DIWPA News Letter

Office: Center for Ecological Research, Kyoto U No.36

Message *from the Chairperson*

Shin-ichi Nakano

We, Center for Ecological Research (CER), have concluded the Memorandum of Understanding (MoU) for Academic and Research Cooperation with National Institute of Ecology (NIE), South Korea on December 1, 2016.

NIE was established in 2013, to be an institution for ecology and biodiversity, and has been recognized as one of the most important research institutes for ecology in Asia now. Prof. Jae C. Choe, the former NIE President, and I had many discussions about the MoU through e-mail since January 2016. Then Prof. Jeong-Kyu Kim, Head at Bureau of Ecological Research, Dr. Chulgoo Kim and Dr. Eunha Ko visited CER on October 18, 2016 to have a discussion about the MoU and a joint symposium between NIE and CER. On December 9, 2016, six CER professors together with Dr. Tsubaki * the former CER Director *visited NIE, and we held the symposium with many people celebrating the signing of our MoU. Presentations by both NIE and CER researchers were very excellent and I was very much impressed with the intense and insightful discussions during coffee-breaks ,

We will collaborate in the fields of ecology, biodiversity and environmental sciences that mutually benefit both institutions, so as to recognize the importance of academic and research collaboration, as well as to enhance mutual understanding and establishing long-term

cooperation between the two institutions.

CER has 25 years of history with many trials and tribulations, and is looking forward to having more events in future. NIE is a fresh and energetic institution, and is expected to have some future challenges. CER would like to provide its experience for development of NIE, with hope for the formation of Asian base for ecology, biodiversity and environmental sciences as mutual collaboration between NIE and CER. South Korea and Japan are close in terms of climate, culture and geographical distance. Such scientific exchanges allow us to share the variety of histories for ecology, limnology, mathematical biology, microbial ecology and so on. Through the act of MoU, we w materials, information, faculty members, post-docs and students, and conduct joint research activities, in hope of the development of the future researches in Asia and all over the world. We will provide regular updates on the activities through the MoU. If you are interested in our activities, please join us.

International Field Biology Course (IFBC) in 2017

IFBC will be conducted in Japan in the summer of students in the Western Pacific and Asia regions and learn in the field of terrestrial cosystems. whose supervisors are the DIWPA members, a e high be announced in the spring on our HP. Plea se che ac.jp/index.html)

Report 1

2016 DIWPA International Field Biology Course, Kiso River, Nagano, Japan

Dwi Atminarso
Research Institute for Inland Fisheries, Ministry of Marine Affairs and Fisheries (Indonesia)

DIVERSITAS in the Western Pacific and Asia (DIWPA) is a non-governmental and non-political-regional organization financially supported by the Center for Ecological Research (CER), Kyoto University. DIWPA focuses on the integration of the efforts and resources of scientists towards the study of the unique ecosystems of the Western Pacific and Asia including the terrestrial Green Belt from Siberia to New Zealand and the marine Blue Belt along its east border. The secretary office of DIWPA is launched at CER. One of the main functions of DIWPA is "capacity building of scientists in particular young scientists from developing countries". In the summer of 2016, the International Field Biology Course (IFBC) took place in Kiso River, Nagano, Japan, where the graduate students in the Western Pacific and Asia regions stayed at a station together with professors and learned stream ecology including basic limnology in streams, fundamental ecological and/or biodiversity studies on sessile algae, benthic invertebrates, freshwater fish, data analysis and database preparation.

I am a researcher from Research Institute for Inland Fisheries, The Republic of Indonesia. My institution is responsible for conducting research studies on freshwater fishery resources, environment and the study of fish stock assessment throughout Indonesia. IFBC appealed to me because Japan is a modern country, which produces superior fisheries research result, so I believe I get a lot of experience and skills there. My chief and deputy recommended me to submit an application to DIWPA. I was very grateful when I got an email from DIWPA office that I am one of the winners to join the short course. This is my first opportunity to go overseas. It was fortunate that Japan, a developed country, was not my first country to visit. I had a lot of pre-trip preparation works before going to Japan. I have started preparing my training equipment a month before my departure, such as buying swimsuits, waterproof shoes, luggage, portable irons and so on. Using technological electronics in Japan made me a bit nervous, especially purchase of tickets with vending machines for trains and buses when I had to take transportation to a hotel by myself. Before the departure, I looked up for information on how to use vending machines and transport paths I would take, and I read carefully the instructions given by the DIWPA offce.

I arrived in Osaka on 15 August from the Palembang-Jakarta-Tokyo which indeed was a very pleasant for me to enjoy flying with one of the best airlines in the world, All Nippon Airways, with first class service and food, and typical Japanese travel companions. At 10:00 local time, the plane landed smoothly at Itami-Osaka airport. I had to use two different types of transportations, buses and trains, to reach the hotel booked. I had no problem buying a bus ticket to Shin-Osaka station because their customer service supported me. A 25-minute travel to Shin-Osaka was smoothly without any traffic jam at all. After arriving at Shin-Osaka station *I had to buy a ticket to Seta station, the nearest station to CER. I wanted to purchase a ticket with a vending machine, but I did not find the English language version on it. Finally, I asked the staff for assistance. It was very diffcult to understand Japan information is displayed only in Japanese language. I finally reached to Seta station at 13:00 after relying on the direction provided via the e-mail from DIWPA secretary. It surprised me that almost all trains come on time in Japan. The hotel that was reserved by DIWPA is only 300 m far from Seta station. The hotel is clean and modern and have nice scenery. It is also convenient for shopping. Although the room was not spacious, it was very comfortable

Not long after I arranged clothes in the room and took a bath, the phone in my room sang from Professor Nakano made the call from the hotel lobby. It was heartwarming moment to meet Prof. Nakano again after we first met at the inland fisheries seminar in Palembang, Indonesia, five years ago. He did not recognize me at the time we met in the hotel lobby but he was shocked after I told him about our times in

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Fig. 1. Center for Ecological Research (CER)

Fig. 2. Genetic laboratory

Palembang and he gave me a hug. After the greeting he took me to his office at the Center for Ecological research (CER), Kyoto University with the public transportation bus taking an approximately 30-minute drive and 25-minute walk (Fig. 1). View of the city was very charming, clean, orderly and organized, and the traffc rules are obeyed. Prof. Nakano showed me their laboratories. Their equipment are very modern and fully maintained. He also introduced me to the researchers and employees in CER. I am very interested in the genetic laboratory with the best and latest equipment which range from every stage of the genetic analyzes (Fig. 2). These equipment are of domestic productions. Besides the genetic laboratory, they also have other laboratories that facilitate researchers to do any research related to marine and inland water biodiversity. Many international students from different countries were awarded scholarship to do research using CER facilities every year. After that, Prof. Nakano invited me to a famous Japanese restaurant in Seta to have dinner together. I am very interested in Japanese cuisine served in the restaurant because it is my frst time trying Japanese food.

On the second day, we drove 7 hours to Kiso biological station in Nagano prefecture. 10 participants including 4 teachers and 6 students shared two CER offcial cars. I was the training course. We arrived at Kiso biological station at 15:00. Only one person is in charge of the building and provided meals during our stay in Nagano. Here we had to be self-sufficient, preparing the beds, and washing our own clothes. After fnished tidying up the River to check the possibility of conducting a training of sampling techniques and requested permission from the authorities to do research and take samples on the river. On the third day, a lecturer taught us the sampling techniques for macroinvertebrate and chlorophyll using a brush, plastic containers, markers and a grid of rubber. For chlorophyll sampling, we chose green or greenish-black rocks with a smooth surface. Then the professor showed us how to use the grid, brush stones, and to rinse the brush with water in plastic containers. For sampling macroinvertebrate, we placed sybernet at the bottom of the shallow water and then made the clay mouth to affix to the sybernet so as to facilitate insects to enter. After completing the chlorophyll and macroinvertebrate sampling, all samples were labeled according to the corresponding location (latitude and longitude), collector and the sampling time. After that, all samples were inserted into the cold box that has been filled with gel ice to maintain the temperature prior to further analysis. Before the samples were taken to the laboratory, a lecturer taught us the way of good sorting using the proper equipment. After that, a lecturer, Dr. Jeremy Jay Piggot from New Zealand, taught us how to use the identification book to best identify macrozoobenthos.

On the fourth day, a lecturer taught me about basic limnology, which he covered how to measure dissolve oxygen, acidity, and conductivity in situ using digital equipment. He also showed me how to measure chlorophyll using two techniques, fluorometer and spectrophotometer technique. After that, Prof. Keisuke Koba taught us how to measure nitrate in the water. He showed me how to measure nitrate step by step. And then, Dr. Yoshikuni Hodoki taught us how to use DNA technique to identify cyanobacteria. In the afternoon, Prof. Nakano taught us the i in the river. He also taught us how to use the book to

identify periphyton well and make observations using a microscope with thoroughness. In the evening, Dr. Jeremy Jay Piggot, a researcher and a lecturer of Otago University, gave a presentation on his research project conducted in Germany and Australia, which have good results for the management of the river at the location. He is a researcher who has numerous publications in journals with high grade impact factor. Following the presentation, a documentary film associated with stream ecology was shown to us. The film contained words of an expert limnology of Hokkaido University, Dr. Shigeru Nakano, who has contributed significantly to the development of limnology before he passed away.

On the fifth day, Dr. Yoshikuni Hodoki taught us laboratory techniques for the genetic analysis of cyanobacteria. He covered laboratory techniques ranging from DNA extraction to the Polymerase Chain Reaction. Each participant was responsible for one sample. After completion of the DNA lab, Prof. Koba and Prof. Nakano taught us the data calculation of chlorophyll analysis results. Each participant worked on the calculation for the respective samples we took. During the day, all participants were given two hours to work on our own research. I decided to conduct individual research with title "Diversity of Macrozoobenthos and EPT index at Kurokawa Station". I wanted to know how many macrozoobenthos species live at Kuro-kawa station and the percentage of ephemeropterans, plecopterans, and trichopterans. I took two samples from two sites in indifferent water discharge and vegetation (Fig. 3). Site 1 was characterized by slow current water and surrounding of aquatic plants. Site 2 was characterized by rapid current water and surrounding of many stones. From our analysis, I found six families macroinvertebrate and 102 individuals in site 2. EPT index was 45t/25/30% in site 1 and 58/24/18% in site 2. Ephemeropterans dominated in both two sites, but superiority of plecopterans and tricopterans different in two sites (Fig. 4). I have presented my results in a seminar which all participants and lecturers were present. There were many questions asked, and discussions and suggestions were given to improve my paper.

Fig. 3. Collecting samples at Kuro-kawa research station

Fig. 4. Sorting samples

On the sixth day, we cleaned up the station and prepared for going back to Seta. We departed at 9:00 and arrived in Seta at 15:00. I still had one day in Seta and one day in Osaka before going back to my country. Finally, I expressed my gratitude to DIWPA (Diversity in West Pacific and Asia) for making my dream of going abroad come true, to concentrate on the studying of stream ecology. Beside that, I also had many great encounters with good scientists, lecturers and students from different countries. Japan is a great country with many excellent lecturers and scientists in all research areas especially in fsheries study in Japan under the Masters degree scholarship program.

New Site 1

Transformation of tropical peatland ecosystems in Indonesia

Satomi Shiodera
Center for Southeast Asian Studies (CSEAS), Kyoto University
(Japan)

Tropical peatlands exist mainly in Southeast Asia and South America. The total area is 0.44 million km^2 with distribution in Southeast Asia (0.25 million km^2, 56 %) and most of them are found in Indonesia (47 %), Malaysia (6 %) and Papua New Guinea (3 %), with small pockets and remnants in Brunei, Myanmar, the Philippines, Thailand and Vietnam (Page *et al*. 2011). They are distributed in low lying areas and riversides, where the forest floor would be flooded during the rainy season (Fig. 1). Plant residues such as fallen leaves, branches and trunks are soaked in the water, and the activities of the soil microorganisms are suppressed. As a result, plant residues accumulate as peat soil. This tropical peat is called "woody peat", and can be distinguished from the peat in the high latitudes that is formed by sphagnum or grass litters due to low temperature and under water logged condition. The organic materials in the soil are maintained as a peat in steady state, and tropical peatlands store large amounts of carbon, where it was said about 20 percent of global soil carbon (89 Pg) might be accumulated in tropical peatlands (Page *et al*. 2011). Due to their particular characteristics, such as their tendency to be flooded seasonally and low soil nutrients, tropical peatlands have been neglected from development for a long period. Thus, forests in tropical peatlands (tropical peat swamp forests) abound with many endemic species adapted to its specific environment and have served as habitats of the endangered species (animals such as the orangutan and tree cat, and rare tree species such as *Gonystylus bancanus* and Meranti). As the forests are also a treasure-trove of indigenous species, they play an important role in the nurturing biodiversity and in preserving rare species (Anderson 1963, Whitmore 1984, Page *et al*. 1999, Simbolon and Mirmanto 2000, Yule 2010, Mirmanto 2011, Rahajoe *et al*. 2016).

However, for these two decades, the deforestation and degradation of tropical peatlands due to anthropogenic disturbance have caused various environmental issues. In Indonesia, the large-scale agricultural land development project, which called "mega rice project" had been conducted in Central Kalimantan Province in 1990s. On the other hand, development of the large scale plantation of fast-growing trees and oil palm made great advancement in Sumatra Island. Infrastructure for these large-scale agricultural land and plantation development, such as roads and canals, enabled more people to enter the area, transforming the peat swamp forests into a frontier for companies and migrants alike. Drainage canal, which had been established, had led to a decrease of groundwater levels and drying of peatlands, resulting in an increase of emissions of greenhouse gases (GHG), especially carbon dioxide (CO_2) by peat decomposition, and frequent fires (Hirano *et al*. 2009, 2012, 2014). Furthermore, the smoke hazards (haze) from the peat fire have become more serious issues in recent years (Fig. 2). The biodiversity of the tropical peat swamp

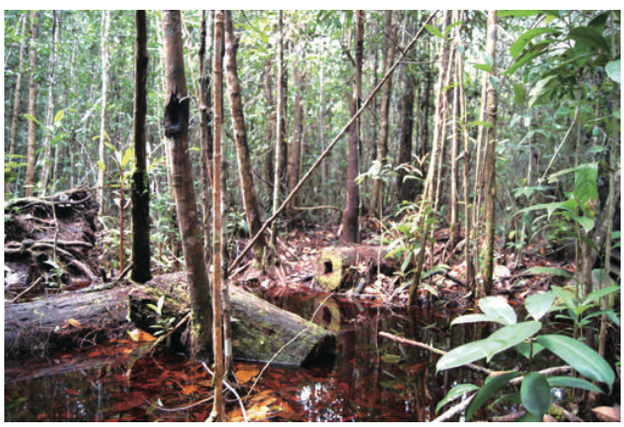

Fig. 1. Peat swamp forest in the rainy season

Fig. 2. Smoke hazards (haze) in Riau Province

New Site 1

Fig. 3. Pneumatophores of tree

forests have also been threatened by these disturbances (Shiodera *et al*. 2016). In 2015, in 2.1 million ha of forests was burned, and most of them were peatlands in Indonesia.

The research site of our group is in the Sumatra Island, Indonesia, which is one of the hot spots of environmental issues in peatlands. Our objectives are to understand the mechanisms and environmental factors to construct ecosystems of peat swamp forests, to detect the change of biotic and abiotic (that is climate and geology, etc.) factors after anthropogenic disturbance, and to clarify the possibility of forest recovery after the disturbance. Peat swamp forests are wetland ecosystems that have been established under seasonal flooding over many years. Fundamentally, the inputs of water and nutrients to the ecosystems are only from rain water, and the nutrient conditions as peat soil, or leach to the groundwater. Thus, soil nutrient level and pH is extremely low. This situation has been maintained under the suppressed activity of microorganisms by flooding for a long period of time. In peat swamp forests, adaptation to the extreme environment can be an important factor of survival of the plant species. Plants have various special organs or traits for it. They have buttress and stilt roots to provide stability in the soft peat substrate. Knee roots and pneumatophores help to enhance gas exchange in the waterlogged substrate (Fig. 3). They also adapt to lower nutrients to develop the root mat system to enhance uptake of nutrients since they are more abundant in the surface layers (Posa *et al*. 2011). However, after peat fire disturbance, the environment will be totally changed from the pristine peat swamp forests. Although the area suffers flooding and low nutrients, it will change from the closed forest to the open area, and suffers from severe dry situation in the dry season. Once the delicate balance between various organisms is destroyed by disturbance, it is very diffcult to recover in a sho is well known that Alang-alang (*Imperata cylindrica*, Poaceae) grassland will be es However, in the peatlands, the vegetation seen after the fre is grassland of various not only forest trees but also the peat soil itself were burnt, the ground becomes uneven and there will be many ponds flled with rain wa circumstance suppresses the germination and growth of plant seedlings there, and only plants which have a strong resistance to this environment can grow up. For this reason, groundwater level and water chemistry can be important factors to define the ecosystems of disturbed peatlands. We research on the kind of species that can grow and the factors that can regulate the development of vegetation af in the sight of ecology and hydrology. While a large number of forests continue to be lost due to rapid anthropogenic forest disturbances, clarifying the mechanisms of remaining forests and recovery systems for degraded forests remains an important task.

Our group consists of researchers from various backgrounds, which is hydrology, biogeochemistry, biology, ecology and atmospheric chemistry. Our fore research targets also include various biotic and abiotic components in pristine and disturbed tropical peat swamp forests. We deal with not only all important features of ecosystems such as soil, water, tree and insects, but also microclimate and geological information. For example, understanding the material cycling in peat swamp forests, especially carbon and nitrogen cycling, is important to recognize the mechanisms of the emission of GHG from disturbed peatlands. For this object, many kinds of simultaneous observations are needed to carry out. Here, we also research about 1) the carbon storage in peat soil, 2) changes in water quality and quantity which determine

New Site 1

the amount of carbon flow in water, 3) CO_2 and methane (CH_4) emission rates from soil surface to the atmosphere and also 4) wood or soil decomposers (such as termites and ants) activities to understand carbon fow in the whole ecosystem.

In Center for Southeast Asian studies, we conducted the project entitled "In Search of Sustainable Humanosphere in Asia and Africa" (the JSPS Global COE Program, project reader: Prof. Kaoru Sugihara, CSEAS) in tropical peatlands in Riau Province, Indonesia from 2007 to 2011. We will also start a new project, which targets the whole tropical peatland beyond Indonesia, named "Toward the Regeneration of Tropical Peatland Societies: Establishment of an International Research Network and Proposals for a Better Future" sponsored by Research Institute of Human and Nature (RIHN) (project reader: Prof. Kosuke Mizuno, CSEAS). In this project, we will answer how we can control and manage tropical peatlands under corroboration with local societies. Our research project will conduct transdisciplinary research on the social-ecological system of tropical peatlands to understand and address their vulnerabilities. Through collaboration with local stakeholders, the project will integrate scientific findings with local knowledges to establish mitigation and adaptation strategies in order to achieve sustainable (low carbon) use and conservation of tropical peatlands.

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Message *from the Secretary General*

Atsushi Ishida

We held an International Field Biology Course (IFBC) at a research station in a stream of Kiso River in Japan in August, 2016. The report from the attended student is published in this volume.

In February 2017, we conducted a symposium at the Ogasawara (Bonin) islands, which is one of World Natural Heritage sites, with general public. The several reports were written in the past DIWPA Newsletters. In the summer of 2016, the Ogasawara islands were besieged by relatively prolonged drought and some drought-adapted endemic trees died. In the symposium, physiological mechanisms of drought-induced tree die-offs were reported. The reports of the symposium will be published in the next volume.

In Thailand, severe drought occurred in the dry season from 2015 to 2016 and some canopy trees died. In January 2017, severe flooding occurs especially in southern part of Thailand. These climatological phenomena may be related to global climate change, and have affected severe infu life but also to ecosystems.

We have to enhance the ability of prediction of ecosystem change in future and to consider its adaptation. We hope that DIWPA becomes a good platform to exchange our opinions. Please send the information of the situations in your countries to DIWPA Newsletter (diwpa@ecology.kyoto-u.ac.jp).

CALL FOR NEW MEMBER OF DIWPA

We are now calling for membership of DIWPA. Membership fee is no charge. When you become a member, you can;

1. Receive the DIWPA News Letter
   You can receive the News Letter by post or e-mail. News Letter contains various information of biodiversity research in Asia Pacifc area, especially (Asia–Pacific Biodiversity Observation Network) as w Network), IPBES (Intergovernmental Science and Polic and new big project which is "Observation, Evaluatio Environment Research and Technology Development Func ONLY in DIWPA News Letter except that AP-BON provides

2. Apply for the Field Biology Course
   You can apply for the Field Biology Course sponsore participate the Field Biology Course which is orga international initiatives which conduct educational activities such as DIWPA even though some of the initiatives carry out biodiversity research.

3. Run your articles regarding your biodiversity activities in DIWPA News Letter
   DIWPA introduces our member's various activities in DIWPA News Letter. Your activities would spread throughout the world, and you may receive more information about biodiversity conservation as well as the supports.

4. Build up a circle of friends within biodiversity re
   Ask DIWPA when you want some information of foreig research. DIWPA can introduce people who have information you want. More than 400 members in 4/ countries belong to DIWPA network.

If you would like to join DIWPA, please contact to "DI

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Also we always welcome articles or any information related to biodiversity for DIWPA News Letter. Please send them to us.

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Center for Ecological Research
Kyoto University
509-3, 2-chome, Hirano,
Otsu 520-2113 JAPAN
Tel & Fax +81-77-549-8238
E-mail: diwpa@ecology.kyoto-u.ac.
http://diwpa.ecology.kyoto-u