Freshwater Monitoring (AP BON FWM) focuses on monitoring freshwater biodiversity at the genes, species and ecosystem levels. Thus, the activities of this WG are corresponding to the activities of GEO BON WG4.

Concepts to be implemented

GEO BON aims to make it possible for each biodiversity observation anywhere in the world to contribute to improved understanding of the current status of global biodiversity. Environmental/biodiversity monitoring in Asian freshwater systems has been actively conducted by local government, NGOs, NPOs and amateurs. We also already have strong world-wide networks which may serve as link among the monitoring such as GEMS/Water. However, the fruits (data) derived from the monitoring which are not included in a world-wide network are still individually or independently stored, and this is probably dominant in environmental/biodiversity monitoring and conservation activities in Asian freshwater systems.

GEO BON can play an essential role in integrating the objectives, methods, and results of various programs such that they have the greatest potential application to multiple users, and WG4 will seek to facilitate research on freshwater biodiversity by identifying key research questions, creating networks of researchers interested in addressing these questions, and supporting applications for research funding. So, AP BON FWM will also do the same way as WG4 with special reference to Asian freshwaters, supporting the activities of WG4 by sharing the information about environmental/biodiversity monitoring and conservation activities in Asian freshwaters. Provision and/or publication of data collected by national and local governments in Asian countries is usually difficult for some reason, though it is a central assumption of GEO BON that it will be based on, and contribute to publicly accessible data, via online and widely distributed reports/publications. So, we promote the importance of GEO BON activities, ask international, national and local organizations and individuals to share the information about environmental/biodiversity monitoring and conservation activities in Asian countries and facilitate the compilation of data through GEO BON WG4.

Since WG4 have two time-frames, short-term (5 years, 4.2.1.1 in WG4 Implementation Plan) and long-term (4.2.1.2 in WG4 IP), we also follow those time-frames. In addition, GEO BON aims to make it possible for each biodiversity observation anywhere in the world to contribute to improved understanding of the current status of global biodiversity. For this, GEO BON WG4 will have "spatial unit" to associate each observation with a place that has clearly defined boundaries (WG4 IP, 4.2.2), and we AP BON FWM also use the terminology. However, there are current efforts in other GEO areas and other organizations (e.g., Ramsar) to derive such classifications for terrestrial, marine and/or freshwater ecosystems so that, in the long term, it might be possible to define spatial frameworks that integrate hierarchically nested catchments, broad ecosystem types, and ecological regions.

Types of observations of freshwater biodiversity, species, ecosystems (condition and extent), ecosystem services and genes, are the levels of organization to be captured as changes in biodiversity of Asian freshwaters (WG4 IP, 4.2.3). As well as WG4 IP, the focus of AP BON FWM will be on observations of the status of freshwater species and biological health of freshwater ecosystems in Asian countries using species and community level biological data together with data on key abiotic drivers (WG4 IP, 4.2.3).

Facilitating the detection and quantification of changes in biophysical characteristics of freshwater ecosystems in Asia is a primary objective of the AP BON FWM. It is also desirable to have the capacity to forecast how biodiversity in freshwater ecosystems may change in the future as a result of changes in key drivers including land use, river regulation and human water use, the introduction of alien species, and impacts of climate change.

Activities

It is a central assumption of GEO BON that it will be based on, and contribute to publicly accessible data, via online and widely distributed reports/publications. We know that some of the freshwater monitoring results published but written in local languages and those stored in researchers' computers, book shelves and/or file cabinets are good enough to be shared to users all over the world. We will conduct information gap analysis and identify geographic and thematic coverage of existing freshwater biodiversity information. So, we AP-BON FWM will identify those monitoring which has possibility to be published in English and ask the responsible organizations thus identified to provide the information. As the first step, we identify the databases which have

already launched on the web but written in local languages.
In addition, quality control (QC) of collected data is also crucial. So, we will provide guideline of quality control system to Asian networks.
Provisional collaborators are listed below. We will be supported not only by more Asian freshwater researchers but also foreign freshwater researchers who have ever conducted monitoring and/or conservation in Asian countries.

Japan
Shin-ichi Nakano, Noboru Okuda (CER, Kyoto University)
Machiko Nishino (Lake Biwa Environmental Research Institute)
Shuhei Ban (Shiga Prefectural University)
Hiroki Haga (Lake Biwa Museum)
Noriko Takamura (National Institute for Environmental Science)
Michio Fukushima (National Institute for Environmental Science)
Takehiko Fukushima (Tsukuba University)
Futoshi Nakamura (Hokkaido University)
Wataru Makino (Tohoku University)
Shinji Fujii (University of Human Environments, Japan)
Shin-ichiro Matsuzaki (University of Tokyo, Japan)

Indonesia
Dede Irving Hartoto (Research Center for Limnology)

Korea
Gea-Jae Joo (Pusan National University)
Bomchul Kim (Kangwon National University)
Kwang Guk An (NIER& K-Water?)

China
Huangzhang Liu (Wuhan Institute of Hydrobiology)
Yuwei Chen (Nanjing Institute of Geography and Limonlogy)

Mekong River System
Eric Baran (WorldFish Center)

Taiwan
Ling-Ling Lee (Global Lake Environmental Observatory Network)
Jiunn-Tzong Wu (Biodiversity Research Institute)
Chiu, Chih-Yu (Biodiversity Research Institute)

Mongolia
Clyde Goulden (Asia Center)

Cambodia
Eric Baran (WorldFish Center)
Yumiko Kura (WorldFish Center)

Deliverables

- Inventory of environmental/biodiversity monitoring and conservation activities in Asian freshwaters
- Compilation publicly available data on environmental/biodiversity monitoring and conservation activities in Asian freshwaters (4.4.6 and 4.4.7 in WG4 IP)
- Asian Fish map (provisional) (4.4.4 in WG4 IP)
- List of invasive alien species in Asia

Schedule

- Inventory of environmental/biodiversity monitoring and conservation activities in Asian freshwaters (2010, 2011)
- Compilation publicly available data on environmental/biodiversity monitoring and conservation activities in Asian freshwaters (4.4.6 and 4.4.7 in WG4 IP) (2010-2014)
- Asian Fish map (provisional) (4.4.4 in WG4 IP) (2010-2012)

Marine Ecosystem Change WG of AP-BON

Hiroyuki Yamamoto (JAMSTEC), Masahiro Nakaoka (Hokkaido Univ.), Yoshihisa Shirayama (JAMSTEC)

Introduction

This working group, AP BON MM (Asia Pacific Biodiversity Observation Network Marine Monitoring) focuses on marine biodiversity observations at the species (and/or higher taxonomic level), and marine ecosystem dynamics in the tropical, subtropical, temperate and boreal climate region in the Western Pacific region. The area includes both the area beyond the national jurisdiction (often referred as open ocean) as well as the area within the exclusive economical zone (EEZ) defined by the law of the sea. The activities of this group are thus corresponding to the activities of GEO BON WG5.

Concept to be implemented

One of main aims of GEO BON is to make it possible for each biodiversity observation anywhere in the world to contribute to improved understanding of the current status of global biodiversity. Some programs, such as Reef Check and Seagrass Watch, have been carried out by NGOs, NPOs and amateurs. At the national level, research/monitoring programs have been conducted either by the local scientist alone or by international group of

scientists that includes local scientists. At the global scale level, international research programs, e.g. Census of Marine Life (CoML), SeagrassNet, have been carried out in the intensive support from funding agencies.

Ocean Biogeography Information System (OBIS) is a biodiversity database created by CoML, and collects a lot of data since 2000. This database is now transferred to International Oceanographic Commission (IOC), which is an international organization under UNESCO. Currently OBIS is thus very trustful database for data sharing in global scale, because the metadata structure of OBIS is compatible with GBIF.

While global synthetic analyses used data set in OBIS have revealed an extant of many ecologically or biologically significant areas such as Asian and Pacific Ocean region, inventories of regional biodiversity based on long-term observations remain incomplete. Data coverage of OBIS is insufficient to analyze the regional biodiversity change in fine scale. Data in OBIS also have large bias to shallow water biota. For example, nekton and plankton data are very rich, but benthos data are not so. Data from open-ocean, mid-water and deep-sea are very poor.

Many causing factors of biodiversity decline and habitat loss are identified, e.g. disruption of coastal habitats, coral breaching, ocean acidification, decline of primary production, development of deep-sea resources, and etc. Biodiversity decline and habitats loss in marine environments are already crucial issues and we have to assess the present state and suggest the perspective on changing ocean.

To attain such a goal, Japanese members established a project for an integrative observation and assessments of biodiversity loss in a changing ocean, as a part of research program, Integrative Observations and Assessments of Asian Biodiversity, promoting from 2011 to 2015 by Environment Research and Technology Development Fund (S9) of the Ministry of the Environment, Japan.

Activities

The S-9-5 project of Japan is an eligible partner of Asian Pacific BON. The S-9-5 consists of six research teams to collects data on marine biodiversity from regional or local habitats such as kelp forests, seagrass meadows, coral reefs, pelagic water and deep-sea. The data sets described in Darwin Core format are accumulated into Biological Information System for Marine Life (BISMaL) managed by Global Oceanographic Data Centre (GODAC) of JAMSTEC. BISMaL is a regional node of OBIS network, and broader capacity of data contents.

The data collection is conducting by specimen-based approach, habitat-targeted approach, and remote sensing approach. Data mining approach is appropriate procedure to know historical events of biodiversity, and improves inventories of regional biodiversity based on long-term observations. Establishing the research network for data collection and sharing on marine biodiversity within the Asian and Pacific region is indispensable element in this project.

Statistical analysis and modeling for the changing patterns of marine biodiversity are performed to identify what

are risks for biodiversity decline. The data accumulated in BISMaL are an intelligent resource to analyze present state of biodiversity decline, and suggests improvement protocol of marine biodiversity declines, ecosystem based environmental management methods for sustainable use of marine products, and biodiversity conservation methods for mining activities.

Japan
S-9-5 project
Subtheme 1: coastal ecosystem
Yoshihisa Shirayama, Yoshie Uchifune (JAMSTEC)
Subtheme 2: kelp forests
Masahiro Nakaoka, Kazushi Miyashita, Norishige Yotsukura (Hokkaido University)
Subtheme 3: seagrass meadows
Teruhisa Komatsu, Shuhei Nishida, Kazuhiro Kogure (University of Tokyo)
Subtheme 4: coral reefs
Hiroya Yamano, Masanobu Kawachi, Kaoru Sugihara, Chuki Hongo (NIES)
Subtheme 5: plankton community in pelagic water
Hiroya Sugisaki, Yuuichi Hirota, Tadafumi Ichikawa, Kiyoutaka Hidaka, Kazuaki Tadokoro, Takuhiko Kameda, Kou Nishiuchi, Hruyuki Morimoto (AFFRC)
Subtheme 6: deep-sea benthic community in deep-sea hydrothermal vent field
Katunori Fujikura, Hiroyuki Yamamoto, Hiormi Watanabe, Katsuhiko Tanaka (JAMSTEC)

Indonesia
Suharsono (Research Center for Oceanology, LIPI)
Susetiono (Research Center for Oceanology, LIPI)

Korea
Dong Song Kim (KORDI)

China
Song Sung (National Institute of Oceanography, Chindao)

Malaysia
Zulfigar Yasin (USM)
Aileen Tan Shaw Hwan (USM)

Vietnam
Pham Ding Trong (Institute of Marine Environment, Hanoi)

Philippines
Miguel Fortes (University of Philippines)

Thailand
Somchai Bussarawit (National Museum of Natural History)

Deliverables
Ecologically or Biologically Significant Area (EBSA), which prescribed by 7 criteria (1: uniqueness or rarity, 2: special importance for life history stages, 3: importance for threatened, endangered or declining species and/or habitats, 4: vulnerability, fragility, sensitivity or slow recovery, 5: biological productivity, 6: biological diversity, 7: naturalness), will be recommend from this project, as a touchstone to establish the marine protected area (MPA).

Contribution to advance the twenty ‘Aichi targets’ defined by the Convention on Biological Diversity (CBD) for the period 2011–2020, is an ultimate goal of this project.

Schedule
In the framework of CBD, it is recommended to establish 10% of EEZ as MPA before 2012. We consider 5 years are at least necessary to show significant progress in activities described above, and continuous efforts over 10 years are needed for modifying criteria for EBSA, recognition of EBSA and step forward to set MPA in AP BON region based on sound scientific research.