Wetlands in Arctic

Monaco Arctic Experts Meeting

3-6 March, 2009

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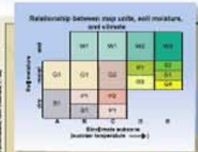
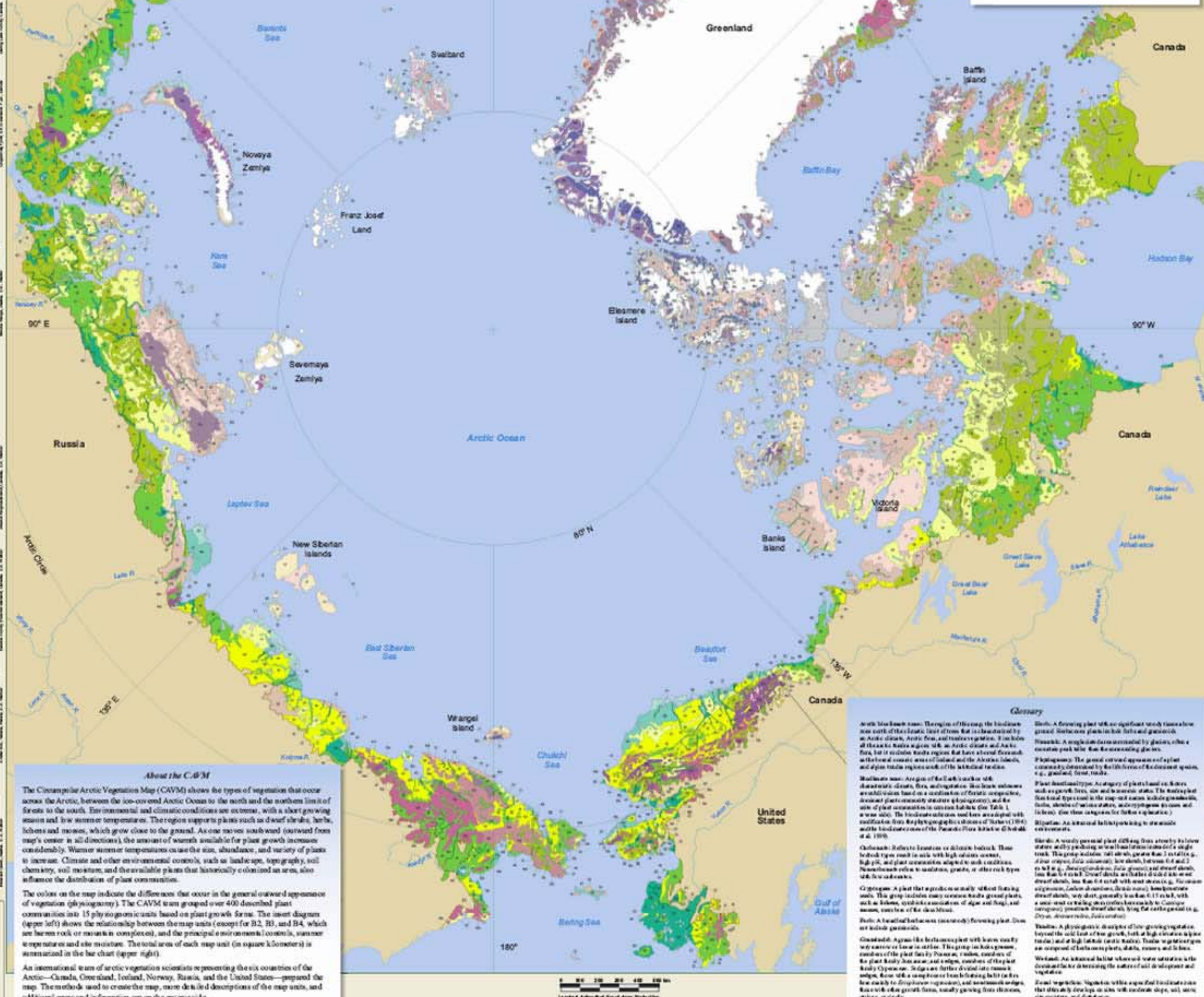
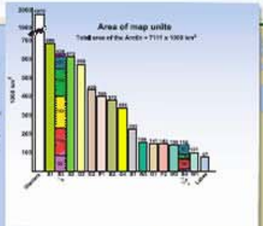
The wetlands can make up to the 60 % of all Arctic ecosystems

- Permafrost peatlands (polygonal, shallow peat tundra, palsa mires);
- shallow lakes;
- rivers and deltas;
- periodically flooded lands;
- coastal wetlands;
- shallow sea waters

Circumpolar Arctic Vegetation







Barrens

B1. Cryptogam, herb barren
Dry to wet barren landscapes with very sparse, very low-growing plant cover. Scattered herbs, lichens, mosses, and liverworts. *Subzone A and B, some C at higher elevations.*

B2. Cryptogam barren complex (bedrock)
Areas of exposed rock and lichens interspersed with lakes and more vegetated areas, as found on the Canadian Shield. *Subzones C and D.*

B3. Noncarbonate mountain complex
Mountain vegetation on noncarbonate bedrock. The variety and size of plants decrease with elevation and latitude. Hatching color and code indicate the bioclimate subzone at the mountain base. B3a through B3e indicate subzones A through E; B3n indicates noncarbonate nunatak areas. For more explanation see reverse side.

B4. Carbonate mountain complex
Mountain vegetation on carbonate bedrock. The variety and size of plants decrease with elevation and latitude. Hatching color and code indicate the bioclimate subzone at the mountain base. B4b through B4e indicate subzones B through E; B4n indicates carbonate nunatak areas. For more explanation see reverse side.

Graminoid tundras

G1. Rush/grass, forb, cryptogam tundra
Moist tundra with moderate to complete cover of very low-growing plants. Mostly grasses, rushes, forbs, mosses, lichens, and liverworts. *Subzones A and B.*

G2. Graminoid, prostrate dwarf-shrub, forb tundra
Moist to dry tundra, with open to continuous plant cover. Sedges are dominant, along with prostrate shrubs < 5 cm tall. *Subzone C, some B.*

G3. Nontussock sedge, dwarf-shrub, moss tundra
Moist tundra dominated by sedges and dwarf shrubs < 40 cm tall, with well-developed moss layer. Barren patches due to frost boils and periglacial features are common. *Subzones D and C, some E.*

G4. Tussock-sedge, dwarf-shrub, moss tundra
Moist tundra, dominated by tussock cottongrass (*Eriophorum vaginatum*) and dwarf shrubs <40 cm tall. Mosses are abundant. *Subzone E, some D.*

Glaciers
Treeline – [illegible]
Riparian corridors – [illegible]
Water
Non-Arctic areas

Prostrate-shrub tundras

P1. Prostrate dwarf-shrub, herb tundra
Dry tundra with patchy vegetation. Prostrate shrubs < 5 cm tall (such as *Dryas* and *Salix arctica*) are dominant, with graminoids and forbs. Lichens are also common. *Subzones B and C.*

P2. Prostrate/Hemiprostrate dwarf-shrub tundra
Moist to dry tundra dominated by prostrate and hemiprostrate shrubs < 15 cm tall, particularly *Cassiope*. *Subzone C.*

Erect-shrub tundras

S1. Erect dwarf-shrub tundra
Tundra dominated by erect dwarf-shrubs, mostly < 40 cm tall. *Subzone D.*

S2. Low-shrub tundra
Tundra dominated by low shrubs > 40 cm tall. *Subzone E.*

Wetlands

W1. Sedge/grass, moss wetland
Wetland complexes in the colder areas of the Arctic, dominated by sedges, grasses, and mosses. *Subzones B and C.*

W2. Sedge, moss, dwarf-shrub wetland
Wetland complexes in the milder areas of the Arctic, dominated by sedges, grasses, and mosses, but including dwarf shrubs < 40 cm tall. *Subzone D.*

W3. Sedge, moss, low-shrub wetland
Wetland complexes in the warmer areas of the Arctic, dominated by sedges and low shrubs > 40 cm tall. *Subzone E.*

About the CAVM

The Circumpolar Arctic Vegetation Map (CAVM) shows the types of vegetation that occur across the Arctic, between the ice-covered Arctic Ocean to the north and the northern limit of forests to the south. Environmental and climatic conditions are extreme, with a short growing season and low summer temperatures. The region supports plants such as dwarf shrubs, herbs, lichens and mosses, which grow close to the ground. As one moves southward (outward from map's center in all directions), the amount of warmth available for plant growth increases considerably. Warmer summer temperatures cause the size, abundance, and variety of plants to increase. Climate and other environmental controls, such as landscape, topography, soil chemistry, soil moisture, and the available plants that historically colonized an area, also influence the distribution of plant communities.

The colors on the map indicate the differences that occur in the general outward appearance of vegetation (physiognomy). The CAVM team grouped over 400 described plant communities into 15 physiognomic units based on plant growth forms. The insert diagram (upper left) shows the relationship between the map units (except for B2, B3, and B4, which are barren rock or mountain complexes), and the principal environmental controls, summer temperature and site moisture. The total area of each map unit (in square kilometers) is summarized in the bar chart (upper right).

An international team of arctic vegetation scientists representing the six countries of the Arctic—Canada, Greenland, Iceland, Norway, Russia, and the United States—prepared the map. The methods used to create the map, more detailed descriptions of the map units, and additional maps and information are on the reverse side.

Glossary

Arctic bioclimate zone: The region of this map, the bioclimate zone north of the climatic limit of trees that is characterized by an Arctic climate, Arctic flora, and tundra vegetation. [illegible]

Bioclimate zone: A region of the Earth's surface with characteristic climate, flora, and vegetation. [illegible]

Carbonate: Refers to limestone or dolomite bedrock. [illegible]

Cryptogam: A plant that reproduces sexually without flowering seeds. [illegible]

Forb: A broadleaf herbaceous (nonwoody) flowering plant. Does not include graminoids.

Graminoid: A grass-like herbaceous plant with leaves usually very narrow or linear in outline. [illegible]

Herb: A flowering plant with no significant woody tissue above ground. Herbaceous plants include forbs and graminoids.

Nunatak: A single summit surrounded by glaciers, often a mountain peak taller than the surrounding glaciers.

Physiognomy: The general outward appearance of a plant community, determined by the life forms of the dominant species, e.g., grassland, forest, tundra.

Plant functional type: A category of plants based on factors such as growth form, size and taxonomic status. [illegible]

Riparian: An azonal habitat pertaining to streamside environments.

Shrub: A woody perennial plant differing from a tree by its lower stature and by producing several basal stems instead of a single trunk. [illegible]

Tundra: A physiognomic descriptor of low-growing vegetation beyond the cold limit of tree growth, both at high elevation (alpine tundra) and at high latitude (arctic tundra). [illegible]

Wetland: An azonal habitat where soil water saturation is the dominant factor determining the nature of soil development and vegetation.

Zonal vegetation: [illegible]

Circumpolar Arctic Vegetation Map

CAVM Mapping Team: [illegible]

Project Director: [illegible]

Compilation and Cartography by: [illegible]

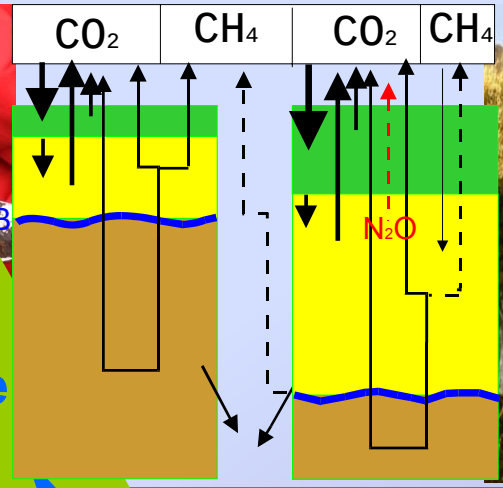
Produced by: [illegible]

Funded by: [illegible]

Suggested Citation: [illegible]

Web sites: [illegible]

What children and ministers should know about peatlands in Arctic!!!



Peatland is a wetland

a) waterlogging dela

b) dead plants form

c) peat accumulat ears storing concentrated hick layers;

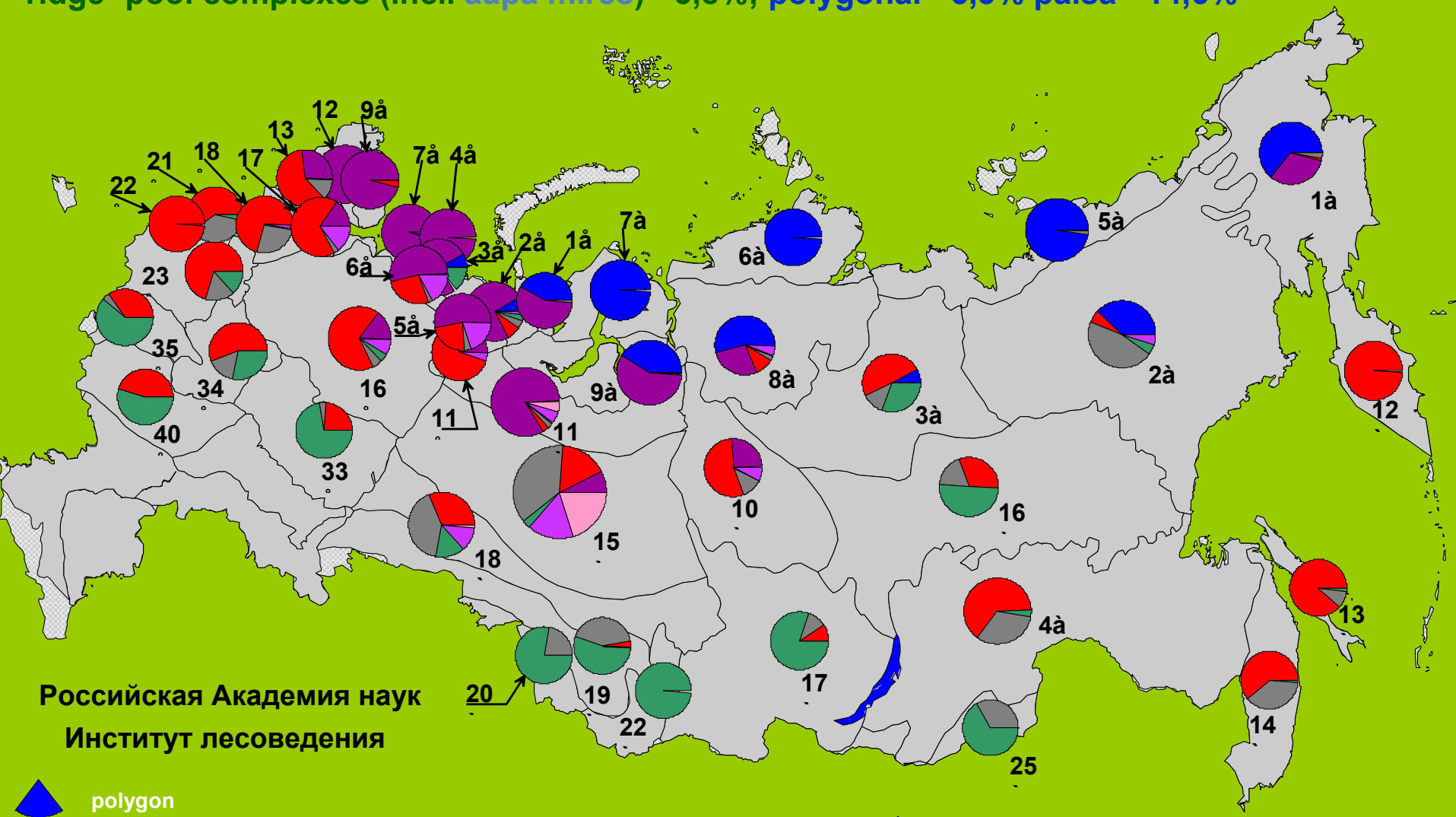
d) as soon as p vs or burns with emission o

e) as soon a varm conditions – methanogenesis starts (CH_4)

f) peat is an ideal thermoisolating material for

Peatland types distribution in Russia

raised bogs - 18,8%; transition mires - 30,0% fens - 18,3%; ridge- hollow complexes - 7,2%
ridge- pool complexes (incl. aapa mires) - 5,8%; polygonal - 5,3% palsa - 14,6%



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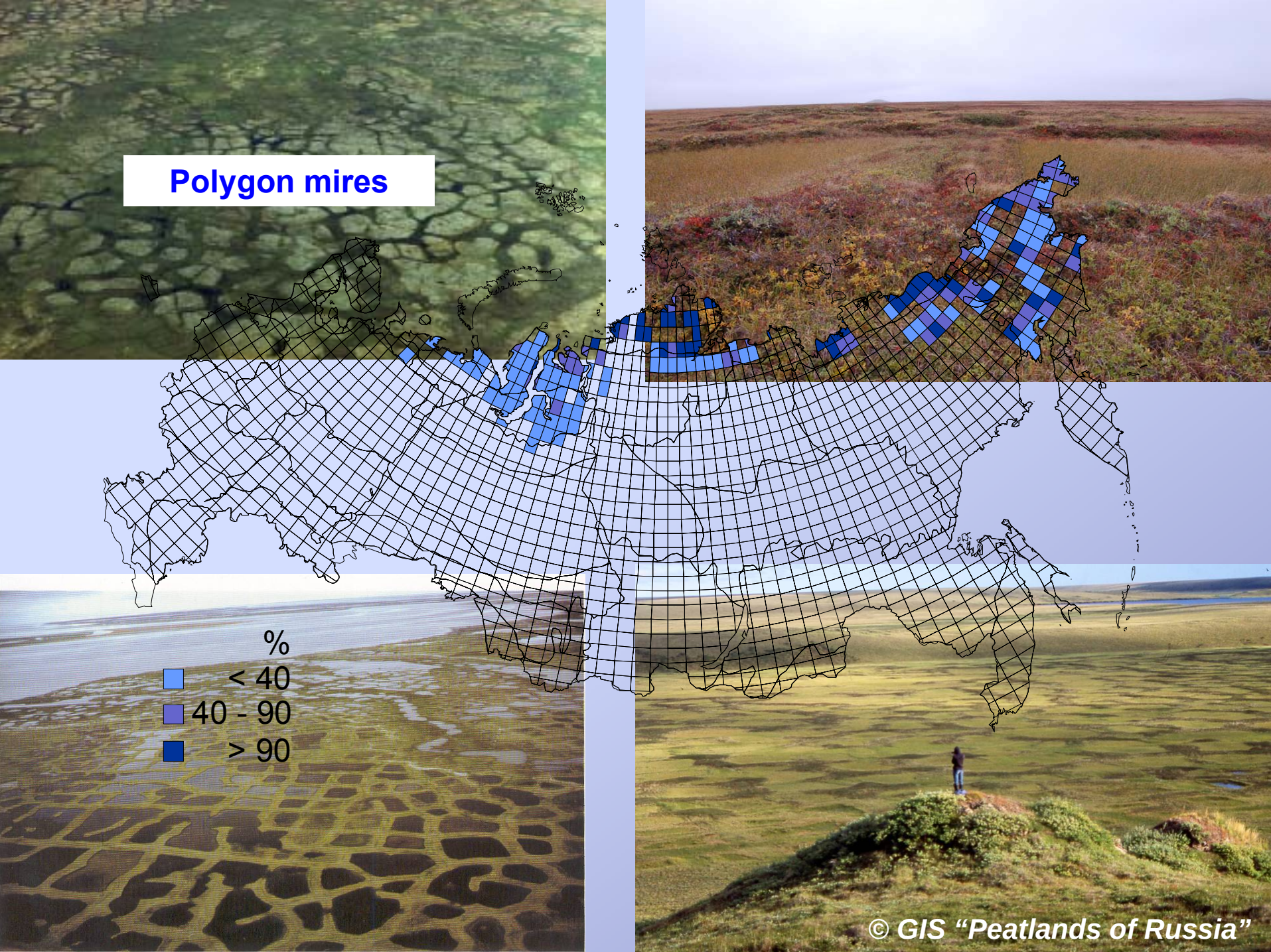
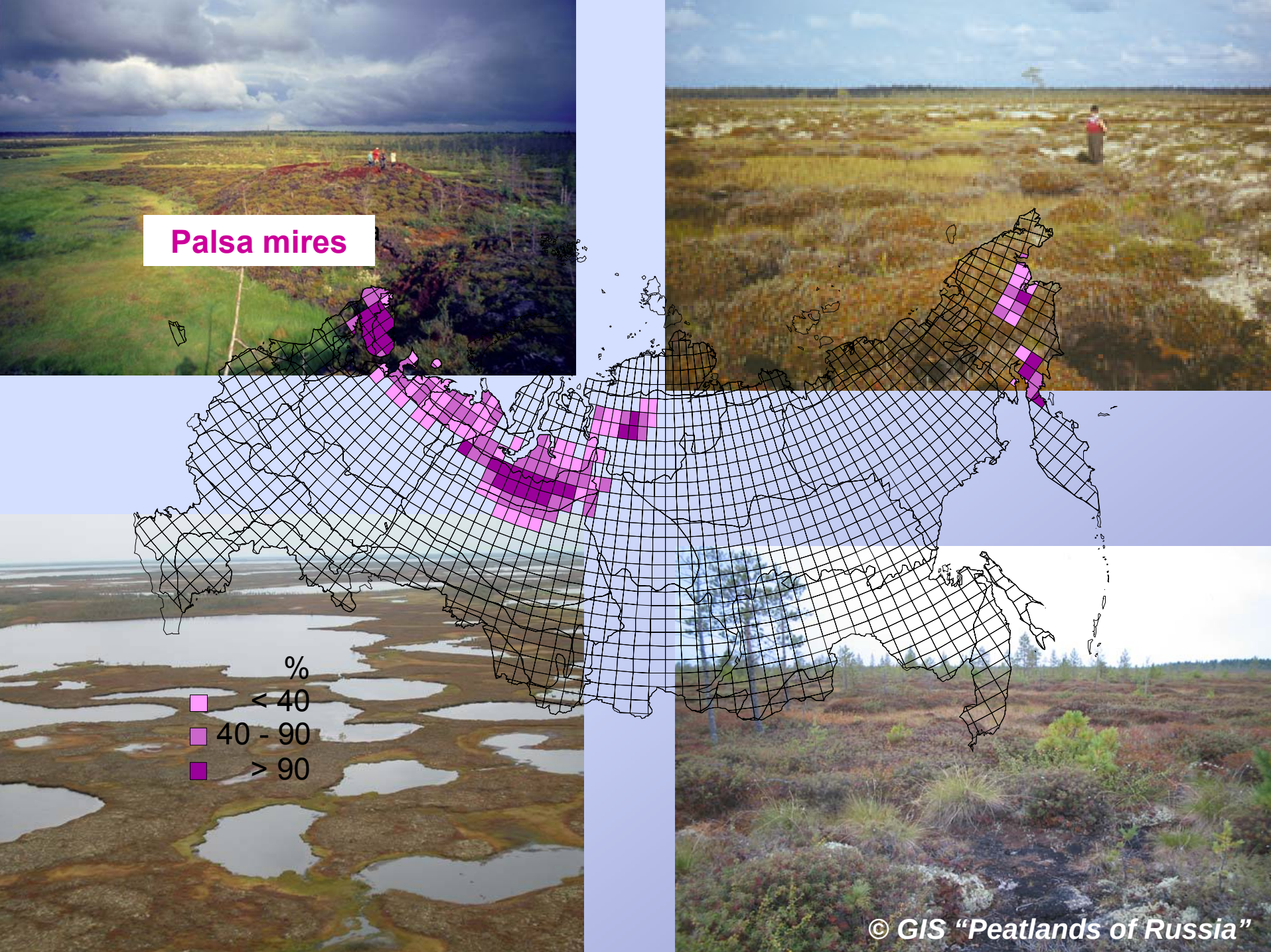
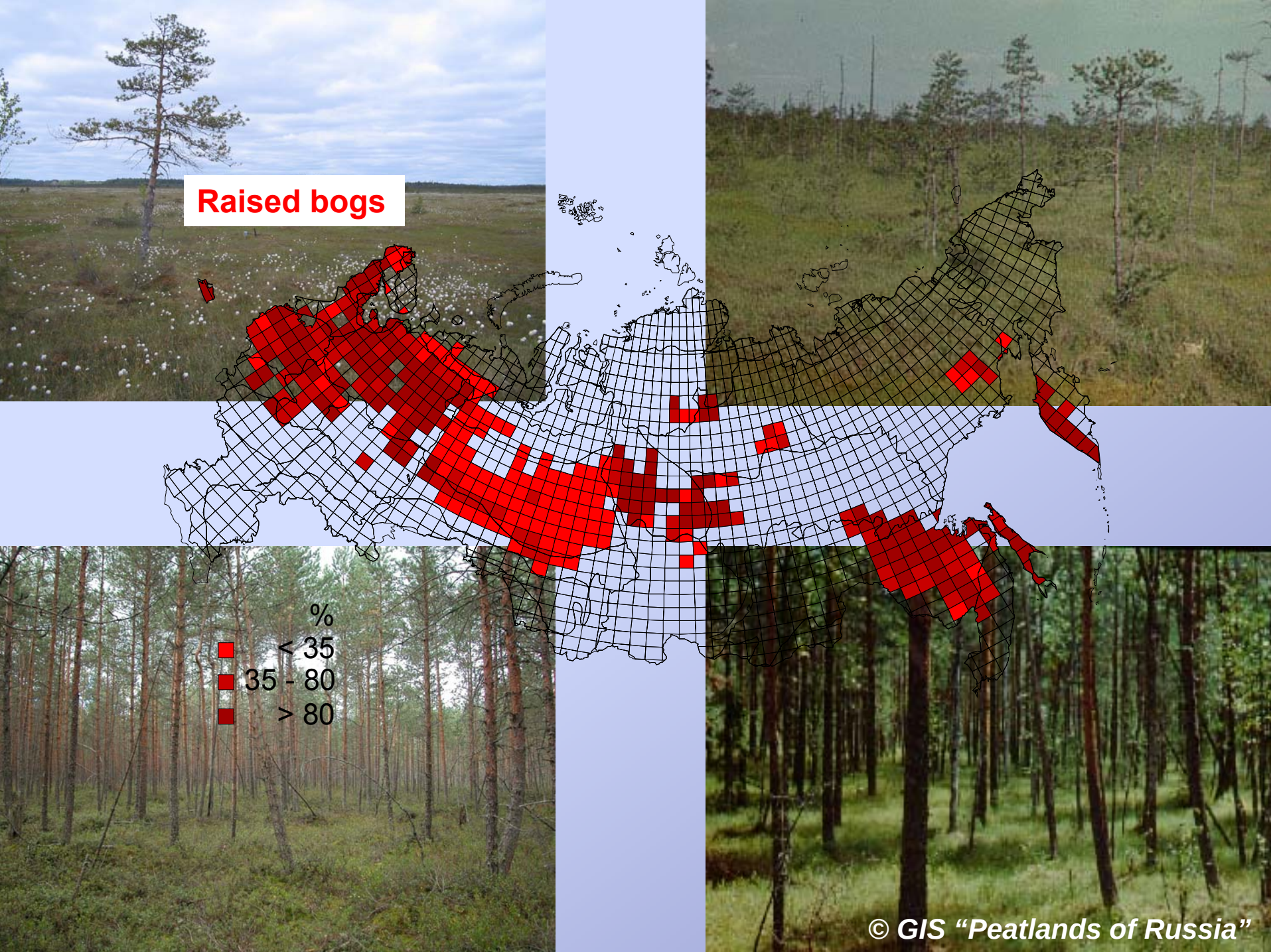
polygon
palsa
oligotrophic
mesotrophic
eutrophic
ridge-pool
ridge-hollow


Polygon mires
%
< 40
40 - 90
> 90
© GIS “Peatlands of Russia”

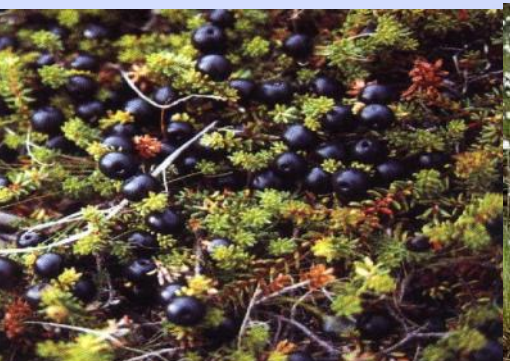

Palsa mires
%
< 40
40 - 90
> 90
© GIS “Peatlands of Russia”

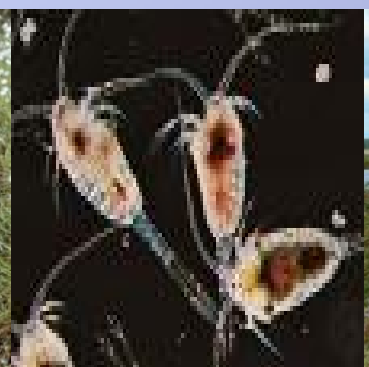

Raised bogs
%
< 35
35 - 80
> 80
© GIS “Peatlands of Russia”

Arctic wetlands biodiversity is unique

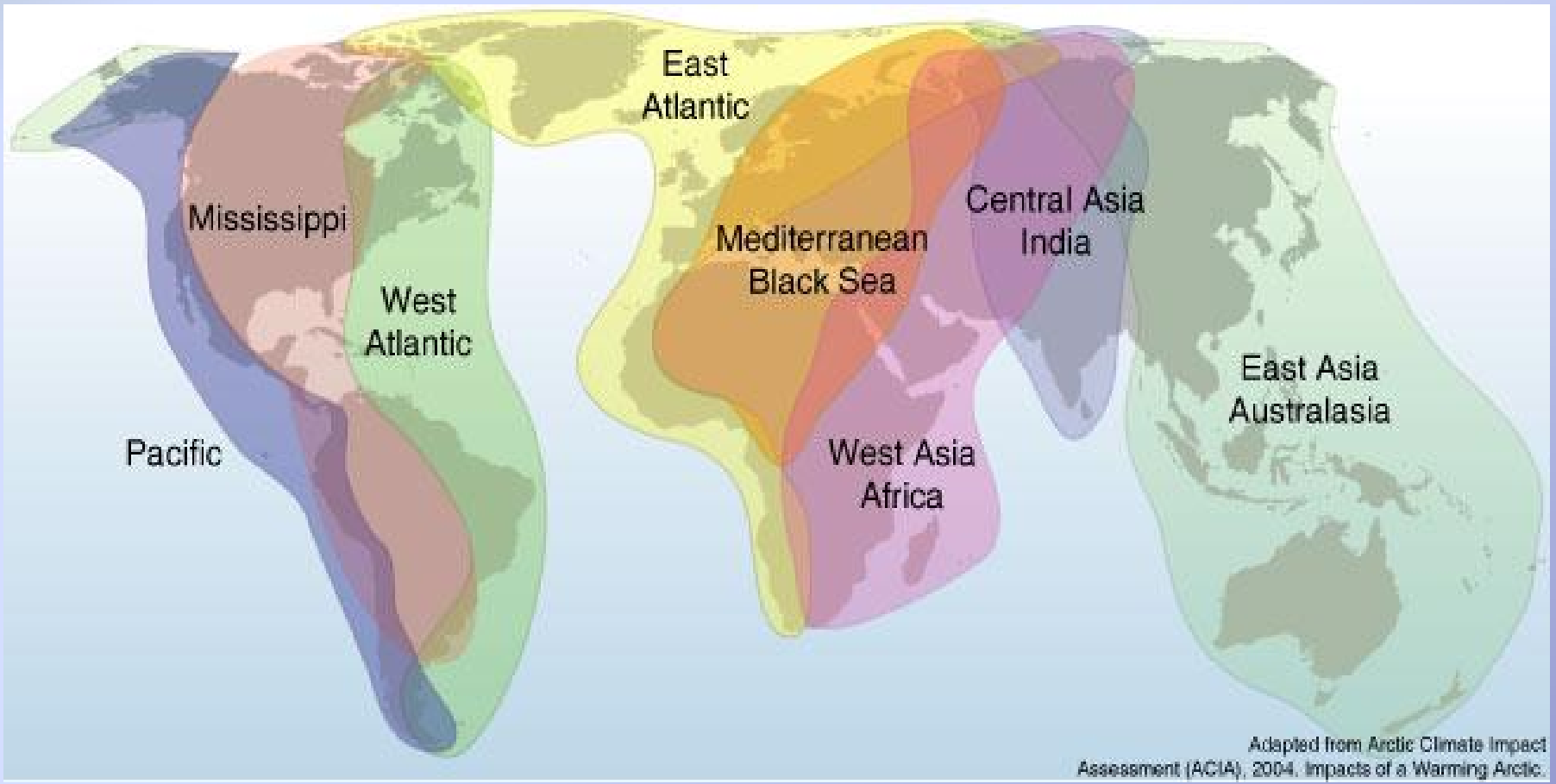
Wetlands species diversity in Arctic is low, but biological species are very specialized and tightly connected to their habitats.

organisms, populations and ecosystems are more directly dependent on abiotic factors. The changes in habitat quality and spatial distribution will have an impact on population structure and even species presence. All changes have “chain” consequences





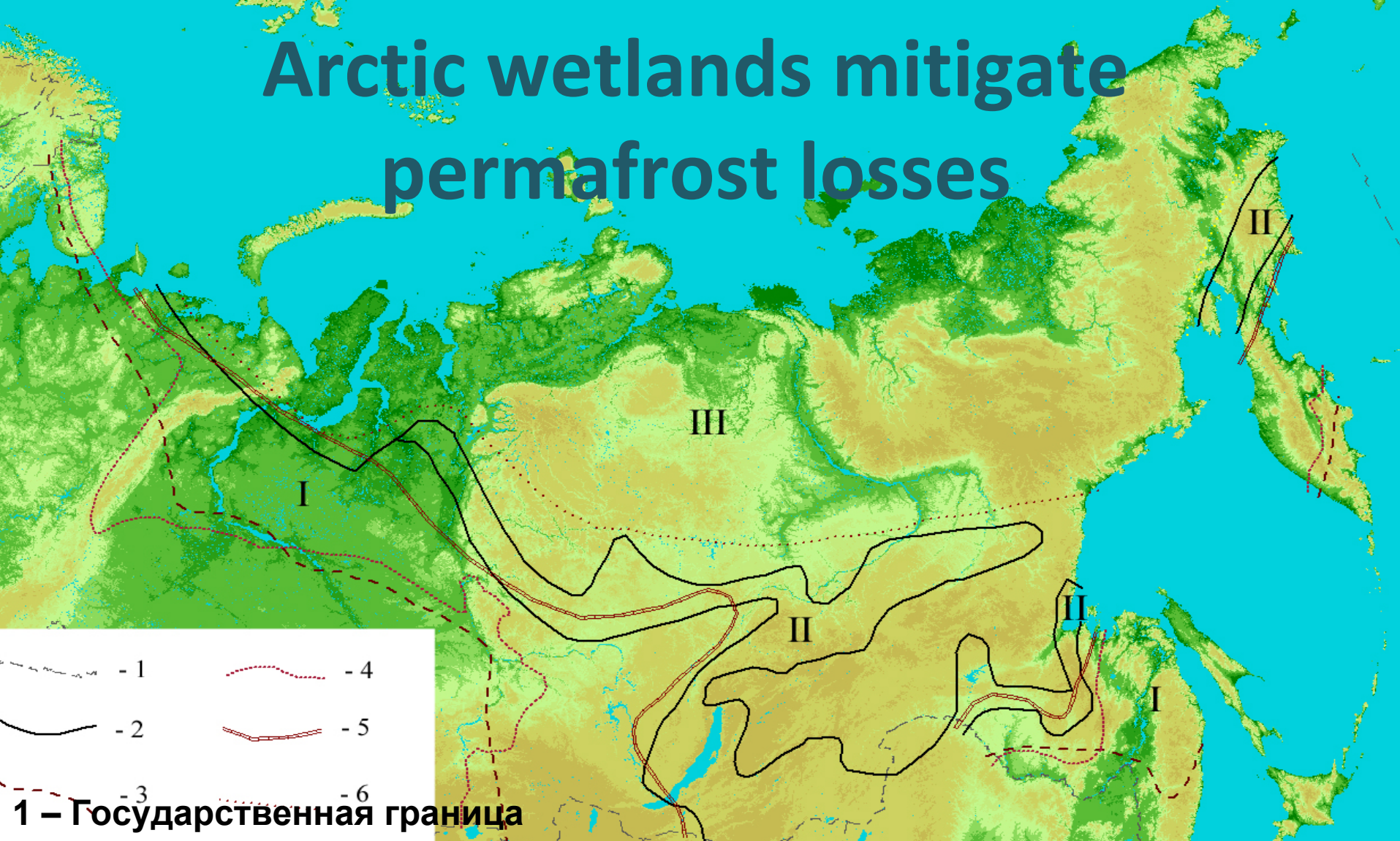

Arctic wetlands provide habitats for migrating species



Bird Migration Routes to the Arctic

Artist: Hugo Ahlenius, UNEP/GRID-Arendal

Arctic wetlands mitigate permafrost losses



1 – Государственная граница
2 – Граница между островным (I), прерывистым (II) и сплошным (III) распределением вечной мерзлоты
3 – современная южная граница вечной мерзлоты
4-6 – расчётные современные южные границы вечной мерзлоты в грунтах: 4 – торфяных, 5 – глинистых, 6 – песчаных

The land use in Arctic for centuries have been based on the traditional knowledge of indigenous people

- The land use have been balanced with resource availability and synchronized with seasonal and spatial resources dynamic
- The land use have been harmonized and integrated with natural processes compatible with ecosystem capacity

The new technologies lead to industrial uniformed rapid development in the region

- New technologies provide opportunities to overcome challenges of harsh Arctic environment and
- Development is mainly focused oil and gas industry
- Even traditional land use such as reindeer herd - appears to be industrialized.

Arctic peatlands threats

- As a consequence of climate change serious changes in peatland hydrology are expected including permafrost melting and disappearance
- Peatlands transformation by climate change will have a feedback on climate by the release of methane. The volume of (modern and relic) methane expected to be released is comparable to the current fluxes of industrial origin and will have global impact
- The predicted hydrocarbon shortage and unstable political situation cause competition for resources in the region, which could cause unsustainable development ignoring environmental demands
- The importance of Arctic wetlands and their conservation and wise use is inadequately represented in the international conventions and Arctic related processes

Convention on Biological Diversity

CBD COP9, Bonn, 19-30 May 2008, Decision 9/16

Biodiversity and Climate Change

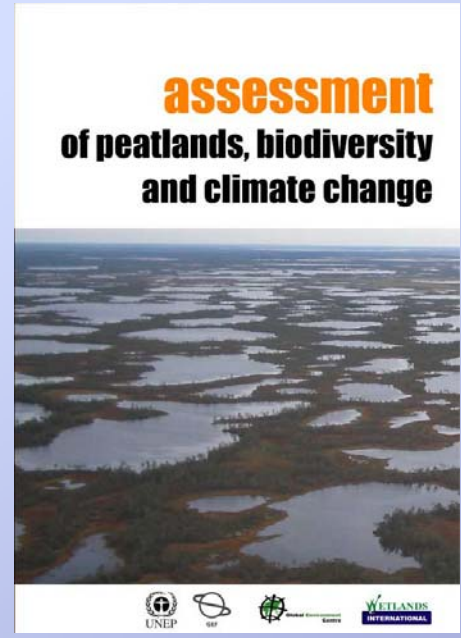
- *notes* the results of the International Expert Meeting on Responses to Climate Change for Indigenous and Local Communities and the Impact on their Traditional Knowledge Related to Biological Diversity in the Arctic Region held in Helsinki, 25 to 28 March 2008
- *recognizes* the importance of the conservation and sustainable use of the biodiversity of wetlands and, in particular, peatlands in addressing climate change and ***noting with appreciation*** **the findings of the global Assessment on Peatlands, Biodiversity and Climate Change;**
- *Invites* the Global Environment Centre, subject to available resources, **to translate into other United Nations languages, and further disseminate the global Assessment** on Peatlands, Biodiversity and Climate Change;
- ***Encourages*** **Parties and other Governments to** strengthen collaboration with the Ramsar Convention on Wetlands and **promote the participation of interested organizations in the implementation of the Guidelines for Global Action on Peatlands and other actions, such as the ones listed in the global Assessment of Peatlands, Biodiversity and Climate Change, that could contribute to the conservation and sustainable use of peatlands**

Convention on Biological Diversity

COP7, 2004 г. – peatlands designated as specific ecosystem type; declared the need of Global assessment on peatlands biodiversity and climate change (Res.VII/15)

Assessment on Peatlands, Biodiversity and Climate change (2008) - Review of the latest scientific information with key finding as background for decision making, endorsed by CBD SBSTTA , July 2007 ; Endorsed by COP 9 in May, 2008, Decision 9/16

Designate Arctic peatlands as threatened ecosystems as well as highland peatlands and peatlands of semiarid and arid areas



Available from:
www.geonet.org

Links the interests of a range of global environmental conventions, including the UN Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD), the UN Convention to Combat Desertification (UNCCD), and the Ramsar Convention on Wetlands.

Parish, F. Sirin, A., Charman, D., Joosten, H., Minayeva, T. and Silvius, M. (eds.) 2008. Assessment on Peatland Biodiversity and Climate Change: Full report. Global Environment Centre, Kuala Lumpur and Wetlands International, Wageningen.

Peatlands in Ramsar Convention

CPs recognised peatlands as one of the most important wetlands by recommendations and resolutions:

COP 6 (1996): Recommendation VI.1 - encouraging further cooperation on wise use, sustainable development, and conservation of global peatlands

COP 7 (1999): Recommendation VII.1 - on the wise use of peatlands" with an annexed "draft global action plan for the wise use and management of peatlands

COP 8 (2002):

Resolution VIII.3 Climate Change and Wetlands: Impacts Adaptation and Mitigation - calls for managing wetlands adaptively in response to the impacts of global climate change; recognises peatlands role in mitigating impacts of climate change

Resolution VIII.11 Additional guidance for identifying and designating under-represented wetland types as Wetlands of International Importance – addresses peatlands as underrepresented wetland type

Resolution VIII.17 – adopts "guidelines for global action on peatlands", calls to establish coordinating committee fro global peatlands action plan implementation (CC GAP)

The Arctic Wetlands conservation is not adequately addressed by Ramsar in circumpolar context

Resolution X.24 – Wetlands and Climate Change

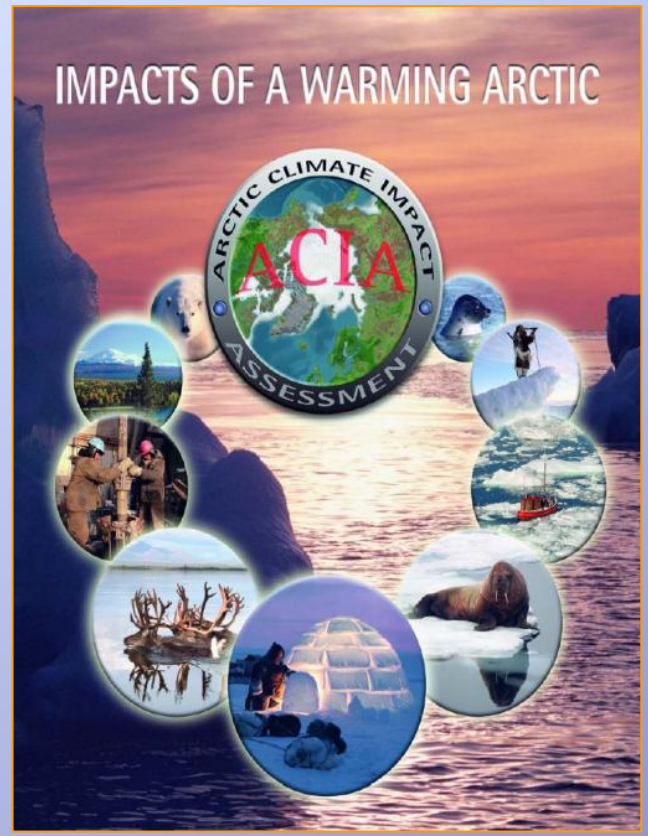
INSTRUCTS the STRP

to liaise with the Arctic Council on an assessment of the vulnerability of Arctic wetlands to climate change and the development of guidelines for wise use while taking account of the ongoing Arctic Biodiversity Assessment; and ENCOURAGES Contracting Parties, other governments, and relevant organizations to undertake, where possible, studies of the complex and interactive effects of climate change and invasive species in wetlands, and to undertake an investigation of potential adaptive strategies for Arctic wetlands, seeking cooperation with the Arctic Council

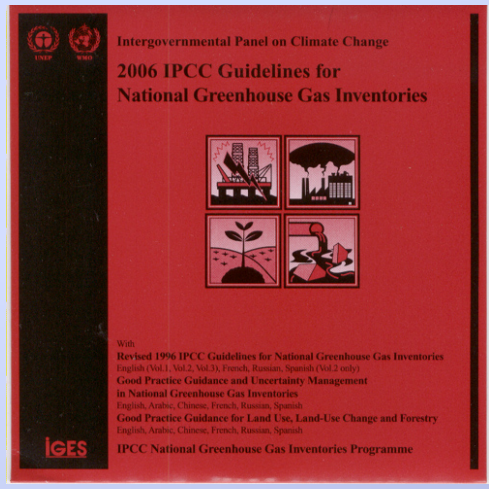
Ramsar sites within CAFF border

Peatlands in Arctic are extremely fragile to climate change

- Occupy very thin biota layer mainly represented by shallow peatlands and shallow lakes
- The main ecosystem-forming factor of arctic wetlands defining their genesis and function – is permafrost
- At the same time permafrost is the most vulnerable to Climate Change



Reporting for UNFCCC and KP



Peatlands included in GHG (CO_2, CH_4, N_2O) source inventories under IPCC 2006 Guidelines (Chapter 7 Wetlands)

peatland prepared for / under extraction / abandoned after extraction

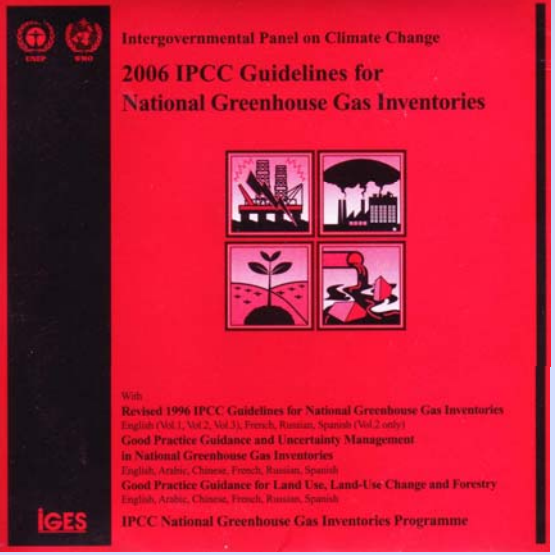


TABLE 7.4. EMISSION FACTORS FOR CO2-C AND ASSOCIATED UNCERTAINTY FOR LANDS MANAGED FOR PEAT EXTRACTION, BY CLIMATE ZONE

Climate Zone	Emission Factor (tonnes C ha^{-1} yr^{-1})	Uncertainty (tonnes C ha^{-1} yr^{-1})	Reference/Comment
Boreal and Temperate			
Nutrient - Poor $EFCO_{2\ peat\ poor}$	**0.2**	**0 to 0.63**	Laine and Minkkinen, 1996; Alm *et al.*, 1999; Laine *et al.*, 1996; Minkkinen *et al.*
Nutrient - Rich $EFCO_{2\ peat\ rich}$	**1.1**	**0.03 to 2.9**	Laine *et al.*, 1996; LUSTRA, 2002; Minkkinen *et al.*, 2002; Sundh *et al.*, 2000

CO_2 1,6

CH_4 1,3

2,9

How to address Arctic wetlands

- Peatlands diversity and status mapping
- Peatlands dependent species habitats and migrating routs mapping
- Threat analyses mapping
- Identify and highlight Arctic peatlands natural functions and values including permafrost protection, river flow forming
- Identify conservation gaps in legislation and protected areas
- Map peatlands restoration potential and integrate peatland knowledge in spatial land use planning
- Identify peatlands ecosystems and species status indicators for monitoring
- Identify monitoring parameters and map peatlands monitoring capacity
- Launch peatlands monitoring network within CBMP Freshwater chapter in cooperation with CC GAP (Ramsar)
- To integrate peatlands into ABA
- To promote ABA findings on peatlands in further UNFCCC, CBD and Ramsar COPs

General Gaps and Recommendations

General GAPS

- Ecosystem based land use planning (including background knowledge on ecosystem functions and values)
- Specific legislation on land use including EIA and restoration
- Involvement of large corporations

GAPS which seems to be relevant for UNESCO to be covered

- Synergy of international conventions
- Especially promotion of Land Use induced climate change issues in UNFCCC
- Humanization of development and governance in Arctic
- MAB and UNESCO related networks and capacity (BRs, WHS etc., WCPA)
- Translation of knowledge in crosscutting context


Thank you
www.imcg.net
www.wetlands.org
www.ramsar.org
www.peatlands.ru