DIWPA: DIVERSITAS in the Western Pacific and Asia

DIWPA News Letter

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Message from the chairperson
Shin-ichi Nakano

DIWPA, the same as you colleagues, has been adjusting to new ways of working in response to the COVID-19 pandemic. The present situation provides us the opportunities to think how we respond collectively to this global crisis under the limitations of face-to-face. In the Fiscal Year 2021, DIWPA is going to host two biodiversity researchers: Dr. Luki Subehi, Research Center for Limnology, LIPI (The Indonesian Institute of Sciences); Dr. Indranil Mukherjee, Hydrobiological Institute, Czech Academy of Sciences. The former researcher uses BRIDGE Fellowship Program by JSPS. And Dr. Indranil Mukherjee will be employed as a faculty member of CER. Dr. Subehi is a researcher for hydro-climatology, ecological processes, freshwater environments and water quality. We are going to discuss about the data of water quality profile from several lakes in Indonesia, together with discussions for a new lake database from more than 5,000 lakes in Indonesia. Dr. Mukherjee researches ecology and/or biodiversity of protists in limnetic systems. He is interested in the diversity, seasonal dynamics, bacterivory and selective grazing, and evolution of important groups of flagellated protists mainly from freshwater lakes and reservoirs, and will initiate research on those items in Lake Biwa. We DIWPA are very much looking forward to collaborating with them, though we are still not sure when the COVID-19 vaccine will be provided in Indonesia, Czech and/or Japan. May peace, safety, health, joy and happiness prevail on earth.

Message from the Secretary General
Atsushi Ishida

We have received COVID-19 pandemic in globally. In Japan, we are in the third wave of COVID-19. Recently we started the vaccine inoculation in Japan. I know that many readers have various difficulties for your research, education and normal life. I have a research site in the Ogasawara Islands, located in 1,000 km south of Tokyo. These are oceanic islands, which have fairly vulnerable for pandemic diseases. Thus, we could not enter the islands for research during several months in the last year. In the present, we can enter the islands after receiving the PCR test. According to this situation, the number of visitors largely decreases in islands. As a result, we face a manpower shortage for forest conservation against alien trees, and the economic conditions in the islands decrease now. However, it seems that the vegetation recovers gradually especially along to trekking roads, detecting over tourism in the past. For the conservation of ecosystems, there are various trade-offs between economy and nature, and we can often find such situations under the COVID-19 pandemics. DIWPA newsletter welcomes to reports from various disciplines, including not only biodiversity conservation but also transdisciplinary fields for enhancing sustainability in our life globally.

We cannot inform about the International Field Biology Course in 2021 now. The information will be placed on our website. I appreciate your support to keep and enhance DIWPA activities.

New Site

Lake Baikal and biodiversity studies

Koji Shichi

Forestry and Forest Products Research Institute (Japan)

Fig. 1. Lake Baikal and people bathed in the lake

Lake Baikal (**Fig. 1**) is located at 51-55˚N and 103-109˚E in the southeast of Siberia in Russia, and is the oldest (approximately 30 million years) and the deepest (more than 1,600 m) lake in the world. Lake Baikal is slightly spreading and deepening even today because it is placed in the depression of a rift valley called the Baikal rift zone. Lake Baikal is famous as the lake which has extremely high biodiversity. There are many endemic species such as fishes and amphipods in Lake Baikal. It is said that more than 80% of all fauna in the lake are endemic species. The Baikal Seal (*Phoca sibirica*) which is one of the representative endemic species is suggested that the ancestor came down from the Arctic ocean to the lake approximately 0.4 million years ago by DNA analysis (Sasaki *et al*. 2003).

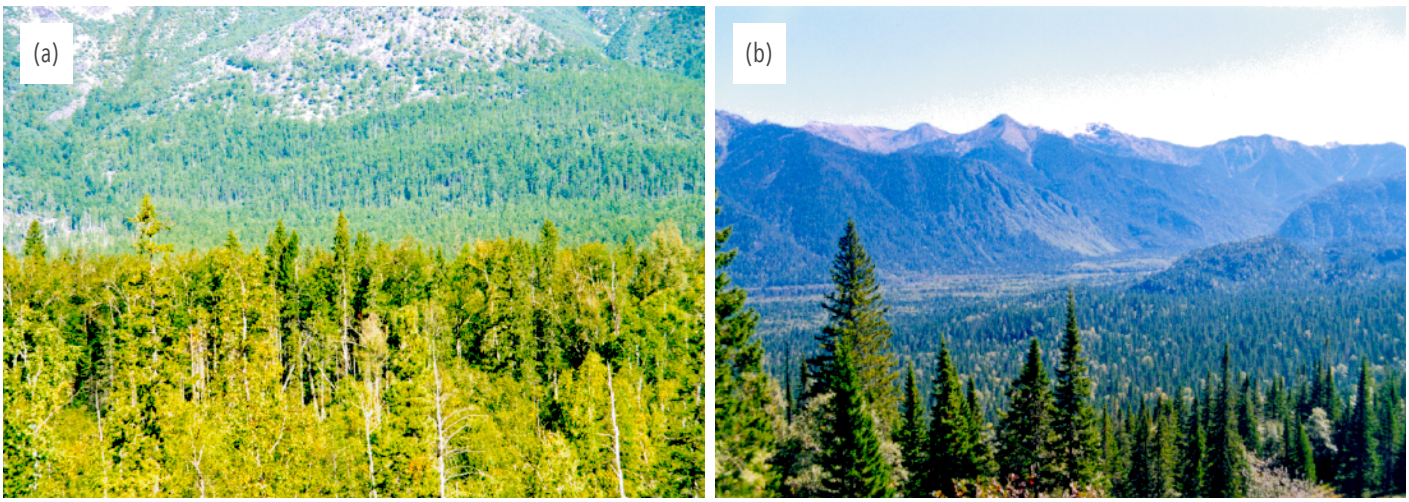
Biodiversity studies of Lake Baikal was largely developed from 1980s and the endemic species were discovered successively. In order to pursue further research, the Baikal Drilling Project (BDP) was conducted from the beginning of 1990s by scientist of Russia, the United States, Germany, and Japan. The international joint research aimed to clarify historical change of the biodiversity and influence of past climate change on Lake Baikal and the watershed by drilling in Lake Baikal (**Fig. 2**) and analyzing the provided sediments. In the project, I participated in the research on vegetation history of the Lake Baikal region by using the lake sediments.

At present the Lake Baikal watershed is mainly covered with subarctic coniferous forests “Taiga”. The northeastern part of Lake Baikal with distribution of continuous permafrost is widely covered by pure deciduous larch forests (*Larix gmelinii*; **Fig. 3a**). On the other hand, the southwestern part with distribution of discontinuous or sporadic permafrost was covered with mixed evergreen coniferous forests such as pine (*Pinus sylvestris* and *P. sibirica*), spruce (*Picea obovate*), and fir (*Abies sibirica*; **Fig. 3b**). We conducted reconstruction of the past vegetation change over a long period of time by using fossil pollen (**Fig. 4**) in the lake sediments drilled from the center of Lake Baikal in order to clarify process of establishments of the subarctic coniferous forests.

The vegetation reconstruction during more than 10 million years showed that the deciduous broad-leaved forests such as *Quercus* and *Ulmus* were

Fig. 2. Ice-based drilling of Lake Baikal in 1998

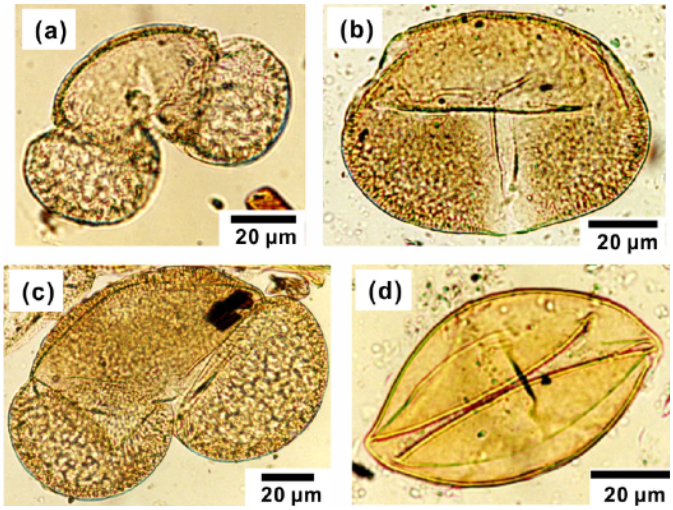
Fig. 3. Typical forest landscape in the Lake Baikal region



(a) Deciduous coniferous forest of larch (*Larix gmelinii*) on a plain of the northeastern part

(b) Evergreen coniferous forest of fir (*Abies sibirica*) on a mountain area of the southwestern part

predominant during the warm Late Miocene to the Pliocene of the Neogene Period in the Lake Baikal regions, subsequently they gradually declined and the coniferous forests expanded because of the prevailing glacial (cold) intervals in the Pleistocene of the Quaternary Period (Hase *et al*. 2002). The vegetation changed coniferous forests in interglacial (warm) intervals and sparse cold deserts in glacial intervals during the past 450 ka (450 thousand) years (Shichi *et al*. 2007; 2009; **Fig. 5**). The appearance of *Larix* pollen increased during the interglacial intervals suggested the coniferous forests including deciduous larch expand to the southward during relatively cool interglacial intervals, approximately 310 ka (310 thousand) and 200 ka (200 thousand) years ago. Moreover, coniferous forests temporarily decreased and birch trees increased in the abrupt cooling events of approximately 8,200 years ago (Shichi *et al*. 2013).



It is said that there are many endemic species which are still unconfirmed in Lake Baikal and required to clarify the whole biota in the lake and watershed. As for past vegetation research, it is necessary to advance studies on vegetation response to the past short term climate change that are available as analog of the future climate change. It is difficult to participate the research of Lake Baikal from overseas at present because it was almost impossible to take samples for scientific research to outside of Russia since the mid-2000s. Studies on the lake sediments are now slightly performed to use samples which had collected before. Recently, the center for an object of the studies moves to lakes of Mongolia. Additionally, it is possible to research by using the lake samples which were preserved in a long term in the research institute of Japan.

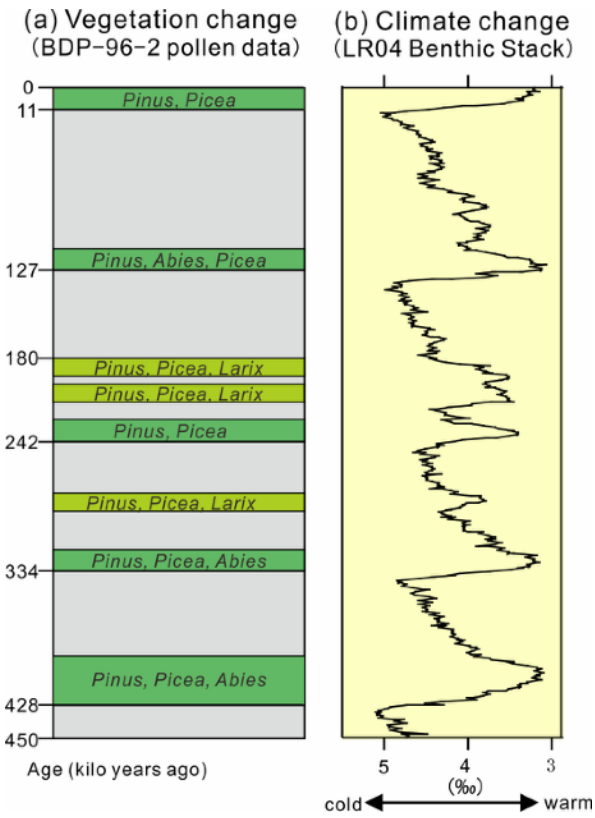


Fig. 5. Vegetation and climate changes in the Lake Baikal region during the past 450 ka (450 thousand) years

(a) Change in dominant taxa in the Lake Baikal region based on pollen analysis of BDP-96-2 core (Shichi *et al*. 2007; 2009)
Green, yellow green, and gray bars indicate expansion periods of evergreen coniferous forests, forests including larch, and sparse cold deserts respectively.

(b) An average δ18O records of globally distributed benthic foraminifera in deep ocean floor (LR04 Benthic Stack; Lisiecki and Raymo 2005)
This figure shows an average of deep ocean temperature in the world. Evergreen coniferous forests expanded in the Lake Baikal region when the average ocean temperature was high and coniferous forests including deciduous larch expanded when the temperature was slightly lower than the warmest period. On the other hand, sparse cold deserts were dominant when the temperature was low.

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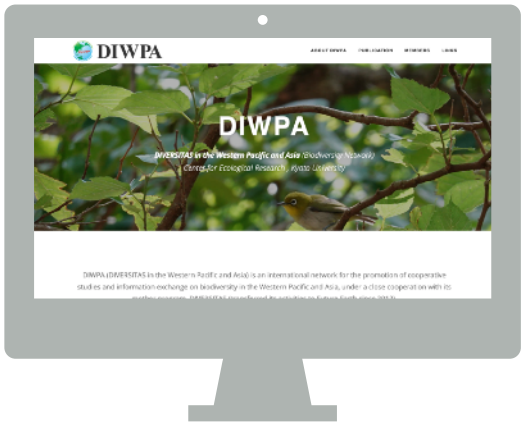
from DIWPA Office

DIWPA website has been redesigned. Enjoy our new website!
https://diwpa.ecology.kyoto-u.ac.jp

DIWPA New Letter is published in PDF format only on our website to promote paperless. Thank you very much for your understanding.



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