The Core to Core symposium:
Objective of the international symposium on

"Regeneration and dynamics of mixed conifer broad-leaved forests in East Asia after Natural and Man-made disturbances"

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We are conducting research project on "Up-scaling evaluation for symptom of environmental changes in permafrost-affected boreal forests" funded by JSPS Core-to-Core Program (FY 2005-2006). The objective of the research project is to establish coordination and cooperation among the scientists from Germany as well as Russia working in the field of nutrient cycling in terrestrial ecosystems to investigate and evaluate the influence of forest disturbance on the balance and cycle of carbon (C) and nitrogen (N) in a large scale in Siberian Taiga.

Boreal forests encircling the Earth above 48° N latitude occupy 21% (861 M ha) of the world's forested land surface. Siberia forested land stores about 447 Gt C, which accounts for 21% of the total amount of C stored in the terrestrial biosphere. Boreal forests have been damaged from forest fire frequently. In severe drought years, 15 to 20 M ha of forests is burnt. Carbon emission from burnt area of 17.9 Mha in 1998 boreal forest fire was estimated to be 290-383 Tg C, of which Russian forest fires accounted for 71%. It corresponds to Japanese total greenhouse gas emission of 355 Tg C occurred in 2000.

Carbon emission rate from boreal forest fire ranges from 8 to 21 t C ha^{-1}. The values are significantly larger than the net primary production (NPP), which is, for example, 1.23 Mg C ha^{-1} y^{-1} in average for Siberian forests estimated by Schulze et al. (1999), and soil respiration, which is 2.73 Mg C ha^{-1} y^{-1} on average for Taiga soils estimated by Raich and Schlesinger (1992). Carbon emission rates may depend on fire intensities. Estimation of carbon emissions with respect to fire intensities is necessary.

The recovery of forests generally requires about 20 years. Nitrogen and other nutrients release through organic matter decomposition, which is stimulated by forest disturbance. However, released N and nutrients can not be re-fixed in ecosystems due to lack of plants in destroyed forests, which may cause nitrate leaching and nitrous oxide (N_2O) emission from disturbed land surface. It is, therefore, necessary to clarify the effect of forest disturbance on N and nutrient movements in soil.

Carbon (C) budget in terrestrial ecosystems, which is determined by photosynthesis, respiration of vegetations, organic matter decomposition, and consumption of C by human and herbivorous animal, is influenced by climate change, and it also strongly influences the climate. Rise on surface air temperature and change in amount of precipitation alter plant productivity and decomposition of soil organic matter. It changes C budget in the ecosystem, then it influences atmospheric carbon dioxide (CO_2) concentration. Plant productivity depends on soil nutrient condition which is determined by soil biological, chemical, and physical processes such as N_2 fixation, denitrification, mineralization, immobilization, weathering, leaching, and so on. Therefore, soil nutrient condition is also influenced by climate change. These indicate that the various factors relating to the interaction between ecosystem C budget and climate change are dependent on each other and they can not be described by single mechanistic model for each phenomenon. Therefore, a holistic approach to explain the whole phenomena is necessary to establish a strategy to protect and revive the ecosystem.

Objective of this symposium is to discuss about the forest management to conserve Siberian Taiga and its vicinity based on the status quo of its environment.

Keywords: Carbon and nitrogen cycling, forest fire, Siberia Taiga,

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