



# HOKKAIDO UNIVERSITY

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## Brief Information of Projects

Abstract of oral and poster presentations of informing content of projects without main text and brief sketch of field studies in the Uryu Experiment Forest.

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### **Structure and processes in fluctuating rodents: using long-term monitoring data on the Hokkaido gray sided vole (*Clethrionomys rufocanus*) as a basis for deducing the structure and suggesting possible underlying processes**

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#### **Abstract**

The paper will review earlier work on the population dynamics of the gray sided vole in Hokkaido, as derived from long-term monitoring data. By way of introduction, different approaches to the study of population dynamics will be surveyed – focusing on the contrasting approaches of aiming at deducing the underlying structure (as in time series analysis) and of aiming at deducing the underlying processes (as in experimental studies) generating the observed structures. It is pointed out that both approaches are essential. As a core example illustrating these points, time series studies (focusing on deriving the structure of the dynamics) on the gray sided vole in Hokkaido will be discussed. As part of the presentation, mathematical models will be discussed helping us narrow down the possible processes having generated the observed structures. The paper will conclude that there is no reasonable alternative to long-term monitoring studies for getting at the underlying structure of the dynamics. However, it should also be remembered that experimental studies are efficient means for deducing and testing for the underlying processes. The paper is finally concluded by a brief discussion on the necessity of understanding the underlying population dynamics (both its structure and its underlying processes) when aiming at designing management strategies for a region's biological diversity (as well as in several other applied issues).

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### **Interaction between environmental quality of the watershed and environmental consciousness**

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#### **Abstract**

The Research Institute for Humanity and Nature (RIHN), MEXT, Japan, has been established in Kyoto in April, 2001. The interdisciplinary projects are planned in RIHN, in order to elucidate the interactions between human beings and natural environments. We have been planning a new project entitled "Interaction between environmental quality of the watershed and environmental consciousness with reference to environmental changes caused by the uses of land and water resource". Since the freshwater environment is one of the most important resources for human beings, it must be used and conserved appropriately to assure the possibility for future generations. With respect to the research activities on water and material cyclings and to the facilities, the Lake Shumarinai watershed, where Forest Research Station, Field Science Center for Northern Biosphere, Hokkaido University is located, would be the most suitable site for this project. The project will be composed the following steps: 1) Development of response-prediction model for a watershed environment to the changes in land and water resource uses, 2) Unity of the response-prediction model and economical model for the watershed, and 3) Elucidation of the relationship between environmental qualities and the view of environmental value in the formation process of environmental consciousness. The relationship between the environmental consciousness

and the environmental qualities will be elucidated. Frameworks of the action principle and the mutual agreement for land-use will be proposed, in order to keep sustainability and possibility for future generations.

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## **Strategies for long-term studies on carbon cycle functions of forest ecosystem projected by Center for Global Environmental Research (CGER)**

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### **Abstract**

CGER carries out continuous, long-term and integrative monitoring of the global environment. Here, I would like to introduce the evolution of monitoring on carbon cycle functions of forest ecosystem that is relevant to global warming projects.

As a part of global environment monitoring, CGER, with the cooperation of Hokkaido Regional Forestry Office, has been preparing a site since 1999 for long-term measurement of carbon dioxide and water vapor fluxes of a boreal *Larix* ecosystem in Tomakomai National Forest. By using the international standardized techniques, continuous measurements of various functions of forest ecosystem are being done. The flux site also provides a core field to improve the flux observation methods and to examine the flux evaluation accurately. In this way, we are coordinating the cooperative activities among researchers of various fields, and performing synthetic analysis according to the accumulation of various observed data. In addition, this monitoring project also provides us with the opportunity to gather many flux research teams to construct the "AsiaFlux" network. Hence, the Tomakomai flux site is and will be playing important roles in supporting the AsiaFlux network activities.

Since 2001, CGER started to integratively monitor how the carbon cycle functions will change with silvicultural processes in the catchment basin in Teshio Research Forest, with the cooperation of Hokkaido University and Hokkaido Electric Power Co. Inc..

Furthermore, CGER is characterized by coordinating the global environmental research. The activity of this function would be anticipated in the future monitoring research, which is associated with carbon cycle of terrestrial ecosystem.

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## **Asia research center of studying forest dynamics for monitoring global environmental change**

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### **Abstract**

Hokkaido University Forests were established in 1901 before intensive migration of population occurred from southern Japan to Hokkaido region. Although the forests were mainly used for timber production until ca.1996

for the purpose of timber supply to the university, several primeval forests have been monitored for long-term ecological studies, such as natural regeneration studies, hydrological watershed studies and CO<sub>2</sub> flux monitoring. There are 15 preserve forests and 8 experiment stands belong to University Forests, a total of 70,126 ha belonging to 8 experiment forests located between 33°8'N and 45°0'N. Based on vegetation characteristics, most forested areas are classified into mixed conifer-broadleaved forests in Hokkaido where volcanic ash is the main component of soil (as shown in Figure 1). Representative tree species are belong to the following genus; **angiosperm:** *Abies*, *Pinus*, *Picea* and *Taxus*; **gymnosperm:** *Juglans*, *Populus*, *Salix*, *Betula*, *Fagus*, *Quercus*, *Tilia*, *Fraxinus*, *Acer*, etc. Similar mixed forests are found at the northeastern part of North America where secondary forests develop on infertile Canadian Shield as well as around the southern part of Northern Europe and Estonia on fertile conditions. These forests have almost the same species composition at the genus level and characterize as the transition stage between temperate forests to Taiga or sub-frigid forests. In northeast China, species composition of forests is very similar to northern Japan but the land seems to be relatively fertile. Several reports have been published on these mixed forests from leaf level to stand or ecosystem level. Moreover, there are many permanent plots for monitoring forests dynamics in these three regions. We also would like to be involved in the forest area of northeast China as comparative study site. Each forest has its own characteristics of growth and development of trees through nutrient condition of edaphic factors. Complex effects of recent increase in atmospheric CO<sub>2</sub> and acid deposition could have dramatic effects upon the forests of these regions including changes in ecosystem structure and nutrient dynamics. Forests in Hokkaido, especially around south central part and around Tomakomai Region, may be suffering from phosphate deficiency because of immature volcanic ash as main soil components. Growth and development of forests native to the North America may be facing several feedback regulations due to nutrient deficiency. Growth of European forests may be changed due to an increase in atmospheric CO<sub>2</sub>. In this presentation, we list up available published data related to forest dynamics from leaf to stand level to understand current conditions of the forests and to predict future changes in stand structure and function under global environmental change.

**Key words:** mixed conifer-broadleaved forests, edaphic factors, leaf to stand level, global environmental change, monitoring

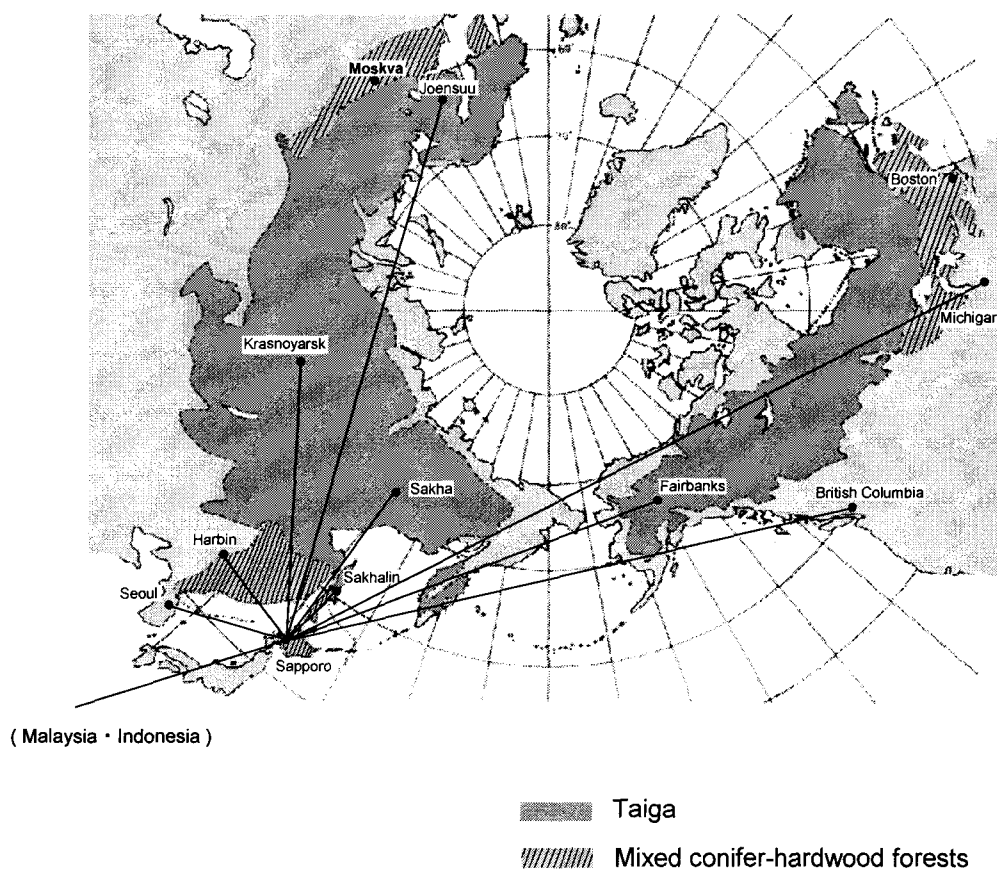


Figure 1. A view of mixed conifer-broadleaf forests distributed in three regions.