Remote Sensing of Forest Cover in Western Russia and Fennoscandia

Executive summary

This workshop was a follow-up from Novosibirsk GOFC Boreal Forest Workshop (August 2000), which recommended a series of more focused workshops to be convened within different regions of the boreal forest to address the issues specific to those regions. The regional workshop for Western Russia -Fennoscandia region was held in St. Petersburg, Russia on June 25-27, 2001 at the Center for International Environmental Cooperation (INENCO) of the Russian Academy of Sciences. GOFC management (Drs. John Townshend, David Skole, and Chris Justice) attended the workshop and helped guide the workshop deliberations. Several global, regional, national, and local programs are active in the region and were represented at the workshop (i.e., GOFC, NASA, ESA, Russian Academy of Sciences, Forest inventory (Russia), EFI and others). The workshop location enabled a large participation by the Russian scientific and forestry community.

The general theme of the workshop was the **integration of satellite and in-situ observations** for monitoring forest and land cover. Within this general theme the workshop addressed three main objectives: (i) review current uses of remote sensing in studies of forest cover in the region; (ii) examine data requirements and information needs at the global, regional, and national scale; (iii) identify mechanisms for improved coordination among scientists, in particular assess the need for a regional network that would address information needs unique to the region.

Recent and current research projects were presented and discussed during days one and two of the workshop. They address primarily two GOFC themes: "Forest Cover Characteristics and Change" and "Forest Biophysical Processes". The third theme, fires was addressed at all-Russia scale because it is of relatively minor significance for the Western Russia – Fennoscandia region where fires are controlled. The results of ongoing projects indicate that the region has distinct characteristics that set it apart from other boreal forest regions. The distinctive features include:

~ *significant direct human impact throughout the region.* There are very few remaining intact landscapes and natural disturbance regime has been replaced by logging for many decades. There is great interest in the region in conservation measures and in monitoring the remaining intact forests.

~ *active forest management for timber production and recreational use of forests*. This creates a large group of current and potential operational users of remote sensing.

~ *large areas of aggrading forests represent a major carbon sink*. Monitoring carbon accumulation is important for the global and regional studies of carbon exchange.

~ *extensive knowledge base, research infrastructure, forest inventory and monitoring systems* can provide a wealth of in-situ data for interpretation and validation of remotely sensed observations.

Studies in the region developed methods and experience with integration of remotely sensed and in-situ observations. In several projects Landsat, Resurs, ERS, and SPOT imagery was

integrated with in-situ data to map vegetation types and forest biomass. GIS systems were developed for operational forest management and fire monitoring. Multiple studies examined the impact of pollution, urban development, and logging on hydrological network. In-situ data sets and models are being developed for projecting the future dynamics of water run-off, soil organic carbon, and peatland growth. Biophysical properties of forest ecosystems are analyzed with a combination of flux tower measurements and modeling. The review of ongoing projects in the region included 24 oral and poster presentations. The abstracts are available at www.inenco.org.

Several long-term research priorities were identified for the region:
- further development of methodologies to address the following user needs:
    a. assessing and mapping carbon stocks and annual deposition at regional and national levels based on integrated use of remotely sensed and forest inventory data.
    b. detecting change in vegetation cover with spatial resolution of 10-100 m and annual – decadal temporal resolution
    c. detecting biomass change due to forest growth and non-clearcut timber harvest
    d. assess the capabilities of MODIS, MERIS, ASAR, and other instruments for improved mapping of major categories of forest lands, tree species and age composition of forests and the detection of forest decline. Appropriate algorithms will have to be developed.
- development of inter-disciplinary research
    a. increased affiliation with social sciences for better understanding of driving forces and consequences of land-use change
    b. integrated studies to advance understanding of interaction between hydrological processes and carbon cycling
- harmonization of forest cover mapping between countries that make up the region

The workshop participants discussed options for improved coordination and information exchange among scientists and operational data users in the region. The roles of GOFC and regional networks were presented by Dr. J. Townshend. The experience with SEARIN (South-East Asia Regional Information Network) and two African networks (Miombo Network (Southern African Woodlands) and OSFAC (Central African Network – Rainforest) was reviewed based on presentations by Drs. D. Skole and C. Justice. It was decided that a regional network for Northern Europe would address the regional needs for coordination and information exchange. It would also promote collaborative projects and region-wide harmonization of forest cover mapping. Covered by the network will be the forest zone of Western Russia – Baltic countries – Scandinavia, roughly North of 55º N. A separate Siberia-Far East network should be considered to include the eastern part of Russia, Mongolia, China, Korea, and Japan.

As the first step towards organization of the **North-European Regional Information Network (NERIN)** the following activities were recommended:
— Inventory of ongoing and planned projects in the region and associated datasets. The information will be collected from workshop participants and other interested professionals and posted at INENCO web site. Dr. Victorov of INENCO Center and Dr. Krankina of OSU will take the lead on compiling this information.
— Form a coordinating committee to plan the development of the regional network, identify research priorities and benefits for users, and define information and data distribution system. Drs. A. Isaev and T. Hame agreed to co-chair this committee, Dr. Krankina will

      coordinate its work with GOFC and NASA. Additional members will be invited to join this committee as needed.

— Convene a follow-up meeting in Finland (?) in June of 2002. This next meeting should include space agencies, forest inventory organizations, other established networks (EFI, IUFRO). Dr. Hame will contact EFI Director Dr. Paivinen with request to host the next workshop.

— In preparation for this next workshop scientists active in the region are invited to propose to the coordinating committee their ideas for pilot/demonstration projects to help cement the newly established network.

Conclusions

The western part of the Former Soviet Union and Fennoscandia represent a distinct region within the boreal forest with common land-use history and forest types, controlled fires, and active forest management for timber production playing an important role in local economies. The region was shown to be an active carbon sink in the past decades. Countries within the region share many common challenges in land and forest resource management. The systems for collection of in-situ observations, in particular the forest inventory systems, are extensive and well maintained. The proposed development of the regional information network will help integrate these and other extant datasets into the framework of GOFC. The network will promote international cooperation and coordination within the region and advance the GOFC goal to improve the quality and availability of satellite observations of forests at regional and global scales and to produce useful, timely, and validated information products from these data for a wide variety of users. The network will synthesize and update the region-specific requirements for observations and products, work with government agencies to improve access to data, and help coordinate regional research agendas with global remote sensing community.