



# DIWPA News Letter

No.25

Office: Center for Ecological Research, Kyoto University, Otsu, Japan

## Ogasawara islands is the 4th site in Japan to be added to the World Natural Heritage list

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From the Chair

Shiran Kaikan, Kyoto University on 6th November.

I am deliriously happy to announce our 20th anniversary of the Center for Ecological Research (CER). The Anniversary Ceremony and memorial lecture presentations will be held at

Along with the function of DIWPA office, the CER is open to any scientists who conduct ecological research. The CER was established in 1991 as an inter-university joint-use facility aimed at promoting basic research and international cooperative work in the field of ecology. The CER has offered exciting opportunities for research in a variety of areas in ecology including aquatic ecology, tropical ecology, plant-animal interaction, theoretical ecology, molecular analysis, and conservation ecology. Please contact DIWPA office for more details about the possibilities of joint research with the CER.

As all of you may know, we had a tragic disaster on March 11, 2011. I would express my deepest condolences to the victims who lost their lives in the disaster. The huge earthquake occurred in Tohoku area which is a north part of main island, followed by large tsunamis. The double disasters had caused immeasurable damages on human activities in north Kanto and Tohoku regions. Dead or missing topped 20,000 people, as of September 2011. In addition, many people in the areas near Fukushima Nuclear Power Plant, together with the disaster-stricken areas, have still been suffered from the uncomfortable daily life. We must provide the necessary helps as much as possible continuously. We do hope the safety and early settlement for the people who make the best effort to prevent the radioactivity of the nuclear power plants from spreading.

We Japanese deeply express our gratitude for warm supports and helps from all over the world for our recovery. Many countries have been providing

machines, technologies, information and human resources to save Japan. We feel blessed for having great friends around the world.



From the SG

This issue contains the various interesting reports and attractive new sites including the following topics:

- The latest information of AP-BON biodiversity book. (See Page 10 "What's NEW!" for more details.)

- Restart of DIWPA Field Biology Course in the summer of 2012. (See Page 10 "What's NEW!" for more information.)

DIWPA thus has been becoming more active. We will continue our efforts for coming to a higher level. Your comments on our activities are highly welcome!

# Report: 1

July 25-29, 2011

## Report of a Kick-off meeting for the research project "Observation, Evaluation and Prediction of Biodiversity in Asia"

*Shin-ichi NAKANO*

*Secretary General of DIWPA*

*Center for Ecological Research, Kyoto University*

The research project "Observation, Evaluation and Prediction of Biodiversity in Asia", supported by Ministry of Environment Japan (MoEJ), has been started under the leadership of Prof. T. Yahara. A kick-off meeting was held on 16 July 2011 at National Institute for Environmental Studies, Tsukuba. The project consists of five teams (see below). The aims of the meeting were (1) to understand the difference between common (usual) research grants and the present project, (2) to have discussions for efficient research management, and (3) to share the information among the teams by exchanging fruits of the above discussions. For (1), since the project is supported by the Environment Research and Technology Development Fund of MoEJ, we will be required every fiscal year to provide concrete research fruits which are followed by contract documents between researchers and MoEJ.

More than 100 researchers got together to the meeting and had active discussions. We manage the project for the coming five years, though we will have mid-term evaluation in the 3rd year.

Followings are the brief explanation for the project which is extracted from the discussion material "Environment Research and Technology Development Fund (S9) of the Ministry of the Environment, Japan: Integrative Observations and Assessments of Asian Biodiversity" which was distributed to the participants of the meeting.



Food diversity in Palembang, Indonesia. Asian people enjoy various cuisine, using diverse food materials from terrestrial and aquatic ecosystems. In S9 project, we hope we would conduct biodiversity researches in Asian countries, together with those foods. What a precious ecosystem service we have!

### Biodiversity Observations and Assessment in the global scale in order to achieve the post-2010 targets.

Principal Investigator: Tetsukazu YAHARA  
(Kyushu University)

This study was carried out to design a strategic research and development project on biodiversity observations and assessment in Asia scale that will be promoted from 2011 to 2015 by the Ministry of the Environment. We reviewed achievements of the previous biodiversity observations and assessment in the levels of genes, species, and both terrestrial and marine ecosystems. Then, we concluded that major challenges to be attacked are (1) to quantify the rates of species loss in association with rapid habitat loss, (2) to quantify the loss of ecosystem functions/services in association with species/habitat loss, and (3) to develop evidence-based strategies to identify areas to be protected urgently. To carry out a project for tackling these challenges, we recommended organizing five teams that will study on (1) integration by modeling spatial patterns and temporal trends of biodiversity, (2) patterns and trends of terrestrial species/genetic diversity, (3) patterns and trends of terrestrial ecosystem functions/services, (4) patterns and trends of freshwater biodiversity and ecosystem services, and (5) patterns and trends of marine biodiversity and ecosystem services. To design projects in these teams, we organized a series of workshops on species/genetic diversity, forest ecosystem, freshwater biodiversity and marine biodiversity by inviting qualified researchers in these subjects and identified major tasks to be performed and effective strategies to be adopted. We concluded that specimen-based approach, plot-based approach, area-targeted approach and remote sensing approach should be integrated with statistical modeling of spatial distribution patterns by incorporating both natural and social explanatory variables.

# Report:2

July 25-29, 2011

## Report on the "Science workshop: Assessment and the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES)"

**Shoko SAKAI**

*Research Institute for Humanity and Nature*

The Millennium Ecosystem Assessment (MA) in 2005 reported the alarming rate of decline of ecosystem services and biodiversity at the global level. Since then, it has been strongly recognized that we need to establish an intergovernmental science platform along the lines of the IPCC for climate change (Larigauderie & Mooney 2010). Although assessments on biodiversity and ecosystem services at the global scale such as MA, the Global Environment Outlook (GEO), the Global Biodiversity Outlook (GBO), the Economics of Ecosystems and Biodiversity (TEEB) already in existing, none of them have established an 'intergovernmental status' and it has limited the magnitude of effects on decision-making processes. IPBES has been the object of a formal consultation under the auspices of UNEP since 2007, and the third intergovernmental meeting on the issue held in Busan, South Korea, finally adopted the outcome which clearly stated the agreement by countries to establish a International Platform on Biodiversity and Ecosystem Services (Perrings et al. 2010). It will be operationalised after two further meetings in October 2011 and April 2012. DIVERSITAS and IHDP (International Human Dimensions Programme) under ICSU (the International Council for Science) have contributed to the whole process representing the international science community.

To make an input from science into the two meetings, a workshop was convened on 25-29 July in Tokyo. The main goal of the one-week workshop was to prepare a document that delegates at the IPBES plenary might find useful when deliberating and deciding on the nature, type, scope and scale of assessments IPBES should undertake. It is not a concrete plan or proposal for IPBES assessments, but a guideline for decisions with recommendations and options to be chosen. About 40 scientists of different disciplines from different regions and countries, including several members of DIWPA and representatives from DIVERSITAS, discussed based on a draft prepared by several leading authors. During the first three days we repeatedly broke up into five groups to brush up different sections of the draft and gathered again to see the progress. On the last two days, about half of the participants, including the leading authors and young scientists, finalized the draft.

Although analogy between IPCC and IPBES is often drawn, the assessments by IPBES may be much more complex than IPCC, since it includes many human aspects in addition to ecological characteristics in its scope. In contrast to IPCC mainly focusing on global assessments and scenarios, multi-scale approach is essential in IPBES, because geographical dimension varies depending on the variables to consider; therefore, coordination among scales and vertical transfer of information are real challenges. Close partnership with existing international organization of scientists such as DIVERSITAS and DIWPA will be important for success of IPBES assessment.

All scientists involved in biodiversity research should keep a close eye on the launch of the new platform and its assessment. For further information, please visit the IPBES website (<http://www.ipbes.net/>).

### References

Larigauderie, A. and H. A. Mooney. 2010. The intergovernmental science-policy Platform on Biodiversity and Ecosystem Services: moving a step closer to an IPCC-like mechanism for biodiversity. *Current Opinion in Environmental Sustainability* 2: 9-4.

Perrings, C., D. Duraiappah, A. Larigauderie, and H. Mooney. 2010. The biodiversity and ecosystem services science-policy interface. *Science* 331: 1139-1140.



# Report:3

September 5-9, 2011

## A report on ILTER Annual Meeting 2011

**Noboru OKUDA**

*Center for Ecological Research, Kyoto University*

**I**nternational Long-Term Ecological Research Network (ILTER), which is a networking organization of scientists engaged in long-term, site based ecosystem and socio-ecological observations and researches, was established in 1993 to provide the scientific community, policy makers and society with information necessary to create a sustainable human society and nature under changing global environments. Its annual meeting was held in Hokkaido University, Sapporo, Japan, from 5th to 9th September, 2011. Here I briefly report this meeting.

Our institute, Center for Ecological Research, registered two monitoring sites, Lake Biwa Watershed research site and Kiso Basin research site, on Japan Long-Term Ecological Research Network (JaLTER) in 2010. I attended this meeting to present our research activities on the long-term monitoring and also to discuss an early draft of the strategic action plan for JaLTER as a chief in future planning committee.

At this meeting, there were 91 participants from 25 countries including 9 from East Asia/Pacific regions. It was really diverse in terms of research topics, targeted scales and scientific disciplines as well as nations. It consisted of scientific and business meetings, beginning with the opening remark by an ILTER chair, Dr Terry Parr, from UK ECN (Photo 1), followed by four plenary speakers.



Photo 1. The opening remark by an ILTER Chair, Dr. Terry Parr.

In addition to 38 poster talks, we had a workshop entitled "Global Change Science and LTER" with the following four parallel sessions: 1) Evaluating ecosystem services and indicators, 2) Remote sensing of ecosystem dynamics, 3) Diversity and functions in terrestrial ecosystems and 4) Monitoring marine and freshwater ecosystems. As a usual manner for the ILTER meeting, summaries from the parallel sessions

were quickly output by moderators and then actively debated together with participants of all four sessions.

We also had a science symposium entitled "Vulnerability, Sustainability, and Resilience of Ecosystems", thereafter breaking out four groups to facilitate the future collaboration and networking for the LTER. Break-out discussions were made in relation to the following topics: 1) Strategies for addressing human and ecological adaptation to change, 2) ILTER science-based approach to link with other international programs, 3) Cross-network approaches to involving scientists with each domestic network and 4) Linking scenarios of climate change with drivers of land use and land cover (Photo 2)



Photo 2.  
Break-out discussion in a science symposium

In the excursion, we enjoyed a field trip to Tomakomai Experimental Forest (TOEF) of Hokkaido University which is a core-site of JaLTER. We observed two on-going field experiments: one is an enclosure experiment to monitor the deer grazing impacts on the forest ecosystem and another an in-situ warming experiment to examine a tree response to the warming climate and to predict its ecosystem consequences. All of us were really excited by a wonderful bird's-eye view from a big crane by which we can take access to tree canopies (Photos 3).

At the business meeting, the Chair adopted a motion that ILTER should take the leading in GEOSS/GEO BON with all approvals. The ILTER is now planning to work with the GEO BON Steering





Photo 3. A crane standing in TOEF (left) and its bird's-eye view of the forest extending to the horizon.

Committee to organize international workshop in 2012/13 for developing an implementation plan, so that we also have to discuss how to contribute to this action as a member of DIWPA.

At last, one of my strong impressions at the business meeting was a report on an international summer school organized by IFES-GCOE of Hokkaido University in which many foreign students were invited to learn social-ecological approaches for the LTER. Many audiences paid much attention to such an activity and recognized that capacity building for next generation scientists would be very

important in sustaining the LTER. In next summer, our CER is planning to provide an opportunity for the international field biology course in the stream ecosystem of Kiso. Although the number of invited students will be quite limited, many proposals from your countries are greatly welcome. Our office will announce its details in the forthcoming News Letter.

The next annual meeting of ILTER will be held in Lisbon University, Portugal, September 2012, with some exciting excursions. So, see you all in Lisbon! (Photo 4)



Photo 4. Participants enjoying the excursion tour to TOEF.



# New Sites

## The Ogasawara (Bonin) islands have been inscribed in the World Natural Heritage List in 2011.

Atsushi Ishida<sup>1</sup> and Naoki Kachi<sup>2</sup>

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Kyoto University

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Department of Biological Sciences,  
Tokyo Metropolitan University

The Ogasawara islands are called Bonin Islands in English, originally coming from “Munin” of a Japanese word. “Munin” in Japanese means “inhabited”. The human colonization in the Ogasawara islands has started since 1830. The islands are small oceanic islands that formed as a result of volcanic activity during the Tertiary period, located in the subtropical North Pacific Ocean approximately 1,000 km south of central Tokyo. The main island, Chichi-jima, lies 27°04' N and 142°13' E. In the present, humans live on only two islands of Chichi-jima and Haha-jima, and the human population is approximately 2,800 in 2011. The areas of Chichi-jima and Haha-jima islands are approximately 24 km<sup>2</sup> and 20 km<sup>2</sup>, and the maximum elevations are 318 m and 463 m above the sea level, respectively. The mean annual temperature was 23.1°C with the mean temperatures of 27.7°C in the hottest month (August) and 17.9°C in the coolest month (February) for 1969-2010 in Chichi-jima. The mean annual precipitation was 1,278 mm with a minimum of 751 mm in 1971 and a maximum of 1,875 mm in 1989.



The beautiful ocean and islands in Ogasawara

In the beautiful sea, many colorful fishes, green sea turtle (*Chelonia mydas*), and whales (*Megaptera novaeangliae*, *Physeter macrocephalus*) live in the Bonin blue ocean around the islands. Characteristic topography, geography, and geology can be observed on the islands, including karst landform, sea cliffs, pillow lava, boninite, and foraminifers. A large part of the islands is covered by broad-leaved evergreen forests and, like the Galapagos and Hawaiian Islands, they have rich flora with a high endemism. Forests of short trees with sclerophyllous leaves called “drought dwarf forests” are dominated in Chichi-jima, and forests of tall trees called “subtropical rainforest” are typically

found in Haha-jima. The tree height gradually increases from the ridge (less than 1 m high) to the valley (more than 15-20 m high) with increasing soil depth in Chichi-jima. The 75% of woody plant species are endemic. There are also many endemic animals, including birds, such as the endemic subspecies of Japanese wood pigeon (*Columba janthina nitens*) and the endemic Bonin honeyeater (*Apalopteron familiare hahasima*); insects, such as the endemic tiger beetle (*Cicindela bonina*) and the endemic dragonfly (*Boninagrion ezoin*); and land snails, such as *Mandarina anijimana* and *Hirasea operculina*. Nevertheless, many of them decrease the population on the islands.



The vegetation called “drought dwarf forests” with rich flora in Chichi-jima

The Ogasawara islands were inscribed as a new protected site on the World Natural Heritage List in UNESCO (United Nations Educational, Scientific and Cultural Organization) on 29 June 2011. In Japan, three sites, Shiretoko, Shirakami-Sanchi, and Yakushima, have been inscribed as the Natural Heritage before the certification of the Ogasawara islands. To be inscribed in the Natural Heritage List, it must meet one or more of four criteria as below, 1) Natural landscape, 2) Topography, Geography and Geology, 3) Ecosystem, and 4) Biodiversity. The nomination of the islands was made based on the third criteria, Ecosystem. The Ogasawara islands are important areas that provide precious information on the evolution of the Earth and organisms.

On the islands, we can observe the process of species diversification to adapt to various types of environments, such as drought and high-light stress. The islands are thus an outstanding example of ongoing biological evolution and adaptation. However, since 1830, various alien species have been introduced to the islands, either on purpose or by accident. As



Adult trees (left) and many seedlings at the understory (right) in the alien tree, *Bischofia javanica*

the results, the islands are facing serious threats, including the extinction of endemic species, vegetation change from native trees to alien trees, and ecosystem disturbances. For example, goats have eaten native and endemic plants, cats have killed seabirds, rats has consumed seeds of woody plants that are also foods of endemic birds, and Green Anoles (*Anolis carolinensis*) have eaten endemic insects. Invasive alien trees, *Casuarina equisetifolia* (Casuarinaceae) has been expanding at the dry ridge sites, and *Bischofia javanica* (Euphorbiaceae) trees have been expanding especially at the wet valley sites. It looks like that the alien trees are rapidly expanding into the natural forests, following disturbance due to big typhoons. In the future, if the number of typhoons and the size scale of typhoons increase in the islands, the alien trees would more rapidly occupy the land.

We have studied the adaptation to environments in the native trees and the mechanisms of rapid

expansion of alien trees on the islands. Researchers, policymakers and various NPO groups have made good teamwork for nature conservation of the islands. Various efforts have been made, including conserving endangered endemic species, preventing the invasion of alien species into core areas, and eliminating already introduced alien species that have had strong impacts on the ecosystems of the islands. Furthermore, various types of guided tours, such as whale watching, scuba diving, bird watching, and vegetation tours, in the mountains and sea are actively conducting by eco-tourism guides. The inscription in the World Natural Heritage List will further activate eco-tourism in the islands. We, scientists, also hope that the valuable nature of ecosystem in the Ogasawara islands will be conserved for the next generation of human and all natural organisms.



The sunset ocean view in the Ogasawara islands

## Yanbaru Fungal Biodiversity Project

*Takashi Osono*

Center for Ecological Research,  
Kyoto University

### The biodiversity of fungi

Fungi are heterotrophic eukaryotic microorganisms that play unique roles as decomposers, mutualistic symbionts, and pathogens of plants and animals in terrestrial and aquatic ecosystems. The magnitude of fungal biodiversity on the globe has been estimated at 500 K to 9.9 M species. However, only approx. 100,000 species have been catalogued, according to the most recent Dictionary of Fungi published in 2008. These numbers indicate that the majority of fungi on the earth are yet to be discovered and described, most of which are considered to be distributed in such 'hotspots' as aquatic environments, inside and outside of arthropods, and forest canopies, especially those in tropical regions. It is easy to imagine that the global inventory has a very long way to go, as a recent estimate indicates that at the current rate of species description (approx. 1,200 new species per year over the last decade) it will take more than 1,000 years to complete the global fungal inventory.

To approach a complete catalogue of fungal biodiversity within a reasonable time frame, it will be necessary to accelerate the speed of species description dramatically. Traditional morphology-based taxonomy will be critical to this effort, but a further increase in the number of active taxonomists would be needed to carry it out. Fortunately, new methodologies of sequence-based taxon discovery from environmental samples have

emerged in recent years, such as high-throughput sequencing technologies and pyrosequencing methods. These methods also have numerous potentials for achieving further understanding of fungal biodiversity, ecology, and geographical distributions. The potential impact of pyrosequencing methods is reviewed and discussed in a paper of Hibbett et al. (2011) in Fungal Biology Reviews in detail.

### Fungal biodiversity research projects in Yanbaru

We are currently conducting research projects aimed at revealing fungal biodiversity and functioning in Asian regions, and a core study site was established in the mountainous area in the northern part of Okinawa Island, southern Japan. The subtropical forest in that area is called Yanbaru in Ryukyuan languages and is known as one of the biodiversity hot-spots in Japan. Yanbaru is especially known for its richness in endemic birds, frogs, and land reptiles. Biodiversity assessments are urgently needed for other groups of organisms in this species-rich region, especially of fungi that are too minute to be visible to the naked eye but play crucial roles in ecosystem functioning and services. Thus, we established study plots in the Yona experimental field

of the University of the Ryukyus (26°9'N, 128°5'E, <http://www.agr.u-ryukyu.ac.jp/eng-field.html>) that are covered with a broad-leaved evergreen forest dominated by *Castanopsis sieboldii* and *Schima wallichii*. The mean annual temperature of the site is 22°C and the annual precipitation is 2,456 mm.

Now we are surveying the biodiversity of fungi, such as litter- and wood-decomposing, mycorrhizal, foliar endophytic, and soil fungi. Over the last seven years, fieldwork has been carried out several times per year to collect fruiting bodies, plant tissues, and other substrata for fungal biodiversity assessments. The samples are taken back to the laboratory and used for the isolation of fungi and molecular phylogenetic analyses. Metagenomics of environmental samples such as live leaves, dead leaves, and soils, using clone libraries and next-generation sequencing techniques, have been performed for the last two years.



Subtropical forest of Yanbaru



We are now analyzing more than 1.1 M fungal DNA sequences that a Roche 454 pyrosequencing has yielded. A preliminary analysis indicated that more than 200,000 reads of fungal ITS regions obtained from healthy-looking live leaves of *C. sieboldii* and *S. wallichii* were grouped into approx. 3,600 operational taxonomic units (with a threshold of 95% similarity), suggesting a hyper-diverse nature of the subtropical endophytic fungal assemblage.

To relate the fungal biodiversity to functioning, we are studying interspecies interactions and

ecosystem processes, such as recurrences between trees and fungi, the decomposition processes of leaf litter, the accumulation and turnover of coarse woody debris, and the production and turnover of mycorrhizal roots. Moreover, our research interest has now become extended to biodiversity conservation, with an emphasis on the effects of clear-cutting and the transformation of natural forests into secondary forests on the fungal biodiversity and functioning. Until now, more than 20 researchers and graduate students of mycology, ecology, and biogeochemistry have been involved in the projects that

have been supported by 14 national and private funding organizations. You can access some publications of the project at the C.V. page of our website (<http://www.ecology.kyoto-u.ac.jp/~tosono/>). Future research interests include studies of other functional groups of fungi, such as plant pathogenic fungi, arthropod-associated fungi, and lichens, and construction of a database to manage massive DNA sequence data. Finally, we welcome international cooperative research and your future contributions to the projects.

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JAPAN

# What's NEW!

## AP-BON biodiversity book

We would like to tell you that we have submitted all the manuscripts of AP-BON biodiversity book to the publisher Springer on June 30, 2011. We finally collected 31 papers and distributed them into appropriate parts. Total pages estimated by Springer may be 500 or so. The book covers over multiple aspects of biodiversity in Asia: Part 1, general introduction; Part 2, networks of monitoring and research on biodiversity in asia-pacific region; Part 3, establishing biodiversity database; Part 4, new methods & analyses for biodiversity studies; Part 5, biodiversity and ecosystem services.

We do hope the book would be useful for a quantum step forward in advancing science that optimizes the synergy between development and biodiversity

conservation in Asia.

Additionally, we will publish the 2nd AP-BON biodiversity book. And DIWPA office will be a secretariat for editing the book.

We (Profs. Yahara, Nakashizuka and Nakano) have been discussing the topics of the new book with editors since last July. Also, the research project "Observation, Evaluation and Prediction of Biodiversity in Asia", supported by Ministry of Environment Japan, has started last July under the leadership of Prof. T. Yahara and it will play important roles for publication of the book. We will update the details of this new book through the future newsletter.

## DIWPA Field Biology Course

We are pleased to announce that we will bring back the Field Biology Course starting next FY 2012. Although our financial situation has yet to be considered, after considering it further, we concluded to finance for the limited students to participate the Field Biology Course.

We had prepared the document of call-for-application and had discussions with our DIWPA Steering Committee members for improvement. Some of the SC members gave us enthusiastic approval, and we did not have any objections.

The details of "2012 DIWPA Field Biology Course in Kiso River, Japan" will be provided in the next newsletter. We will start asking for submissions for this course in March 2012 through the DIWPA website, news letter as well as sending e-mail message to DIWPA members.

This Field Biology Course will join in with the Student Field Biology Course which is supported by Center for Ecological Research, Kyoto University. The Student Field Biology Course supported by CER are held in Lake Biwa and Kiso River every other year respectively. The Student Field Biology Course took place in Lake Biwa this year (2011), therefore next year (2012) will be held in Kiso River.

Motivated students, who belong to DIWPA or whose supervisors are the DIWPA members, are highly welcome for applying.



2007 DIWPA Field Biology Course in Lake Biwa, Japan



2007 DIWPA Field Biology Course in Lake Biwa, Japan

The participants work on a ship under the guidance of the captain.





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## ***DIWPA OFFICE***

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