

# IASC Workshop Summary Report

**Title of workshop:** Arctic Vegetation Archive (AVA) Workshop

**Convener:** Skip Walker

**Location:** Kraków, Poland

**Dates:** 14-16 April 2013

**Sponsors of the Workshop:** IASC Terrestrial Working Group, CAFF Flora Group, and NASA Land Cover and Land Use Change Program

## **Overview of the workshop:**

**Summary paragraph:** Forty-two people participated in the workshop and presented 25 papers. The topics of the papers included reviews of the history and need for the AVA, the status of vegetation data collection and classification in each of the circumpolar countries, and reviews of the various database approaches that are being used. The major accomplishments of the workshop were: 1) a thorough review of the numbers and quality of plot samples in each of the countries; 2) a consensus among the Arctic countries regarding the geographic scope of the database, the types of data that will be included, and the general approach for building the database; and 3) the initial steps for recruiting people and resources to complete the database. The following report contains the daily activities of the workshop, major accomplishments of the workshop, and final workshop resolution.

## **Day 1: Joint CAFF FG/AVA meeting, review of the AVA concept, species database issues, and potential applications of the AVA**

The first day of the meeting contained a joint meeting between the AVA group and the CAFF Flora Group that met during the preceding two days (April 12-13). After welcomes by Skip Walker and Kári Fennar Larusson (CAFF Program Officer), the meeting began with a keynote address by Fred Daniëls, who reviewed the history of the AVA and need for the database. Marilyn Walker, who initiated the idea of an international approach in 1992 (Walker et al. 1994), reflected on the 21 years of progress in international collaboration and database technology that brought us to the point where such an archive is now achievable. Much of the remainder of the morning was devoted to species-level issues related to maintenance of the CAFF species lists (presentations by Steffi Ickert-Bond and Martha Reynolds) and local floras (Olga Khitun). The CAFF species lists of Arctic vascular plants, lichens, and mosses are key elements of the database that are needed for a list of accepted species names that are used across all the plot samples in the database. These lists have been combined into the Pan Arctic Species List (PASL), which is the list of accepted names of vascular plants, mosses, lichens and liverworts used in the AVA. The group recognized the need for regular updates of the species lists, and a general consensus was reached regarding the mechanism required to accomplish this. More specifics are needed for developing a liverwort list and individuals responsible for the moss list. In the afternoon, the discussion shifted to potential applications of the AVA including as a source for understanding spatial distribution of Arctic biodiversity (Loïc Pellissier and Laerke Stewart) and assessing biodiversity feedbacks to climate change (Gabriela Schaepman-Strub, Maitane Iturrate & Reinhard Furrer).

## **Day 2: Status circumpolar vegetation data set and database approaches**

In the morning, twelve papers presented the status of circumpolar plot-based vegetation studies, including reviews from Alaska (Amy Breen et al.), Arctic Canada (Esther Levesque et al.), Greenland (Helga Bultman et al.), Scandinavia (Lennart Nilsen & Dietbert Thannheiser delivered by Fred Daniëls), the boreal tundra region of the North Atlantic and North Pacific (Anna Marie Fosaa et al.), Russia in total (Nadya Matveyeva et al. delivered by Elena Troeva),

northwest Yakutia (Michael Teyatnikov et al.) the Kola Peninsula (Natalia Koroleva delivered by Skip Walker), the European sector of the Russian Arctic (Ekaterina Kulygina), three sectors of Siberian Arctic (Kikolay Lashchinskyi), the Yamal and Gydan Peninsulas (Ksenia Ermokina), and Chukotka (Vladimir Razzhivin, abstract only). In the afternoon, four papers presented the main database approaches that are being used for the European Vegetation Archive (Borja Jiménez-Alfaro), the Canada National Vegetation Classification (Will Mackenzie), the U.S. National Vegetation Classification (Mike Lee) and the Russian database IBIS (Alexander Novakovskiy).

***Day 3: Development of a mission statement, workshop resolution, funding possibilities and publications***

In the morning three working groups discussed: 1) the mission and applications of the AVA, 2) the geographic scope of the project, and 3) issues related to the database construction. After reconvening a mission statement and workshop resolution were developed by the workshop participants. Prospects for funding, and plans for publication of the workshop outcomes were also discussed and agreed to and the meeting was adjourned.

**Major accomplishments of the workshop:**

- Reviewed the status of relevé data and database approaches in each of the circumpolar countries.
- Developed a resolution by the circumpolar Arctic vegetation community to rededicate itself to developing an Arctic Vegetation Archive using an approach that is acceptable to all involved.
- First steps were made in recruiting the people and resources necessary to complete the work.

***Mission and justification of the AVA:***

*The mission of the Arctic Vegetation Archive Working Group is to create a database of Arctic plot data, and promote its application to northern issues.*

The AVA will be useful for a wide variety of purposes, including: Preserving legacy data sets in danger of being lost; designing, locating and extrapolating field experiments at Arctic Observing Stations; identifying research gaps; mapping and remote sensing of vegetation, habitat types, and land cover; assessing Arctic terrestrial biodiversity and biogeographic relationships; modeling functions and ecosystem services of Arctic vegetation; educating scientists, the public and policy makers about the value of Arctic terrestrial systems in relation to local to global systems; industrial and land-use planning; and conserving and managing Arctic terrestrial ecosystems.

Additionally, the AVA is directly relevant to several other circumpolar efforts of the Arctic Council and national Arctic initiatives including:

- **Circumpolar Biodiversity Monitoring Programme and the Arctic Biodiversity Assessment:** The AVA is a foundation data set to assess changes in Arctic plant biodiversity and habitat for other trophic levels.
- **Inter-Act:** One of Inter-Act's goals is the discovery and preservation of key legacy vegetation data sets.
- **Back to the Future:** Many of the data sets are from old International Biological Programme (IBP), ongoing Long-Term Ecological Research (LTER) and other large-scale ecosystem studies established in the 1960s to 1990s. These datasets contain information regarding the baseline condition of the Arctic before the modern era of rapid climate change.

- **Arctic Development and Adaptation to Permafrost in Transition (ADAPT) and other permafrost-related initiatives:** Vegetation is the key element of the “buffer layer” that protects the permafrost from catastrophic thawing. A consistent means to characterize this layer would be highly beneficial to permafrost scientists.
- **International Tundra Experiment (ITEX):** Characterization of control plots and baseline studies would benefit from a consistent means to characterize vegetation across the ITEX network.
- **Arctic Polar Early Career Scientists (APECS):** The next generation of international terrestrial ecosystem scientists would benefit immensely from a consistent international approach to describing the land cover of the Arctic. The AVA would provide this framework. The AVA will strive to involve young investigators to develop, implement, and use the AVA.

**Products of the AVA:** The AVA will use the Panarctic Flora as a common taxonomical base to develop a comprehensive synthesis of Arctic phytosociological information through the publication of a Prodrum of Arctic vegetation syntaxa (list of plant community types); publication of a bibliography of Arctic vegetation studies, development of a revised syntaxonomical classification for the circumpolar Arctic, and web-portal with descriptions photos, maps, and ancillary information related to the vegetation units. Some early potential applications of the AVA are described a recent publication (Walker et al. 2013), and others were described at this workshop.

**Types of data to be included:** Preferably published plot data from homogeneous plant communities with tables of cover or cover-abundance scores for all species, including vascular plants, bryophytes, and lichens, preferably with accompanying environmental geographic location information. Braun-Blanquet or USNVC protocols are ideal. High priority will also be given to datasets that are in danger of being lost.

**Geographic framework of the AVA:** The boundaries of the Arctic as defined by the Circumpolar Arctic Vegetation Map (CAVM Team 2003), which will be modified to include the Arctic portion of the Kola Peninsula in Russia. The database will also include the boreal maritime tundra areas (Aleutian Islands, Iceland, Faroe Islands, Commodore Islands). The group of vegetation scientists working in this region will need to resolve the issues related to boreal species that will be required for the PASL.

**Database approaches:** A conceptual framework for the database (Walker and Reynolds 2011) was modified with data nodes in each country (perhaps several for Russia). The database Turboveg (Hennekens and Schaminee 2001) will be the standard for initial data entry and the procedures being developed for the European Vegetation Archive (Chytrý et al. 2012) will be used as a preliminary model. Metadata standards will follow in part those of the Global Inventory of Vegetation Databases (Dengler et al. 2011). Protocols for formatting vegetation and environmental data, metadata, and minimum requirements for data are under development in two proto-type databases for Greenland and Arctic Alaska. We will strive for maximum compatibility with databases in other countries, including VegBank in the U.S. (Peet et al. 2012), Vpro in Canada (MacKenzie and Klassen 2004), and IBIS, a database commonly used in Russia. Countries using database approaches other than Turboveg will require vegetation data exchange standards currently under development (Wiser et al. 2011) to conform to the AVA. The PanArctic Species List (Reynolds et al. n.d.) will be the list of accepted plant names. The list will be updated at regular to-be-determined intervals and crosswalked to other synonyms used in the initial plot data and in other national vegetation classification schemes. The IASC data protocols regarding data sharing

and credit to database contributors will be used (Parsons et al. 2013). A preliminary framework and dataflow diagram will be used in the beginning. Considerable work remains to address the details of the data protocols. A database group chaired by Marilyn Walker will develop the protocols.

**Publication of proceedings of the workshop:** Authors will prepare 5-6 page short papers based on their presentations at the workshop. These will be published as a CAFF Proceedings volume. The results will be synthesized into a paper that will be submitted to the journal *Applied Vegetation Science* or other appropriate journal.

**Funding:** Funding for the AVA will be pursued by each country. The Alaska portion has nearly been secured through a NASA grant to D.A. Walker that is part of the of the data gathering phase for the Arctic and Boreal Vulnerability Experiment (ABOVE). The Canada High Arctic Research Station (CHARS) has committed to supporting the Canadian portion of the database. The Russian participants will pursue a new mega-grant proposal that will be submitted to the Government of the Russian Federation by Michael Cherosov and a group of Russian colleagues from several insitutions. Participants from the EU and other European countries (Czech Republic, Iceland, Norway, Denmark, Germany, Poland) will pursue funding for Greenland, Svalbard, and northern Scandinavia. This is very important because of the long heritage of phytosociological research and large amount of data in these countries that is not archived.

**Timeline:** A 6-year timeframe is contingent on funding. Years 1-2 will be devoted to organizing national workshops, obtaining internation funding, completing IAVD prototypes, and collecting the key data sets. During years 2-4, we will assemble data from literature sources at several nodes, build server site software, and build web pages for the data portal. In years 5-6 we will test and release the AVA.

***Workshop Resolution for Preparation of an Arctic Vegetation Archive:***

Whereas, the distribution, characteristics, and history of Arctic flora and vegetation are of essential importance with regard to (1) knowledge of how circumpolar terrestrial ecosystems interact with climate and contribute to the changing earth system, (2) conservation of the biodiversity of these regions; and (3) increasing exploration and development in the circumpolar nations; and

Whereas, our knowledge of arctic regions and the environmental constraints on arctic vegetation has increased;

Whereas, no single existing classification accurately portrays the synthesis of existing knowledge of the vegetation of the circumpolar Arctic;

Whereas an Arctic Vegetation Archive will be useful for a wide variety of purposes, including: Preserving legacy data sets in danger of being lost; classifying and analyzing Arctic vegetation; designing, locating and extrapolating field experiments; identifying research gaps; mapping, remote sensing of vegetation, habitat types, and land cover; assessing Arctic terrestrial biodiversity and biogeographic relationships; modeling functions and ecosystem services of Arctic vegetation; educating scientists, the public and policy makers about the value of Arctic terrestrial systems in relation to the global system; land-use planning, conserving and managing Arctic terrestrial ecosystems.

And whereas the International Arctic Research Committee and the Conservation of Arctic Flora and Fauna have endorsed the concept of an international Arctic vegetation database,

Be it resolved that the international community of Arctic vegetation scientists rededicates itself to the tasks of:

**1) Developing an international organizational framework and securing funds for the Arctic Vegetation Archive (AVA); 2) compiling vegetation plot data (relevés) into the AVA using the Panarctic species lists as a common taxonomical base; 3) developing a syntaxonomical classification for the circumpolar Arctic; 4) publishing a compilation of Arctic vegetation types (Prodromus) and a bibliography of Arctic vegetation studies; and 5) promoting application of the AVA to northern issues.**

Finally, be it resolved that the undersigned scientists will create a prototype Arctic Vegetation Archive by the 3<sup>rd</sup> International Conference on Arctic Research Planning (ICARP III) in 2017.

Signed by 20 members present on the final day of the workshop, 16 April 2013, Krakow, Poland.

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