DIWPA News Letter

Office: Center for Ecological Research, Kyoto University, Otsu, Japan No.33

Message *from the Chairperson*

Shin-ichi Nakano

AP-BON Book3 is aiming to be published by fiscal year 2015, for which, I apologize for the delay of its publishing. The book contained most of the papers presented at the "International Workshop on Freshwater Biodiversity Conservation in Asia" at Kyushu University, Japan, in November 2012. Unfortunately, we DIWPA Office had trouble collecting the manuscripts, and hence the unexpected delay. Nonetheless, our review process went smoothly, and we are appreciative of the authors whom appropriately revised their manuscripts.

There are a number of books on biodiversity that are already available. However, those books examined biodiversity and related issues in highly developed countries such as the United States of America (USA) and European countries. On the other hand, we still have limited information about the biodiversity in developing countries. Asian countries are well known for its rich biodiversity, and this is especially the case for Southeast Asian countries such as Indonesia and Thailand that has gained recognition as "Mega-biodiversity countries". In addition, only a few publications had been reported on the biodiversity status in China, even though she is a large country with the world's largest population and rapid economic expansion.

The Book3, together with our previous two books, gives precious knowledge of the status quo of Asian biodiversity towards the biodiversity research where information is lacking from developing countries. We are very grateful to Japan's Ministry of the Environment for their support. Also, we would like to thank the authors for submitting their manuscripts, and the publisher, Springer, for their patience in receiving for our work.

Message *from the Secretary General*

Atsushi Ishida

We are making a plan for International Field Biology Course (IFBC) in 2015. We will conduct it in the subject area of physiological ecology in terrestrial plants. In the current plan, we will make a training course of the measurements of leaf gas exchange in the top canopy leaves of tropical trees in Thailand. However, in late August, a lot of people were injured or killed by successive bomb attacks in Bangkok. We have thus anxiety for conducting IFBC in Thailand now. We will announce the details of the plan on homepage of DIWPA as soon as possible. If you are interested in the IFBC, please see our homepage. Motivated students who belong to DIWPA or whose supervisors are the DIWPA members are highly welcome for applying. Please note that we cannot decide yet whether to conduct IFBC in this year at the present time.

We will make possible efforts for enhancing the activity of DIWPA, as a platform for exchanging information related to biodiversity. To keep our activity, please send your reports for DIWPA Newsletter. We always receive your papers.

A Tentative Plan of

International Field Biology Course (IFBC) in 2015

In November 2015, we will conduct IFBC in Thailand. The subject area is physiological ecology of woody plants. The day period of the training course will be approximately one week. In the IFBC, we do not go to the risky areas, such as the center of Bangkok and the southern part of Thailand. We will pick you up at the Suvarnabhumi or Don Muang Airport in Bangkok, when you arrive. However, we cannot support the finance between the airport and your home. Note that we can support your finance during your stay in Thailand. Furthermore, according to the current aspect in Bangkok, there is a possibility that we change this plan or cancel the IFBC. Please check our homepage for the details (diwpa@ecology.kyoto-u.ac.jp).

Report 1

The Initiative in Supporting freshwater Sustainable Development in Indonesia

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Fig. 1. Group photo at Annual Scientific Meeting MLI 2013

The field of limnology has been evolving with the integration of the ecosystem, which now comprises lakes catchment area, reservoir, rivers and wetlands. As such, all-encompassing studies to understand the structure and the function of inland ecosystem in Indonesia have been encouraged. Also, there is an increasing obligation towards the needs to conceive and to maintain the ecological balance of inland water ecosystem which was subjected to massive pressure in recent times.

The Indonesian Society of Limnology – Masyarakat Limnologi Indonesia (MLI) was recognized as the national organization to carry out strategic role in limnology researches. We conducted Annual Scientific Meeting MLI 2013 as a great moment of scientific gathering and discussion (Figs 1 and 2). The topics raised were lake ecosystem and catchment area, restoration and lake conservation, sustainable management of fisheries, mitigation against lake disaster, social and institutional aspect on lake conservation and the effect of public policies.

Due to the occurrence of natural catastrophes, the ten countries of Association South East Asian Nations (ASEAN) founded The ASEAN Committee on Disaster Management (ACDM) in 2003. Subsequently, The ASEAN Agreement on Disaster Management and Emergency Response (AADMER) was signed by Ministers of Foreign Affairs on 28 July in 2005.

In align with its mission, the Indonesian Society of Limnology – Masyarakat Limnologi Indonesia (MLI), is initiating a discussion forum on lakes between Indonesian and other ASEAN members. This forum will gather the views of many scientific researchers, and is expected to contribute positively to efforts of preserving lakes and responding to freshwater ecosystem disaster. Interesting topics like functional biodiversity for the tropical lakes will be raised. On top of that, it hopes to gather valuable views in the said area, so as to prepare for the World Lake Conference (WLC) to be held in Bali, Indonesia, in November 2016 with the theme: Lake ecosystem health and its resilience: local diversity and the risks of extinction.

Fig. 2. Highly attentive participants at the meeting

Report 2

The activities of the Tadami Beech Center and Tadami Biosphere Reserve

Satoko Kawarasaki
Tadami Beech Center
(Japan)

Tadami Beech Center is a place to begin your visit to Tadami Biosphere Reserve. Here visitors will find information on how to visit the forests and what to see in the forests. Tours guided by our staffs are available for visitors. Tadami Beech Center has been established since 2007 for people to coexist with nature forests. The main aims of the center are 1) to conserve the rich biodiversity and beautiful nature, 2) to research the life and culture of people associated with the natural forests and wildlife, 3) to manage "Museum of Beech and River", 4) to provide a place for learning of nature and culture and 5) to disclose the accumulated knowledge to public. The number of visitors has been increasing over the year, reaching thousands visitors in each year. Here I report the information supplied for our visitors and our various activities to accomplish the aims.

Landscape and Nature

Tadami Town locates on the western end of Fukushima Prefecture and borders on Niigata Prefecture. Many mountains with peaks over 1000 meters, such as Mt. Asakusa-dake, Mt. Aizu Asahi-dake and Mt. Maruyama-dake, surround the town. This region is well known for its heavy snow, reaching approximately 3 m depth in average in winter. The steep mountains and heavy snow periodically cause avalanches, and as a result, bedrocks are frequently exposed (Fig. 1). Vegetation on mountain slopes varies, according to the difference in elevation. At the uppermost part, evergreen conifer, Japanese white pine (*Pinus parviflora* var. *pentaphylla*) trees predominate on the ridges. At the middle part, Japanese dwarf oak (*Quercus mongolica* var. *undulatifolia*) trees make dense bushes on the avalanched slopes. At the lower part, Japanese beech (*Fagus crenata*) trees make winter-deciduous broad-leaved small forests in stable soil sites relatively. These different forests form mosaic vegetation in this area. Moreover, there are vast native beech forests on the northern foot of Mt. Asakusa-dake, the foot of Mt. Aizu Asahi-dake, and Mt. Shionomata, and there are riparian forests consist of Japanese horse chestnut (*Aesculus turbinata*), Japanese wing nut (*Pterocarya rhoifolia*), and several willows (*Salix* spp.) trees along streams and rivers. In herbaceous plants, spring ephemerals, such as *Erythronium japonica* and *Adonis ramosa*, are conspicuous on forest floor in low elevation areas, because they produce beautiful flowers in spring just after snow melting. They bloom along many footpath roads, and their beautiful flowers give a sign that spring has come for the local people living in town with heavy snow (Fig. 2). These plants are thus

Fig. 1. Steep mountains and mosaic vegetation in late autumn. Blackish conifers on the ridge are Japanese white pine and whitish forests in the rear of the middle are dominated by Japanese beech.

Fig. 2. *Adonis ramosa* come into bloom soon after melting snow. We can see spring ephemerals all over Tadami Town.

lovely for many Japanese people.

The topmost predators of the fauna in Tadami area are the mountain hawk-eagle (*Spizaetus nipalensis orientalis*), the golden eagle (*Aquila chrysaetos japonica*) and the Asiatic black bear (*Ursus thibetanus japonicas*). They are big wildlife and their existence will be dependent on rich fauna in natural forests with mosaic vegetation, indicating that a high biodiversity is well maintained. In fact, we can sometimes find small mammals, many birds and rare frogs in the forests.

Tadami Biosphere Reserve

In June 2014, all area of Tadami town and a part of Hinoemata village are added in the World Network of Biosphere Reserves. Because of the accession, the area is called Tadami Biosphere Reserve and Tadami Beech Center acts as the main base of Tadami Biosphere Reserve Project. Biosphere Reserves are in the Man and Biosphere (MAB) program of UNESCO (United Nations Educational, Scientific and Cultural Organization). In 1970s, the threat of sound biosphere, the reduction of biodiversity, the escalation of environment pollution and the destruction of healthy human life became conspicuous in the world, because of the excessive development of natural environments. Therefore, in 1974, this program has been started to maintain and progress well-balanced mutual relationships between human and biosphere. Today, there are 651 biosphere reserves in 120 countries in the world. Out of them, 7 biosphere reserves exist in Japan. As the philosophy of MAB program in UNESCO, we must achieve three following activities: 1) conservation of natural environment and biodiversity, 2) sustainable use of environments and natural resources and local socio-economic development and 3) academic studies and research, education and instruction and personnel training.

Coexistence of society with nature

Mountain forests are still usually used for local people. They enter the mountains to collect edible plants and mushroom. Fiddlehead ferns and brackens are most popular edible plants in the early spring, and mushrooms are most popular food resource in autumn. This area is covered with snow for the half period of a year. They make baskets and other necessities from vine of *Akebia trifoloata* and plant fibers of *Carex dolichostachya* as an indoor work in winter covered with heavy snow. They have been traditionally used wood and charcoal, as the fuel for stoves and cooking. Their life style is well adjusted to surrounding natural environments. Such traditional life can reduce fossil-fuel consumption, serving as a model of low-carbon society.

Understanding and spreading such sustainable use of natural resources are the main target of Biosphere Reserve Project. To keep the traditional life for a long time, we need to make more effort to educate and enhance the global significance of such sustainable life.

Fig. 3. We hold natural observation tours. The staff is explaining about bud form of beech.

Report 2

Activities of Tadami Beech Center as a learning place

In this fiscal year (until March in 2016), we have many plans to conduct seminars and field observation tours for our visitors (Fig. 3 and Table 1). In addition, we hold five special exhibitions related to nature and human life; the titles are 1) Seasonal change of wild avian fauna and their ecological characteristics in Tadami (Fig. 4), 2) Beech forests in Tadami and its ecology and use, 3) The old photos revive something, 4) Biodiversity in Tadami Town and 5) Life history of spring ephemeral herbs. In the past, we have had many special exhibitions; for example 1) The memory of Tagokura hamlet, sunk into the dam, 2) The ecology of Lilium rubellum, a regional endemic endanger species, and 3) Riparian forests: ecology, function, and roll. We have invited forefront researchers as the lecturers of seminars and field tours. We hope to promote more Tadami Biosphere Reserve Project, and to progress understanding of the significance of great nature in Tadami through our activities.

Fig. 4. Special exhibition: Seasonal change of wild avian fauna and their ecological characteristics in Tadami.

Table 1. Education Schedule of Tadami Beech Center in Fiscal Year 2015

	Events	Lecturer, Site and Exhibition
17-Jan-15 ~ 07-Jun-15	Special exhibition: Seasonal change of wild avian fauna and their ecological characteristics in Tadami	Title: Some birds live in Tadami even in winter with heavy snow-cover
02-May-15	Natural Observation Tours: Enjoy spring ephemeral flowers	Site: Kuratani river
02-May-15	Natural Observation Tours: Let's walk a fresh green beech forest with remaining snow	Site: Iyashi-no-mori beech forest
20-Jun-15	Lecture: Formation of Japan archipelago and the geology in Oku-Aizu	Lecturer: Dr. Takahiro Yamamoto (geologist and volcanist)
21-Jun-15	Natural Observation Tours: Let's observe the geology in Tadami	Lecturer: Dr. Takahiro Yamamoto Site: Shionomata
27-Jun-15 ~ 27-Sep-15	Special exhibition: Beech forests in Tadami and its ecology and use	Title: Beech is the most dominant woody plant in Tadami
25-Jul-15	Natural Observation Tours: Let's take photos of Fuzawa hamlet with white lilies	Lecturer: Ms. Kajiko Inomata (photographer) Site: Fuzawa
01-Aug-15	Lecture: How will the forests in snowy regions change under global climate change?	Lecturer: Dr. Toru Nakashizuka (forest dynamics ecologist)
02-Aug-15	Natural Observation Tours: Let's walk summer riparian and beech forests with remaining snow	Lecturer: Dr. Toru Nakashizuka Site: Tadamisawa, a mountain path to Mt. Asakusa-dake
24-Oct-15	Lecture: Ecology and management of an invaded riparian tree, *Robinia pseudoacacia*	Lecturer: Dr. Hitoshi Sakio (riparian vegetation ecologist)
25-Oct-15	Natural Observation Tours: Let's walk along Ina River with observation riparian vegetation	Lecturer: Dr. Hitoshi Sakio Site: Ina River
Oct-15 ~ Dec-15	Special exhibition: The old photos revive something	Title: Remember the events of the era of Showa
Dec-15 ~ Feb-16	Special exhibition: Biodiversity in Tadami	Titel: What is 'biodiversity'? Why is it important?
19-Dec-15	Lecture: The wisdom of use of natural resources before becoming UNESCO Biosphere Reserve and from now	Lecturer: Dr. Hiroyuki Matsuda (mathematical ecologist)
Mar-16 ~ May-16	Special exhibition: Life history of spring ephemeral herbs	Title: In Tadami, a variety of flowers begin to bloom at snow thawing
13-Mar-16	Lecture: Plant life strategy in leaves and flowers and the preservation of endangered plant species	Lecturer: Dr. Izumi Washitani (plant ecologist)
Winter	Natural Observation Tours: Let's walk a winter beech forest with heavy snow	

Report 3

What activities is IPBES promoting now?
- Case of deliverable 3(c) -

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I would like to report what kinds of activities IPBES[1] is now promoting by explaining *IPBES deliverable 3(c) on scenario and models*[2] as a case, which I have been involved in as a lead author. IPBES (Intergovernmental Platform on Biodiversity and Ecosystem Services) was founded in 2012 (1st phase of activities: 2014~2018) after CBD-COP10 in Nagoya adopted the *Aichi biodiversity targets* (2011~2020). The main objective of IPBES is to strengthen the science–policy interface on biodiversity and ecosystem services. It includes scientifically evaluating the current situation and possible changes in biodiversity and ecosystem services from local to global scale and making policy recommendations based on the outcome. Its role is just like IPCC in global warming issue. Its specific activities are aggregated to create *18 deliverables* (scientific evaluation reports) classified to four categories of objectives. One of them is the *deliverable 3(c): policy support tools and methodologies for scenario analysis and modeling of biodiversity and ecosystem services.* In the following, I report my experience as a lead author of this deliverable from its start to goal.

1) From the public offering period to the 1st author meeting: February ~ September 2014

Deliverable 3(c) is one of the earliest starter of the 18 deliverables and is scheduled to complete its mission in two years (fast track assessment: 2014~2016). The mission is to overview the current situation of models and scenarios and facilitate their use and development as common and basic tools for policy-science interface. As I am a mathematical ecologist and have been interested in ecosystem and biodiversity management, I was interested in this deliverable and applied for the public offering in Japan. After public offering of lead authors and review editors in February 2014, I received an email in June from the IPBES secretary that I could be a member of about 80 experts. Then in August, two co-chairs of deliverable 3(c), Dr. Simon Ferrier and Dr. Karachepone Ninan informed us the chapter configuration draft and the list of chapter lead authors (CLA), lead authors (LA) and review editors (RE) of eight chapters[3]. At this time, I knew the specific contents of the deliverable and began to understand what activities we are going to do. I found I was involved in chapter 8 team. As to the nationality, CLAs, LAs and REs of Chapter 8 team consists of eleven experts: three from Europe (Portugal, France, Britain), one from Africa (Senegal), three from Asia (Turkey, Japan), three from Central and South America (Mexico, Argentina) and one from Australia. I knew none of them personally except Dr. Akira Mori from Japan. Soon after that, by the initiatives of two CLAs of our chapter, Dr. Reşit Akçakaya and Dr. Henrique Pereira, we began to discuss by email and had skype meeting to prepare 0th order draft for the 1st author meeting in Netherlands. At this stage, CLAs seemed to have rough vision of the goal and the process to be taken but most of the LAs including me, I suppose, still did not have the overall picture nor clear image of our own roles in each responsible chapter. In my case, I did not have clear image of what kind of content I would be responsible for and had been in uneasy feeling till the 1st meeting.

2) 1st author meeting in Netherlands: 27-31 October 2014

The 1st lead author meeting was a nice opportunity and held in a good atmosphere! Almost all the CLAs and LAs gathered and identified each other who are who! There, we were warmly welcomed by nice secretaries (Rob Alkemade, Thelma van den Brink, Tanya Lazarova, and Eefje den Belder) of *TSU* (Technical Support Unit: hosted by PBL Netherlands

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Fig. 1. Group photo at the 2nd author meeting in Ushuaia, Argentina: 9-13 March 2015 (by courtesy of Mr. Grygoriy Kolomytsev and TSU)

Environmental Assessment Agency) and found that wide range of deliverable 3(c) activities had been supported and facilitated by them. They have been closely working together with the two co-chairs and help us in many ways. We spent five days by being canned in a comfortable hotel in a small resort town near the beach with refreshing air.

On the opening plenary session of the first day, we understood that the eight chapters of the deliverable 3(c) were organized according to the conceptual framework of IPBES and they are designed closely linked and interact. Then altering discussion of each chapter group in a small room (chapter breakout session) and plenary meeting in a hall continued till the last day of the meeting. With the clear policy of two co-chairs and cautious lead of CLAs, we struggled to decide the configuration of each chapter, own responsibility parts (section) to write as well as achieve entire unity of the deliverable.

3) From 1st draft writing to 1st review period: November 2014 ~ February 2015

After the meeting in Netherlands, we began to write each responsible part of each chapter for about a month then the two CLAs prepared the whole chapter. Each chapter of the manuscript was then aggregated to the 1st draft and was subjected to peer review of the reviewers. Although each part responsible for a lead author is not so long, the writing period is short and strictly determined; we were sometimes disturbed and felt stressed by the overlap with the peak of domestic works, such as academic affairs. The comments from reviewers arrived just before the 2nd author meeting in Argentina.

4) 2nd author meeting in Argentina: 9-13 March 2015

The 2nd author meeting was a joint meeting with the review editors (RE) held in Tierra del Fuego, Argentina (Fig. 1). It was an extremely long journey from Japan to Fuego island, but the scenery was splendid and the hospitality of Argentina colleagues was very warm and comfortable, which I will never forget (Fig. 2)! There, as in the 1st meeting in Netherlands, we repeated the plenary and chapter breakout sessions to revise the 1st draft according to the reviewers' comments. This time, cross-chapter sessions to discuss cross-cutting themes for the whole coordination were added and the REs joined and advised us toward the right direction. We soon found that cross chapter coordination seemed to take time because the styles, definitions of key words such as models, scenario, stakeholders were not yet fully unified till then and the progress of the chapters were not the same.

5) From 2nd draft revision to the IPBES 4th Plenary meeting (goal): March 2015 ~ February 2016

After coming back from the 2nd meeting, we soon began to work on revising the draft. This time, it was very hard for me because the late March is the end of 2014 fiscal year in Japan and the annual meetings of ecology-related societies were held in Japan. The deadline of the chapter revision and the peak of other works of mine overlapped in many layers. Anyway, as almost in the same process of the earlier revision, each chapter draft was finally integrated to 2nd draft and all the replies to reviewers' comments were sent back in May for the second review of the draft.

Since then, three months have passed, and I am writing this DIWPA report in middle August. 3rd author meeting after the second review in Beijing was over in late July. This meeting was the last meeting for the deliverable 3(c) and only the CLAs of eight chapters and the REs joined for discussing the final draft policy. We received the summary of the 3rd meeting, the comments from the reviewers and the revision policy from the co-chairs. We are now working on the revision toward the final draft to be finished by 6th November. The goal of the deliverable 3(c) is the approval of the final draft at the IPBES 4th meeting in February 2016. Then the deliverable 3(c) report is to be published on the net and printed as a book. Till then, our activities continue for several more months.

Fig. 2. Ushuaia is regarded as the southernmost city in the world. The Beagle Channel which Charles Darwin passed through during the famous *voyage of the Beagle* is very near.

So far, I introduced an example of IPBES activities according to the deliverable 3(c) case from my experience. It is true, its activity was sometimes hard and uneasy, but at the same time it gave us a valuable experience to broaden the way of thinking which we cannot obtain other than IPBES. As for me, it was very impressive to experience and feel with reality that many colleagues from different regions (Asia, Europe, Africa, America, and Australia) with different cultures can work collaboratively for the same purpose. In fact, I was helped by the colleagues many times in many ways! The activities of deliverable 3(c) will soon finish, however, the main IPBES activities including regional to global assessments of Asia and Pacific regions have just started or are just beginning! I wish many colleagues of DIWPA, especially young researchers are interested in IPBES activities and join to promote with us!

References

1) http://ipbes.net/index.php
2) http://ipbes.net/index.php/3-c-scenarios-and-modelling
3) http://ipbes.net/index.php/40-work-programme/experts/526-deliverable-3c

New Site 1

Role of mangroves in Japan yet to be explored (Important yet ignored!)

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The interface between sea and land is not much hospitable for the growth and survival of terrestrial plants. On the other hand, mangroves have developed the adaptive features to survive in such harsh borderline. As a result, they are the most productive forests. With the exceptional adaptive features, they are considered as one of the most important and remarkable ecosystems which provide considerable services to human societies.

Dr. Miyawaki is one of the pioneers who studied mangroves in Japan. His work in 1986 revealed few (only five) mangrove forest spots were found in Okinawa's main island (Fig. 1).

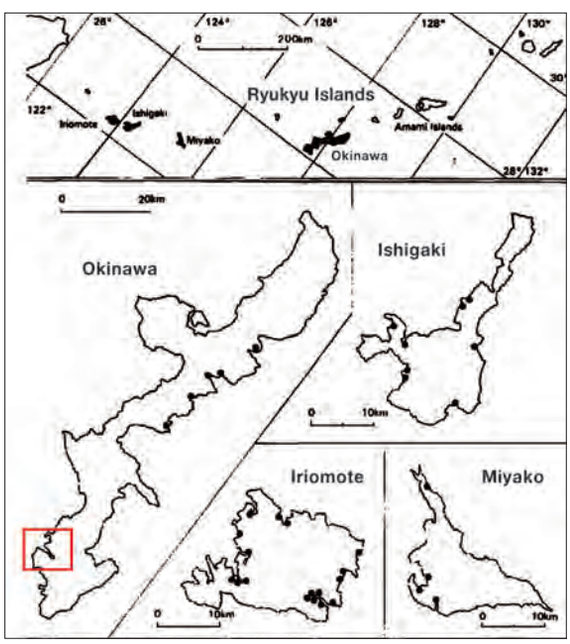


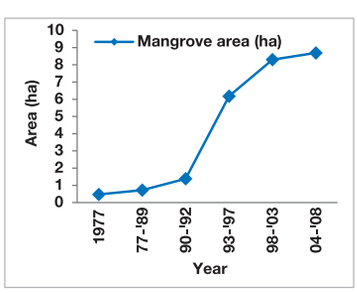
Fig. 1. Principal locations of mangroves in the Ryukyu Islands, Southern Japan as shown in 1986 (Miyawaki, 1986) [Red box shows area around Naha]

Fig. 2. Aerial views of Manko wetland in different times

With the progress of time several other patches of mangroves developed in the southern part of Okinawa's main island especially in Naha, Sashiki and Gushikawa areas. According to a statistics of Ministry of the Environmenta, Government of Japan, the development of mangrove areas in the Manko Wetland in Naha is as follows (Fig. 2 and Table 1):

Table 1. Historical development of mangroves in Manko Wetland

Year	Mangrove area (ha)
1977	0.47
1977-1989	0.72
1990-1992	1.38
1993-1997	6.18
1998-2003	8.30
2004-2008	8.69



New Site 1

The graph shows that mangroves developed very slowly at the beginning and spreaded rapidly from 1990 onwards. However, due to spatial constraint and suitable soil edaphic conditions for establishment of mangroves, the increment rate seems to reach a plateau by 2008.

Nontheless, the new mangrove patches in Naha developed at the Manko Wetland (26º11'N and 127°40' E), Okinawa's main island, Japan, offered us an opportunity to initiate some mangrove related research works which would be fundamental to understand the ecology and function of mangroves from the initial development stage. The Manko Wetland area covered 58 ha area extending from the upstream between the bridge of Manda-banshi and Ishihiya-banshi to the end at the downstream at the Naha-Ohashi bridge. It is a brackish tidal flat, covering an extensive area at low tide. The Manko tidal flats are an important transit point for shorebirds whose migration route brings them along the Nansei Islands. The tidal flat is registered by Japan's Ministry of the Environment, as one of the 12 important shorebirds visiting sites nationwide. Owing to its importance, it was registered as Ramsar Convention site in 1999. The total area of the mangroves within the wetland is around 10 ha. Beside the Manko Waterbird & Wetland Center, the biggest portion of this wetland is dominated by *Kandelia obovata* Sheue, Liu and Yong. Available literature supports that *K. obovata* is the pioneer species in this mangrove succession. However other species have also started appearing as a fate of succession and they were found to grow in patches instead of growing in scattered form. Nowadays, four mangrove species *Kandelia obovata*, *Rhizophora stylosa* Griff., *Bruguiera gymnorrhiza* (L.) Lamk. and *Excoecaria agallocha* L. are availablein the wetland, but only monospecific *K. obovata* stand

Fig.4. Dr. Hagihara with his team members in different time filed data collection

Fig. 5. Dense closed canopy forest from land side part before clearing

has a homogenous canopy. *Rhizophora stylosa* patches dominated on the north-eastern bank of the Kokuba river. During a recent visit to Okinawa it was observed that the part where *Excoecaria agallocha* was available is completely deforested probably due to an intention of exposing mud flat to flying birds and to get rid of huge wastes anchored through the mangrove vegetation throughout the period of mangrove succession.

Since 1998, a group of researchers started Plant Ecology related research under the kind initiative of Dr. Akio Hagihara (currently retired), Faculty of Science in the University of the Ryukyus, Okinawa (Fig.4). Once his disciples we are still continuing with the research work as we would like to see the ecological processes in mangroves, their fate and finally the relation of these ecosystems with the society. Our research started with the self-thinning process investigation in mono-specific stand. Following which, we have gradually investigated the above and belowground carbon storage of Mangrove *Kandelia ovobata*, night-time aboveground respiration behavior of the same plant, and long-term phenological behavior of three major tree species growing in this mangrove forest. Currently we are now investigating the role of these mangroves towards the society.

To study the self-thinning process and long term litterfall pattern a 125 m long belt-transect (5 m wide) was established in the *K. obovata* forest, whose canopy has been completely closed (Fig. 5), perpendicularly to river current and divided into 25 subplots (5 x 5 m^2). Trees within a subplot were uniform in age. All individuals in the subplots were numbered. Tree height

New Site 1

H (m) and stem diameter at H/10 $D_{0.1H}$ (cm) were measured in different years. These data were arranged by subplot. Aboveground phytomass w_T (kg) was estimated using the allometric relationship established by the same research group obtained earlier. The self-thinning exponent was found to be 1.46 (Analuddin *et al*. 2008). The same plot was kept for the long term phonological behavior study of *K. obovata*.

Among many other objectives, two of them were to confirm the size dependence of respiration in mangroves, i.e. the power-functional relationship between respiration and mass of *K. obovata* under field conditions, and to examine the monthly change in the exponent of the power-functional relationship throughout a year, i.e. investigate the seasonal variation of the exponent. Based on the size class distribution of *K. obovata* trees in this mangrove forest six *K. obovata* sample trees were selected to represent the tree size class distribution for the measurement of night-time aboveground respiration from the stand, whose canopy is completely closed. The respiration was non-destructively measured monthly throughout a year (from May 2007 to April 2008) with a modified enclosed standing tree method (Fig. 6). CO_2 increment and the temperature inside the chamber were measured using an infrared gas analyser (Carbon Dioxide Probe GMP343) that was installed inside the chamber. At the end of the study year, 13 sample trees (including 6 trees whose respiration were measured) representing different size classes available in the whole Manko Wetland were harvested to measure the individual aboveground mass m (kg dry weight [dw]) per tree. The resultant allometric relationship was given as

Fig. 6. Aboveground night-time respiration measurement works using closed chamber

m=0.0341 $(D^2_{0.1H}H)^{1.03}$. Aboveground night-time respiration rate (r) of mangrove *K. obovata* increased with increasing mass (m). This tendency was described by means of the power function $r = fm^h$, where f is the multiplying coefficient and h is the scaling exponent. The exponent values ranged from 0.723 to 1.085. In the cool winter (dormant season), the exponent h was close to 1.0, while in the warm summer (growing season) the exponent was closer to 3/4. Respiration varied more between seasons in small-sized trees than in large-sized trees. The relative increase in respiration from the winter dormant season to the summer growing season was large in the small-sized trees compared with that in the large-sized trees. The variation in respiration between the two seasons was explained on the basis of theories about resource harvesting and transport. Separatiing summer respiration into growth and maintenance components is suggested to better understand the dependence of respiration on size and temperature.

During 2008 authorities Manko Waterbird & Wetland Center found that the number of flying birds in Manko Wetland is reducing gradually and the mangrove area is increasing every year (Ministry of the Environment, Government of Japan).

Considering mangrove area extension as a factor of the reduction in the number of flying birds, the Ministry of the Environment has taken a mangrove cutting program over 50 m x 50 m area, so that they can monitor the impact of mangrove area on bird. This cutting program created an opportunity to investigate the above and belowground carbon acquisition of *K. obovata* stand in this wetland. Within the selected area (2500 m^2) chosen by the Ministry of the Environment, 1700 m^2 pure *K. obovata* closed canopy stand was marked. The stand was subjected to self-thinning. The area was divided into 68 uniform plots of 5 m x 5 m each. The tree density, stand age, mean tree height and mean $D_{0.1H}$ were 13588 ha^{-1}, 14 yr, 4.18 m and 6.13 cm, respectively. Five sample plants were selected to measure the aboveground and belowground mass separately which were then used to estimate belowground carbon acquisition following the relationship between aboveground and belowground mass. Aboveground carbon was calculated as 48.47 Mg C ha^{-1}; belowground carbon was calculated as 22.70 Mg C ha^{-1} and the mean T/R ratio was found

as 1.87. Based on the study we concluded that carbon acquisition potential of mangrove *K. obovata* is higher than many other terrestrial tree species.

Our phenological study showed that peaks of leaf recruitment and death occurred in July and June, respectively, for *B. gymnorrhiza* and *K. obovata* but both occurred in July for *R. stylosa.* Leaf recruitment for all the species was lowest in January; leaf death was minimum in December for *R. stylosa* and *B. gymnorrhiza*, and in January for *K. obovata*. Leaf recruitment for the three species was found to be related to monthly mean air temperature and monthly hours of sunshine. The leaf death of *K. obovata* and *R. stylosa* was correlated with monthly mean air temperature, monthly hours of sunshine, monthly mean air vapor pressure deficit, and monthly rainfall; *B. gymnorrhiza* leaf death was not correlated with any environmental factors. Specific leaf area was found for each species; 45.4 ± 1.0 cm^2 g^{-1} for *R. stylosa,* 48.6 ± 0.8 cm^2 g^{-1} for *K. obovata* and 71.0 ± 2.8 cm^2 g^{-1} for *B. gymnorrhiza*. Mean leaf longevity was found to be 13.9 months for *R. stylosa*, 17.2 months for *B. gymnorrhiza* and 12.1 months for *K. obovata*. *B. gymnorrhiza* was found to be shade-tolerant and *K. obovata* was found to be light demanded according to our observation. Besides, *K. obovata* is seen to have different growth form such as some of the *K. obovata* in soft and muddy part of the wetland formed were very dwarf and bushy to support its survival and growth. Besides that, forming small crown perhaps could be another strategy of this tree to avoid strong wind. However, mean leaf longevity was increased with increasing mean annual air temperature.

We have studied the litterfall events for all three major species in this wetland area over 3 years. All three species showed the highest litterfall of leaves and stipules in summer and the lowest litterfall in winter. Litterfall of flowers and fruits peaked in July for *R. stylosa*, and in August and again in October–November for *K. obovata*. Litterfall of flower buds, flowers, and propagules occurred throughout the year for *B. gymnorrhiza*, but was highest in summer. Litterfall of propagules was highest in September and May for *R. stylosa* and *K. obovata*, respectively. The conversion rate of flowers to propagules was 2.3% in *R. stylosa*, 5.9% in *K. obovata* and 10.3% in *B. gymnorrhiza*. Total annual litterfall in *R. stylosa* was significantly different from *K. obovata* and *B. gymnorrhiza*; however, the latter two species showed no significant differences. Leaves contributed the most to the total litterfall of all three species, and represented 58.4, 54.0 and 50.4% of the total litterfall for *R. stylosa*, *K. obovata* and *B. gymnorrhiza*, respectively. Except for branches and flower bud primordia, all other components of litterfall had clear annual cycles for all three species. *Rhizophora stylosa* and *K. obovata* showed a negative correlation between leaf production and reproductive organ production, but *B. gymnorrhiza* tended to increase leaf production with increasing reproductive organ production.

Socio-economic aspects and ecosystem service issues

Mangrove ecosystems are restricted to tropical and subtropical coastlines. Usually their existence is limited to a steep environmental gradient between inland and marine system which offers very unique and selective environment. As a result they are special morphological, physiological and behavioral adaptations. In Japan, mangroves are at the northern limit of their distribution in the Indo-Pacific region. Unlike other developing nations the functions and services of mangroves towards the society need to

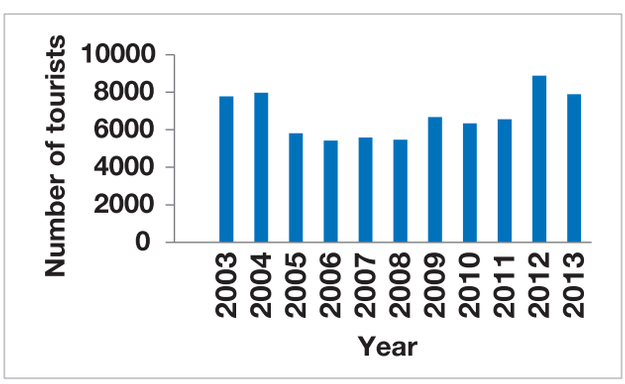


Fig. 7. The numbers of tourists used the facility of Manko Wetland Center

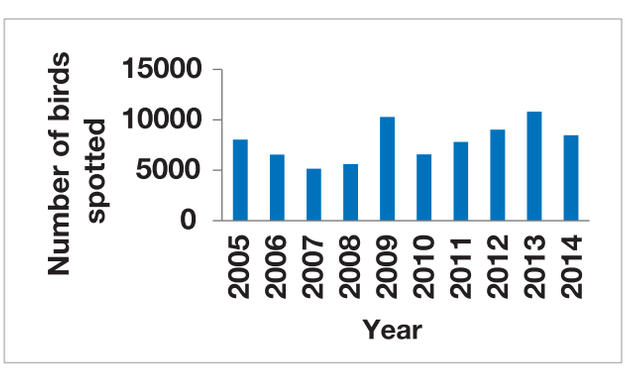


Fig. 8. The numbers of birds spotted in different years

be explored in different point of view. Here in Japan, the protection of shorelines or coastal areas is not a major concern as they are in almost all part of their existence. Researchers have never put emphasis on the social and economic benefits from these forests but the attraction of tourists to the mangroves in the Ryukyu Islands which form an unusual landscape was greatly acknowledged for some specific areas (Fig. 7). To sustain fishery practices as a source of food for local people was also remarkable. At the same time the educational value of ecological studies which may help to improve the productivity of this type of forest were emphasized when scientists called for their conservation. We believe that diversified ecological and socio-economic benefits of mangroves in Japan are yet to be explored. The following information from newly formed mangrove patches or areas where mangroves are associated could form a preliminary study for future potential of mangrove study and existence in Japan:

Despite its potential importance studies on mangroves have got little attention. In some cases they are under threat due to ignorance or wrong information. In some part of Manko wetland mangroves have been reduced to expose mud flat for the wetland migratory birds, but the trends of last ten years hardly support the increase in bird population after clearing the forest area (Fig. 8). Instead other factors like increased traffic load on the bridges and other anthropogenic stresses need to be considered in the next intensive research. Sometimes, mangroves of Manko wetlands are blamed for accumulating house waste materials especially plastics, scrapped electricals and household products. But the responsible agents behind such wastes should not be pointed to be on mangrove rather it is the lack of awareness of the local residents. In Japan, there are some reports and incidents to harness/cut mangrove forests for construction materials and firewood (mainly in the past). Activities like building river-bank levees, road construction, and reclamation for urban and industrial areas were main factors for mangrove destruction in Japan. We hope the mangroves in Manko wetland will be considered as an important part of the ecosystem which in practical gives shelter to the birds to hide from the huge traffic disturbances on the bridges and roadways. In our recent visit we noticed that the exposed mudflat did not have birds instead birds preferred to find their food and shelter hiding beside the remnant mangrove patches. So, we hope for the initiation of an intensive research on the coexistence of mangroves and shore-birds will be initiated with the proper support of the Government.

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New Site 2

Two Rainbow Fushes From Lake Sentani and Lake Ayamaru, Papua, Indonesia

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Fig.1. Lake Sentani
©Kiko Turteliny

Fig. 2. Malr of *Glossolepis incisus* (red rainbow fishes)
©Hectonichus

375 freshwater fishes inhabit in Papua island in Indonesia, forming a very fascinating and highly unique community (Allen *et al.*, 2000). Out of which, rainbow fishes are one of ornamental freshwater fishes that live there. These fishes are a schooling species that live in clear and shallow waters among aquatic vegetation, such as Lake Sentani and Lake Ayamaru.

Lake Sentani (2.61°S 140.56°E) (Fig. 1), located in Jayapura District of Papua, has the a surface area of 9630 ha, and its a maximum depth is approximately 50 m. One of the endemic spesies of the ornamental fishes, *Glossolepis incisus* (red rainbow fishes), is an elongated, laterally compressed fish that develops an arched back with age. This fish species has two a pair of dorsal fins, with its second is fin longer than the its first one. The caudal fin is forked. The head is as small as its mouth. Males are of bright red to copper in color, occasionally have with silver upper parts (Fig. 2). Its fins are also red. Females are of silver to yellow-brown in color. Although this omnivorous fish can grow to a maximum size of 15 cm, it is rare to encounter fishes of this size in nature.

Lake Ayamaru (1°16′S 132°12′E), located in Maybrat District of West Papua, is the habitat origin of another endemic species: *Melanotaenia boesemani* (Fig. 3). It is a karst lake of maximum depth of 6m. Its surface area is about 924 ha in the dry seasons, of which, 27% is occupied by aquatic plant *nymphaea* (KLH, 2012). Its water temperature ranges from 24 to 31 °C and the its pH ranges from 7.7 to 8.9. *M. boesemani* can also be found in small streams near lake, especially smaller tributaries. *M. boesemani* males are blue green in color from their head to the upper part of the its body, while its lower parts are found to be in gold silver color. Females are silver to grey in color.

Both Lake Sentani and Lake Ayamaru are suited for rainbow fishes to thrive in. At the same time, these two lakes are heavily utilized by the communities living around the lake for their daily commuting, fisheries, and source of food and water. As a result of these anthropogenic activities, the existence of fishes is under threat; the rainbow fish *Glossolepis incisus* has been listed in the IUCN Redlist as fish species with vulnerable status. Based on various reports, the number of endemic or native species found in the lakes began to decrease and the number ofexotic species (fish introduction) is increasing. Predation, competition for food and habitat between the exotic species and

New Site 2

native species, and intensive fishing effort may cause a decrease of in native fish populations. Beside, the coupling effect of pollution from domestic activities as well as settlements (deforestation) results in reduced forest cover, reduced water catchment area and poorer water quality.

In August 2014, to solve the problem of declining population, about 600 captive-bred individus were released into Lake ayamaru by the Ministry of Environment, Republic of Indonesia, Indonesian Institute of Sciences, and Ministry of Marine & Fisheries, together with the locals, just to show that protection of the endemic species is an important issue on top of preserving the lakes itself.

Fig. 3. *Melanotaenia boesemani* ©Rufus46

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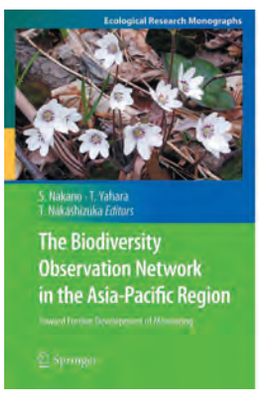
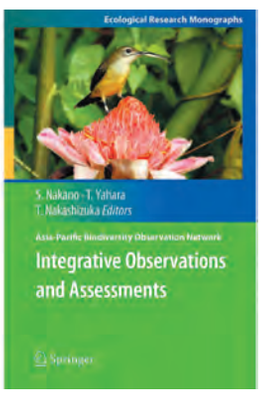
AP-BON (Asia-Pacific Biodiversity Observation Network) Book3 will be published in fiscal year 2015. Till present, we have published two volumes of the book series “The Biodiversity Observation Network in Asia-Pacific Region”: “Toward Further Development of Monitoring” and “Integrative Observations and Assessments”. In the previous two books, we have mainly introduced the status quo of biodiversity monitoring in Asia, together with advanced concept/methods for biodiversity and ecosystem service. In the third volume, most of the papers involved are the one presented at “International Workshop on Freshwater Biodiversity Conservation in Asia” in Kyushu University, Japan, held in 2012.

In November 2012, we held the workshop to discuss about the ways to identify biodiversity hotspots, appropriate methods to identify the drivers on biodiversity loss of particular freshwater systems and data sharing among Asian countries. Some of the speakers at the workshop kindly contributed their papers to the Book3. In addition, we have also invited the submission of papers on a marine system and ecosystem service/ socio-economic aspects with special reference to biodiversity, because of its analogy to freshwater ecosystems. For those contributions will be of importance towards effective conservation and sustainable use of aquatic biodiversity in this region.

The Book3, together with our previous books, introduces the status quo of Asian biodiversity into the biodiversity researches which is lacking in the information of developing countries. In addition, we included contributions, provided reviews on advances in concept and method of biodiversity observation, and linked the challenges to study spatial variability of biodiversity and ecosystems by monitoring various ecosystems in the Asia-Pacific region. We hope the Book3 would be informative for all the stakeholders interested in biodiversity issues: researchers, policy (decision) makers, NPO, NGO, and industries related to environmental issues.





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