DIWPA News Letter

No.27

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

DIWPA is promoting a network among researchers related to biodiversity

Message from the Chairperson

Yoshitaka Tsubaki

It is my pleasure to thank all contributing authors to this issue of DIWPA News Letter. I also thank the organizers and participants of the highly successful 2012 International Field Biology Course (see activity reports on page 2-4). This Field Biology Course was supported by the Center for Ecological Research (CER) that was successfully funded from Kyoto University for noticeable activities. I thank CER for regarding our activities as one of important contributions to CER's achievement.

We are now gradually expanding our activities: we report in this issue the inclusion of a new site of Malaysian forests, participation of Gordon Research Conferences, and tightening our connection to AsiaFlux network. For our future success, we will keep up and make further contributions to DIWPA activities.

Photo 1. Discussions by IFBC participants prior to the stream monitoring. Only English was allowed to use for their communications. They conducted very serious discussions on their collaboration to have win-win results among them.

Photo 2. IFBC participants determined a stream flow rate. To collect the information about environmental variables, they needed to collaborate with other participants during IFBC. We had nice weather, clear stream water, beautiful mountains and excellent foods during IFBC.

Message from the Secretary General

Shin-ichi Nakano

I am very much pleased to let you know we successfully organized and conducted DIWPA International Field Biology Course (IFBC) from 17 to 24 August 2012 at Kiso Biological Station, Kyoto University. IFBC was jointly organized with the workshop "Summer program for young ecologists: long-term monitoring in Kiso River" (organized by Prof. Noboru Okuda) which is one of the workshops sponsored by the Joint Usage / Research Center, Center for Ecological Research, Kyoto University. We made a call-for-applicants on IFBC between mid March and the end of May 2012, had many IFBC applicants and finally identified two winners after our careful examination. The two winners were Ms.Wong Yun Yun (INTI International College Penang, Malaysia) and Mr. Nguyen Duc The (Institute of Marine Environment and Resources, Vietnam). In IFBC, those two winners worked very hard from early morning to around mid-night, conducted short-term research with beautiful results and gave nice talks at the end of the course. I am very much impressed that they were quite excellent, openhearted and friendly, interacting very well with Japanese students. Japanese students also enjoyed the opportunity very much, becoming familiar with English conversation. It is a big success! Please take a look at other articles of the current newsletter, and you will find articles written by the two winners. I am sure you can enjoy them and share the feeling of our success in IFBC.

Special Report International Field Biology Course in Kiso, Japan

A Journey with DIWPA: Entering the freshwater science world in Japan

Wong Yun Yun

INTI International College Penang
(Malaysia)

On 16th August 2012, I stepped on the land of the rising sun for second time. My first visit was back to year 2010, when I was attending the NaGISA Western Pacific Marine Biodiversity Conference at Nagoya University (the full story was published in DIWPA News Letter No. 24). This time, I had a very different feeling, not only caused by the hot sun of summer days, but more significantly by the intention of making this trip. I was selected as one of the participants of the DIWPA International Field Biology Course, which held at Kiso County, Nagano, Japan from 17th to 24th August. It was my first training course in foreign country and the learning topic - limnology was new to me. I was excited and a bit nervous to face the upcoming challenges in this research based training course.

My worry had gone away when I met the Secretary General of DIWPA, Prof. Shin-ichi Nakano. He is very friendly and gave us (there was another participant from Vietnam) a warm welcome at the Center for Ecological Research (CER) of Kyoto University. He introduced about CER and showed us around the center. I was amazed by the strong research environment and remarkable academic development at CER. How wish I could be one of the students working at CER!

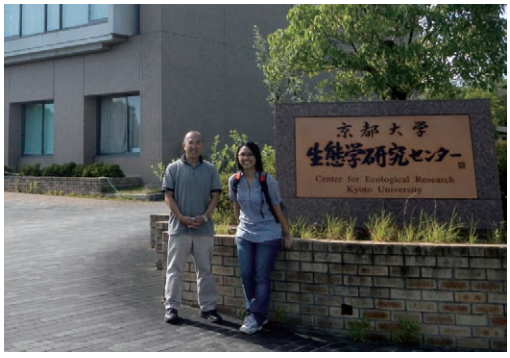

Photo 1. Prof. Shin-ichi Nakano and I were posing in front of the Center for Ecological Research, Kyoto University

The next day, we departed from Otsu city to the Kiso Biological Station and the traveling took approximately four hours. It was in the afternoon when we arrived at the station, which is a modern Japanese style building in the greenery countryside of Kiso town. All participants and instructors were gathered at the station for the briefing of this course. There were ten of us, included three instructors from CER (Prof. Nakano, Prof. Okuda and Prof. Tayasu), one research assistant (Ms. Murakami) and participants from Japan (Ms. Matsuda, Mr. Yuma and Mr. Honda), South Korea (Mr. Kim), Vietnam (Mr. The) and Malaysia (myself).

In the first two days, we had intensive learning programme both in the field and in the laboratory. Under the guidance, we learnt the basic monitoring survey along the study site at Kurokawa River and Akashio Stream. We carried out physical measurements on the environmental variables, sampling of epillithic algae and collecting of zoobenthos from different habitats (riffle, pool and riffle &pool). The collected samples were further processed in the laboratory for physical data analysis, algal biomass calculation and zoobenthos classification.

In the next four days, all the participants focused on the individual short-term research. We first made our own research plans based on the environmental conditions at the research area as well as the equipments available at the biological station. With the advices from instructors, everyone was able to produce a research proposal in a short period of time. Before started, the proposals were presented and discussed among the instructors and participants to improve the details of research. I planned

Special Report

International Field Biology Course in Kiso, Japan

Photo 2. Working in the field – Akashio Stream

Photo 3. Working in the laboratory

to study the effect of light availability on the abundance of grazer type aquatic insects at Kurokawa River. Other suggested proposals included studies of flowing organic matters, water current pattern, micro-distribution of aquatic insects and influence of water current on their abundance. During the presentation, I was very impressed by the interesting ideas provided by other participants.

The coming three days were filled with a series of research work. We worked very hard to complete the field sampling, laboratory analysis and data preparation within three days. I spent half day in the field to collect zoobenthos specimens and more than one day to observe and identify the aquatic insects. The rest of time was dealing with data analysis. Eventually, we completed our short term studies and ready to present the results by end of the days. During the presentation session, we had a good time of sharing and discussing the work together. Some of the studies worth further exploration and they had generated a lot of ideas among us.

The training programme was ended with a barbecue party in front of the station. We enjoyed the dinner and we filled the night with laughter and beautiful fireworks. Personally, the course was tougher than expected but I have to admit that I gained a lot of precious skills and knowledge. I am grateful to be invited by DIWPA and very thankful to the guidance and assistances given by the instructors and friends. There are a lot more wonderful things in this journey that I have not shared in this article, such as the presentation of my project in Malaysia - "Nature Classroom – Forest, Water & Us". Hopefully, I would have the chance to share some of these non-scientific but interesting experiences with you in the next issue of DIWPA News Letter.

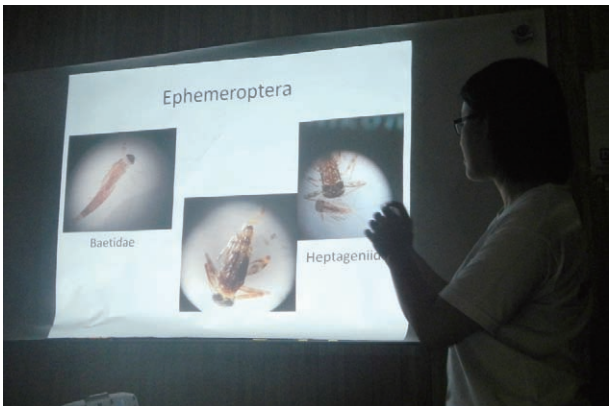

Photo 4. Oral presentation on the results of my research study at Kurokawa River

Photo 5. Group photo in front of Kiso Biological Station

Special Report International Field Biology Course in Kiso, Japan

The feel of myself for biodiversity training course in streams Kiso, Japan

Nguyen Duc The

Department of Marine Conservation and Biodiversity, Institute of Marine Environment and Resources (Vietnam)

I am one of the foreign participants in the biodiversity training course at the Center for Ecological Research, Kyoto University, Japan-in August 2012. After coming back to Vietnam from Japan, I am still very excited about the environment, culture and people at Kiso biological station, the informative course and the kindly Japanese supervisors.

The trip to Japan is the first time I go oversea, so everything seem to be scared, strange and dangerous for me at first. But when I arrived to the Kiso biological station in Kiso town, Nagano Prefecture, I really enjoyed the life and environment, even though it is really different to my hometown. The people here have a high standard life condition with fresh air and well protected natural environment. At the Kiso biological station, every morning I can see many beautiful flowers that I have never seen before. I can find many species of reptiles and amphibians which live freely in the grass nearby my department. I was surprised by the forest around the Kiso station, close to the residential areas but still in very good condition with high diversity of invertebrates. It is very different compared to Vietnam, where almost all forests are located in remote areas. When we surveyed the biodiversity of invertebrates in Kuro-kawa and Akashio-sawa, 10 km from our station, I was one more time surprised by the beauty of its natural landscape. This area is very suitable for the training in biology and ecology.

Within 10 working days of learning at DIWPA International Field Biology Course - Kiso River, Japan, August 17-24, 2012 along with three professors at the Center for Ecological Research, Kyoto University, I learned a lot of knowledge related to aquatic biological research. At that time, I and other participants have been instructed how to measure and calculate the chemical factors, physical factors of stream, methods to collect benthic samples, and especially methods to classify insects.

During the short-term training course at DIWPA International Field Biology Course, I have been required to conduct a small study about the relationships between the current factor of stream and the distribution and abundance of insect family (Ephemerellidae). I have found out that unlike the lentic ecosystems (standing water), the organisms in streams must adapt to lotic or moving water conditions. They may be simply smaller to slip between the rocks, change their shape or reduce surface friction.

One more time I would like to thank all Japanese friends and teachers for their kindly supports.

Photo 1. The participants learn method measuring chemical factors of stream

Photo 2. The participants learn method collection benthic sampling in the stream

Report

July 8-13, 2012

ASLO Lake Biwa meeting ended in success!

Aya Murakami

Center for Ecological Research, Kyoto University
(Japan)

Association for the Sciences of Limnology and Oceanography (ASLO) held its summer aquatic sciences meeting from the 8th to 13th of July this year near Lake Biwa, Shiga, Japan. Despite the issues related to Fukushima Daiichi nuclear disaster, we were fortunate to welcome a large crowd of foreign researchers very close to Center for Ecological Research (Kyoto University, Japan), our research institute. It was rather a nice change to be able to attend and commute to such a big international conference by bicycle :)

I was involved in this summer meeting as a grad student (presenting a poster) but also as a volunteer for ASLO Student Board to help organize various student activities held throughout the meeting. Though the organization of such activities was often hectic and problematic, luckily they all ended in success. I personally felt that two of the most successful events were the student mixer held at the venue (see pictures) and the casual student dine-out. In the former, the idea was for the students to get some opportunities to network. So, we provided snacks and a glass of free drink per person one evening and students were encouraged to meet senior researchers as well as other students from all over the world. In the latter, we wanted students to get the chance to mingle with each other while experiencing some Japanese culture. For this event, we took participants to a central location for dining and randomly grouped up for them to have some fun over dinner. As after dinner activities, we provided two options: Japanese-style Karaoke and enjoying the beach of Lake Biwa. I was organizing the former and we all could have an excellent time getting to know each other while enjoying the Japanese culture.

As for the research part of the conference, I personally gained a lot by networking. I was very fortunate to meet and get to know a few researchers who I could possibly collaborate in the near future. I could also see a few people I have met in my MSc. Time and being able to catch up with familiar faces was a bonus.

Overall, I enjoyed the conference and believe that most of the participants did so too. I would like to encourage more Asian students to join such a large international conference held in Asia.

Photo 1. Students and senior researchers enjoying their time at the student mixer

Photo 2. With ASLO Student Board members

Network

AsiaFlux network: "Bridging ecosystem science to services and stewardship"

Minaco Adachi[1], Sawako Tanaka[1], Takahisa Maeda[2], Nobuko Saigusa[1]

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[2]Research Institute for Environmental Management Technology, National Institute of Advanced Industrial Science and Technology (Japan)

AsiaFlux, established in 1999, is one of the regional research networks of FLUXNET (e.g., AmeriFlux) aiming at integrating worldwide CO_2, water, and energy flux measurements in various terrestrial ecosystems (website: http://asiaflux.net/). Since global warming is one of the most serious environmental issues, our major task is to estimate the exchanges of greenhouse gases (GHGs: CO_2, CH_4, and N_2O) between terrestrial ecosystems and the atmosphere more accurately and instantaneously. In order to evaluate the temporal and spatial variations of GHG budgets in terrestrial ecosystems, which are highly dependent on biome types and climate zones, it is crucial to acquire more direct observational data in various ecosystems in many countries and regions.

The aims of AsiaFlux are to promote international collaborations on flux monitoring and data analyses and to share our findings in the field of ecosystem science with services and stewardship to solve environmental issues in Asia. The main activities of AsiaFlux are to organize workshops and training courses to share knowledge and scientific advancement. Currently, 87 sites are registered in AsiaFlux (Figure 1); these sites are located in various types of ecosystems, including natural ecosystems and agricultural fields.

In November 2011, the 10th workshop (AsiaFlux Workshop 2011) was held in Johor Bahru, Malaysia (Photo 1); it was followed by three optional after-workshop activities, two field excursions, and a training course on flux measurement providing knowledge and skills on micrometeorological theory, data processing, and equipment handling. This workshop consisted of 44 oral presentations at 8 sessions and 63 poster presentations from 14 countries and regions. Session topics covered energy, water vapor, and CO_2 budget based on field measurements as well as regional- and global-scale model simulations and remote-sensing studies. There is growing interest in the emission process of non-CO_2 trace gases, such as CH_4, N_2O, and biogenic volatile organic compounds (BVOC), since BVOC emitted from tropical ecosystems has been recognized to represent a non-negligible portion in the global carbon cycle. Moreover, studies of tree phenology, leaf photosynthesis, water-use efficiency of plants, and decomposition of woody debris have shown much progress during the past several years for understanding and predicting the response of plants and soil under future climatic conditions.

Several attractive studies were also reported from Southeast Asia on the tropical ecosystems, covering natural tropical rain forests and oil palm plantations in Malaysia,

Figure 1. Locations of the registered sites (red dots) of AsiaFlux.

Photo 1. Participants of the AsiaFlux Workshop in Johor Bahru, Malaysia, 2011.

tropical monsoonal forests in Thailand, peat swamp forests in Indonesia and Philippines, paddy fields in Philippines, and the tropical savanna in Australia. A summary of the discussion presented at these workshops is given below:

1) Deforestation and conversion of land to oil palm plantations is one of the most serious problems in Malaysia. A study reported that the amount of CO_2 absorption of a 25-year-old oil palm plantation was higher than that of a natural tropical forest. Some concerns and suggestions were expressed that the total carbon budgets of these two ecosystems should be determined after monitoring for a long time, such as 50 or 100 years, because carbon emissions due to land-use change from a natural forest to an oil palm plantation might continue for several years.

2) Tropical rain forests play the role of providing large carbon storage, but the year-to-year change and mechanism of their carbon exchange processes have not been well understood yet. One of the studies reported that the CO_2 absorption of a tropical rain forest decreased under a seasonal drought caused by El Niño and other climatic events, and the significance of long-term flux observations was emphasized to detect the influence of such extreme weather conditions.

3) A tropical peat swamp forest often stores a large amount of organic carbon in the soil, but it may become a large CO_2 source when the decomposition of peat is enhanced due to drainage for deforestation or cultivation. Studies based on field observations and model simulations in Indonesia reported that carbon emissions from a peat swamp forest increased with a decrease in the soil water content and ground water level caused by artificial drainage treatment.

On the other hand, data sharing was a controversial issue presented during the network session in the workshop. Available datasets are still not enough, although a large number is indispensable to promote integrated studies based on observations and model and remote sensing as well as to develop interdisciplinary research on ecology, meteorology, and hydrology. New study sites have been established in many Asian countries and regions; therefore, AsiaFlux is now trying to promote data sharing among as many sites as possible (website: AsiaFlux Database https://db.cger.nies.go.jp/asiafluxdb/). The enhancement of cross-cutting research would contribute to solving challenging and complicated environmental issues, for instance, compatibility with the mitigation of climate change and conservation of biodiversity in Southeast Asia.

Photo 2. Tropical forest and research tower for flux measurement (upper right) in Pasoh Forest Reserve, Malaysia.

After the workshop, two excursions were conducted to Pasoh Forest Reserve (Photo 2) and Tranjunp Piai National Park in Malaysia. Pasoh Forest Reserve, one of the oldest research sites established in 1969, is located in a tropical lowland forest. A number of international scientists, including Japanese researchers, have been studying the carbon cycle, biodiversity, and tree succession in the forest with the cooperation of the Forest Research Institute Malaysia (FRIM). Participants visited the flux tower and received a detailed explanation of research studies conducted at this forest site. Tranjunp Piai National Park is located on the southernmost coast of Asia and contains a mangrove forest. Tropical lowland forests and mangrove forests, such as those in Pasoh and Tranjunp Piai, are now threatened by deforestation, which is widely expanding all the Southeast Asia.

The workshop provided a remarkable opportunity to share experiences and ideas with colleagues from various countries and regions. Borderless collaboration in an international community such as AsiaFlux is our hope to resolve global environmental issues in the future.

New Site

Hill dipterocarp forests in Peninsular Malaysia are vulnerable to the current selective logging scheme

Naoki Tani[1] and Tatsuya Otani[2]

[1] Forestry Division, Japan International Research Center for Agricultural Sciences (Japan)

[2] Shikoku Research Center, Forestry and Forest Products Research Institute (Japan)

Major forest types can be classified according to altitude into lowland dipterocarp forest, up to 300m above sea level, and hill dipterocarp forest found in elevation of between 300 m and 750 m a.s.l., and upper dipterocarp forest, from 750 m to 1,200 m a.s.l. Although lowland dipterocarp forest has been suffering under intense pressure from development such as conversion to plantation and urban area, most of dipterocarp forest left in Malaysia is hill dipterocarp forest because of unsuitable usage for agriculture in hilly terrain. In Peninsular Malaysia, most of highland areas are conserved because of not only difficulty of timber extraction but also its ecological services, especially the main mountain range, Banjaran Titiwangsa, where is an important water catchment area for the whole Peninsular Malaysia. However, since the 1980s, selective logging in hill dipterocarp forest has been one of the main forestry activities conducted in Peninsular Malaysia. The percentage of forest cover to the total land territory of Peninsular Malaysia has remained constant at approximately 45% since the 1990s. In contrast, plantation forests, excluding rubber and oil palm plantations, corresponded to only 1.9% of the total forested area of Peninsular Malaysia in 2007. Although efforts to establish more plantation forests are continuing, the hill dipterocarp forest of Peninsular Malaysia are currently regarded as a major productive source of timber, which can be used to satisfy increasing market demands for timber resources in the near future.

Our study site (3°37'16"N, 101°44'15"E), Semangkok Forest Reserve, is located in central part of the backbone mountain range of Peninsular Malaysia and 60 km north from Kuala Lumpur. Vegetation in the study site represents typical hill dipterocarp forest. *Shorea curtisii* (Dipterocarpaceae), called as seraya in local name, is dominated on ridges above 300 m a.s.l. On the other hand, *S. leprosula*, called as meranti tembaga, is abundant on slope of this area, however is not so dense as *S. curtisii* on ridges. Going over 500 m a.s.l., the dominant species is gradually transited to *S. platyclados*, called as meranti bukit. This species is highly abundant like *S. curtisii*,

Photo 1. Logging activity is going to deep hill dipterocarp forest now.

however occupies in slope not in ridges. A 4.0-ha study plot was established in 1994 under the joint research project of Forest Research Institute Malaysia (FRIM) and Japan International Research Center for Agricultural Sciences (JIRCAS) and this plot was extended to about 5.4-ha (*c.* 140 m × 400 m) in 2007. The forest compartment containing the plot experienced selective logging in 1988, and 10% of the total basal area was extracted during the logging operation (hereinafter the 5.4-ha plot will be referred as selectively logged plot). In 1994, all of the trees larger than 5 cm diameter at breast height (DBH) were tagged and their DBH was measured. Tree censuses were conducted repeatedly at two-year intervals, and in total, eight tree-census data sets were obtained over 16 years. Exclusively for *S. curtisii*, the most dominant species in the plot and the target species of the FRIM/JIRCAS project, height of saplings (≥30 cm in height and ≤5 cm in DBH) in the entire plot area was measured at almost two-year intervals. Another study plot of size 6.0 ha was established in 1992 under the joint research project of FRIM and Forestry and Forest Products Research Institute, Japan (FFPRI) in an adjacent forest compartment. This 6.0-ha plot was covered by undisturbed hill dipterocarp forest that had not undergone any logging activities. Tree censuses were performed in the 6.0-ha plot in the same manner as in the selectively logged plot (hereinafter referred as undisturbed plot). In both plots, microsatellite genotypes were determined for all *S. curtisii* adult trees (>20 cm in DBH) for molecular ecology analysis. Synchronized mass flowering of *S. curtisii* has been recorded in 1998, 2002, 2005 and 2011 up to date. Many of seeds were collected during the flowering seasons and genotyped using consistent microsatellite markers.

Using these plots, JIRCAS and FRIM have been conducted researches in order to suggest a sustainable logging scheme enabling to healthy forest regeneration with supports of FFPRI. Pollen dispersal and mating processes were studied for development of sustainable selective logging scheme in terms of healthy outcrossing seed production. In Malaysia, timber species trees larger than particular size (generally 50 cm in DBH) have been felled according to the Selective Management System (SMS). This scheme causes less healthy seedling for forest regeneration due to not only limited seed dispersal to logging area but also unsuccessful outcrossing mating between sparse remained adult trees after logging. Therefore, we conducted genetic paternity analysis of seeds to clarify pollen dispersal pattern and relationship between tree size (DBH) and male fecundity, which aim at proposing revised selective logging criterion to promote healthy seed production and subsequent forest regeneration against forest management agencies in Malaysia. The average pollen dispersal distance was identified as very short distance (*c.* 60 m). The current logging criterion (>50 cm DBH dipterocarp trees are felled) causes lower density of remained trees, which would prevent pollen from reaching other trees. Increment of remaining tree density contributes not only increment of seed production but also promoting outcrossing mating and subsequent production of healthy seeds. Male fecundity of each adult tree estimated from the model based on paternity analysis showed that small size trees remained after selective logging (<50 cm DBH) produced less pollen, which caused less healthy seeds production derived from outcross mating. A selective logging simulation revealed that conservation of the middle size class trees (70 cm to 90 cm in DBH) producing higher amount of pollen would maintain about 50% of outcrossing pollen relative to the

Photo 2. *Shorea curtisii* seeds is going to maturation after a synchronized flowering in 2011.

New Site

amount of outcrossing pollen before selective logging.

Using eight tree-census data sets collected in every two years since 1994, simulations using transition-probability-matrix models were conducted in order to forecast population growth of timber species in a selectively logged hill dipterocarp forest in the Semangkok Forest Reserve. Results of the simulations showed that the density of large-sized *S. curtisii* trees reaching the commercial logging size would reach a comparable level to that of the adjacent undisturbed forest within 90 years after the last logging, and that the species composition of logging-sized trees of all species would differ widely from that of the undisturbed forest during this period. In terms of timber stock after the selective logging in 1998, approximately 60% of the exploited basal area had been regained up to date. However, the final species compositions of the selectively logged and undisturbed plots were considerably different. Moreover, the species diversity index and tree number of secondary forest species in the selectively logged plot were still increasing at the end of the census period, indicating that this forest was in an early or middle stage of forest succession. The results suggest that the cutting cycle recommended by the official SMS, i.e., 25 - 30 years, is too short for the sustainable management of hill dipterocarp forests.

All the results mentioned above showed that current logging scheme cause negative effects on sustainable forest regeneration in hill dipterocarp forest, which also disable mankind from extraction of timber continuously.

Photo 3. A view of the undisturbed plot from top of a *Shorea curtisii* tree. Trees with whitish crown are *S. curtisii*. Degraded area due to unsuccessful regeneration after logging is observed beyond the undisturbed forest.

Report

July 22-27, 2012

Guide to the Gordon Research Conference (GRC)[1] in Boston: The 6th "Metabolic basis of ecology and evolution in changing world"

Shigeta Mori

Whole-plant physiological research team, Forestry and Forest Products Research Institute (Japan)

Ecology is fundamentally metabolic, because metabolism is the biologically processing of energy and materials and all ecological interactions involve exchanges of energy and materials. The metabolic rate is the pace of living and interacting with the environment (Sibly *et al*. 2012).

Under the ideas, the GRC focusing on the topic of "Metabolic basis of ecology and evolution in changing world" was held at New England University near Boston, the US from 22nd to 27th July 2012. About 120 participants from all over the world mainly the US and Europe countries stayed in a same dormitory within the campus near the beautiful beach. The participants gathered into one conference room to attend the sessions, and had meals on the same tables, and enjoyed a short kayak tour between the sessions. We enjoyed private talking and discussions about the metabolic ecology (Sibly *et al*. 2012) closely related with the biodiversity of the central topics of DIWPA from breakfast at 7:30 to after dinner at 21:30. Even after the formal sessions, some kinds of Boston's craft-beers encouraged the free discussions at the bar within the campus until midnight. I could feel that the free atmosphere of the best scientific conferences contributed the development of frontier sciences and friendship among scientists so much.

Photo 1. Over Boston's craft-beers with Prof. Simon A. Levin (right side) and Prof. James H. Brown (left side) at the bar of New England University
I hope DIWPA members to join free discussions of GRC to promote the research of global environments. The next GRC about the metabolic ecology will be held in 2014.

From the impression of the conference, we may judge it exclusive and specially coordinated only for top scientists within a limited community and hesitate to join it, but actually many young post-doctoral fellows had no hesitation to join Q & A sessions. Unfortunately, just small number of scientists from the Western Pacific and Asia regions joined GRC in 2012. I believe that the metabolic ecology will bring us one of the most beneficial insights into research of biodiversity through the conference.

Finally, I really thank Prof. James H. Brown who started the conference of "Metabolic basis of ecology and evolution in changing world" in 2000. This year, Prof. Brown retired from the New Mexico University and we hope to succeed to his ideas and develop the metabolic ecology through cooperation with wide range of scientists including DIWPA members.

Note

1. The Gordon Research Conferences are international scientific conferences organized by a non-profit organization. The conference topics cover frontier research in the biological, chemical, and physical sciences. The conferences have been held since 1931, and have expanded to almost 200 conferences per year. Contributions are "off-record" to encourage free discussion, often of unpublished research. The conference topics are regularly publicised in *Science*. (website: http://www.grc.org/)

Reference

Sibly, R.M., Brown, J.H. & Kodric-Brown, A. 2012 *Metabolic Ecology: A Scaling Approach*. Wiley-Blackwell, West Sussex, UK.

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