Circumboreal Vegetation Mapping Project (CBVM)

Boreal forest in North America.

THE BOREAL ZONE

The boreal zone is the earth's largest biome, covering 10% of the world's land mass and constituting 33% of the forest cover, as well as a large proportion of the world's natural wetlands and peatlands. It extends across North America and Eurasia, where it is termed the taiga, and lies south of the tundra and north of deciduous forests and grasslands. The boreal zone's northern boundary is generally the northern tree limit. The forests are comprised mostly of coniferous species that are adapted to a cool climate and relatively short growing season. It constitutes one of the world's largest ecologically intact forest regions where natural forces such as fire and insects continue to be the principal disturbance agents. In North America, the boreal zone covers 627 million ha, with 88% of this area lying within Canada.

Uses of the Circumboreal Map

The CBVM will be a rich source of ecological knowledge and have numerous applications for scientists and land managers. As a map of the potential natural vegetation of the boreal biome, it will portray on a global basis the distribution of vegetation types based on the interaction of climate and soil conditions as they would probably have existed in the absence of anthropogenic disturbances. This is possible because for most of the last century vegetation ecologists in Eurasia and North America collected data on the species composition and structure of plant communities, established plant community classifications and studied the ecological relationship between terrain and vegetation. Thus, the CBVM will form a global benchmark of boreal vegetation prior to the accelerated anthropogenic disturbances and global changes that occurred in the latter part of the 20th century and thereby support future monitoring.

Within Canada, it will provide a new national standard for ecological zonation and reporting by providing more detail on vegetation types to complement existing ecological zonation developed in the 1990s. Also, because vegetation is a strong surrogate for wildlife habitat, the comparison of the CBVM with satellite imagery will permit assessment of the location, nature and extent of habitat change in the boreal region. Within the context of sustainable forest management the CBVM will support the monitoring of biodiversity criteria related to change from historical conditions and fragmentation and help clarify management objectives, particularly "emulating natural ecosystems".

Nature of the project

The CBVM project was initiated by the Arctic Council at the 2007 meeting of the Flora Subgroup of the Conservation of Arctic Flora and Fauna (CAFF). The Arctic Council's interest arises from the fact that most of the Arctic Basin is fed from watersheds originating in the boreal zone. Also, the boreal vegetation map was considered to be a natural extension of the Circumpolar Arctic Vegetation Map published by CAFF in 2007. It can be viewed at http://www.arcticatlas.org/maps/themes/cp. Due to the international nature of the boreal biome, a common framework for comparison of vegetation within the biome would facilitate better global management and conservation.

The Canadian Forest Service, Great Lakes Forestry Service, plays a lead role in coordinating the forest component of the Canadian National Vegetation Classification (CNVC) project. The vegetation classification is an essential prerequisite to developing a national vegetation map legend. Also, the network of regional ecologists participating in the CNVC serves as a logical source of expertise for undertaking the Canadian component of CBVM.

The mapping project entails international collaboration amongst all 13 member countries that have portions of the boreal zone, as the map will depict its distribution and boundaries, including most of the watersheds emptying into the Arctic Basin. To ensure consistency in vegetation mapping methods, the map will be based on a legend that is accepted by the international community of plant scientists.

GREAT LAKES FORESTRY CENTRE (GLFC) ROLE

The Canadian Forest Service has endorsed the CBVM project and assigned Bill Meades of GLFC to coordinate the Canadian component. Meades also leads the North American team, which includes representatives from Alaska and Canada.

The CBVM is being developed by integrating geological maps, biogeoclimatic zonation and national vegetation data that have been synthesized through the Canadian National Vegetation Classification. GLFC ecologist, Ken Baldwin, is coordinator of the forest and woodland

Canada

Project Collaboration Chronology

Date	Location/Attendees	Outcome
2007		**CBVM project launched**
November 2008	Helsinki, Finland 47 scientists from 10 countries	• Established teams for North America and Eurasia to coordinate mapping • Established 4 expert working groups (Legend development, Remote Sensing, Biogeoclimatic Zonation and Coordination) • Agreed map would be Potential Natural Vegetation mapped at a scale of 1:7,5,000,000 using MODIS satellite imagery as an international base map
April 2009	Uppsala, Sweden CAFF	• Eurasian Team provided a 1st approximation of the principles and approach to the CBVM legend development and mapping
December 2009	Sault Ste Marie, Canada	• reviewed the Eurasian proposal and established a Legend Committee to develop a North American response • agreed to support the Bioclimatic Mapping approach of Dr. Daniel Sanchez (Complutense University, Spain) to integrate climate and vegetation relationship
March 2010	Helsinki, Finland	• North American proposal was presented and discussed draft of a higher level legend was developed and will be refined by the International Legend Committee. Pilot mapping will proceed using the lower levels of the legend in both Eurasia and North America • North American pilots will be undertaken in Alaska, British Columbia, Ontario and Quebec • Pilot vegetation mapping will utilize narrow transects along known climatic and physiographic gradients to test the application of the draft vegetation legend and develop recommendations for improvement where necessary.

component of the Canadian National Vegetation Classification (CNVC) project and is providing leadership for the development of the North American Map Legend.

GLFC has also teamed up with scientists at Natural Resources Canada, Canada Centre for Remote Sensing for the use of their global MODIS mosaic to serve as the base map for CBVM. The mosaic has been transferred to regional pilot teams in North America and Eurasia for use in the CBVM mapping pilots this year (2011). The final products, the Circumboreal map of vegetation and accompanying database describing the vegetation in detail, are expected to be published in 2016.

Governance
Within the CBVM international Project Teams have been established for Vegetation Legend development, Biogeoclimatic Zonation and Remote Sensing. The project will be co-led by Russian and North American experts, with the work being done by regional teams from the various countries.

CONCLUSION
The CBVM project recognizes the boreal region as a single global ecosystem with a common set of cultural, political and economic issues and will produce the first detailed vegetation map of the entire global biome. Currently, the various maps that exist of the boreal biome are not based on a unified method for classifying and mapping vegetation. To achieve a standard approach among all countries with boreal forest, extensive national and international collaboration is required to harmonize the various classification systems currently in place. The development of a global map with a common vegetation mapping system and legend will be a useful tool for a wide variety of purposes related to resource development, land-use planning, studies of boreal biota and biodiversity, education, anticipated global changes, human interaction and monitoring.

COLLABORATORS
The entire project is a cooperative effort, under the auspices of the Arctic Council's Conservation of Arctic Flora and Fauna (CAFF) Working Group. In Canada, pilot projects are being undertaken with the British Columbia Ministry of Forests and Range, the Quebec Ministère des Ressources naturelles et de la Faune, and the Ontario Ministry of Natural Resources. More information on collaboration and presentations at CBVM workshops can be found at www.CBVM.org

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SUGGESTED READING
Brandt, J.P. 2009. The extent of the North American boreal zone. Environ. Rev. 17: 101-161.

Baldwin, K. 2010. Canadian Forest Ecosystem Classification System (CFEC). Natural Resources Canada, Canadian Forest Service, Great Lakes Forest Centre, Sault Ste. Marie, Ontario. Frontline Express Note 38, 2 p.