Arctic Coastal Biodiversity Monitoring

EBM1: The CBMP Arctic Coastal Biodiversity Monitoring Plan:
Monitoring and reporting important changes in the biodiversity of Arctic coastal ecosystems – Plan development and evaluation

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The Arctic Biodiversity Congress

October 9-12, 2018, Rovaniemi, Finland

Arctic Coastal Ecosystems

Arctic coastal ecosystems include those areas at Arctic latitudes where tundra, rivers, lakes and oceans meet and interact in complex ways that significantly influence their composition, structure, and function, and their capacity to support a wide spectrum of the Arctic coastal biodiversity that is the focus of the **Coastal Expert Monitoring Group Implementation Plan**. Cultures and societies are part of these ecosystems. Many Indigenous Peoples' homelands include large areas of the Arctic coastlines.

Perception of coastal ecosystems in **Russian Scientific tradition**

Arctic coastal ecosystems are formed in the contact of 3 ecological zones — coastal, fresh-water and marine zones. The coastal ecosystems include coastal tundras, salt and brackish marshes, ephemeral sandy ecosystems and ecotones between all of them. The influence of the salt waters may occur up to the 25 km only in the estuaries and deltas of the arctic rivers.

Arctic Coastal Ecosystems

Unique habitats including migrating birds and marine mammal species

Carbon accumulation and store, matter balance regulation including accumulation of contamination

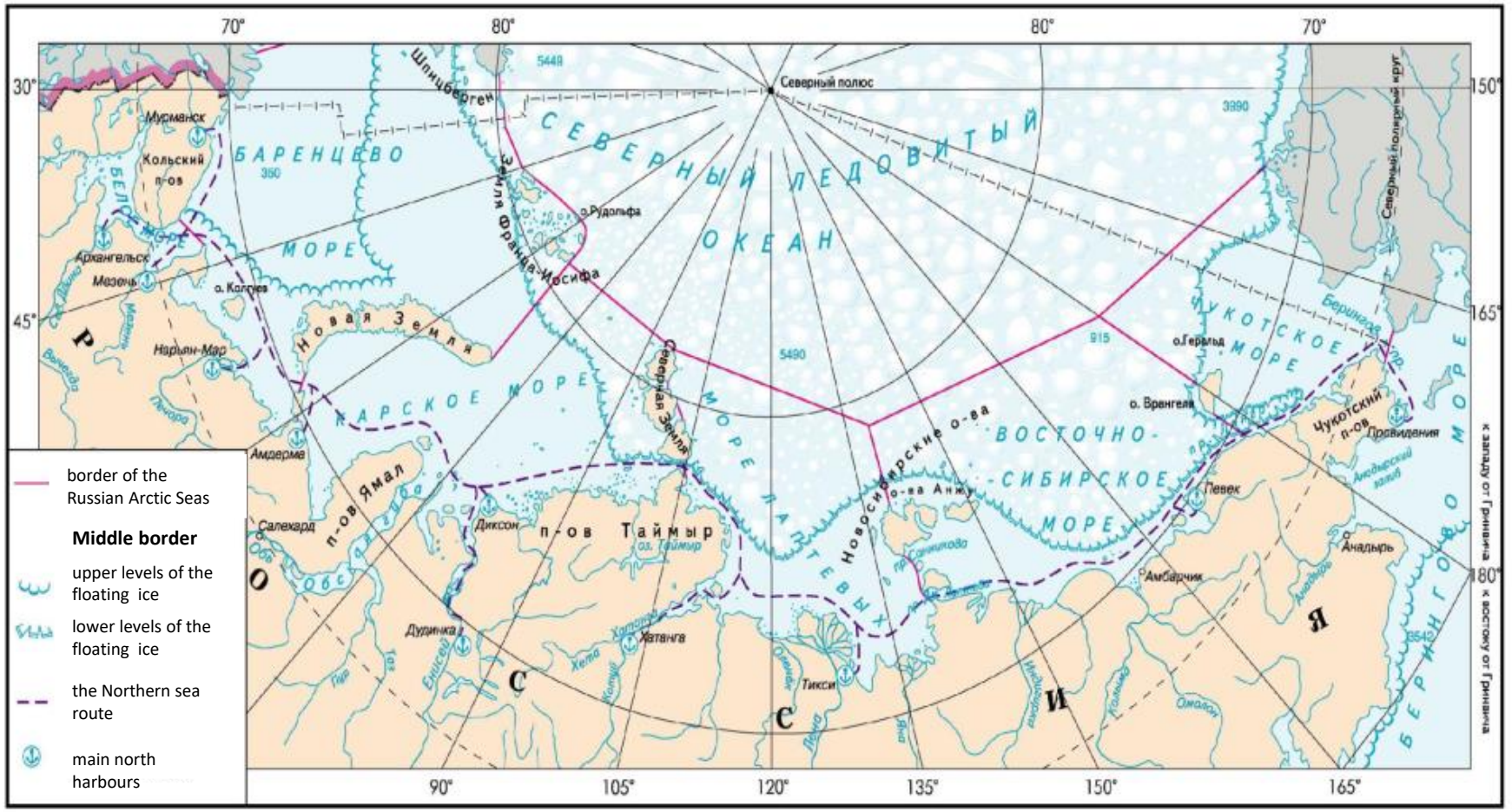
Maintenance of the landscape integrity

Salt marshes are buffer zones between marine and terrestrial ecosystems

One of the most significant storage and accumalation of the “blue carbon”

Matter balance regulation including accumulation of contamination

The Seas of the North of the Russian Federation



Scale 1:25 000 000

- The length of the Arctic coast of the Arctic States is **38700 km**
- The length of the Arctic Coast of Russian Federation is about **22600 km**
- The Arctic coast of Russian Federation is divided by the Barents, Kara, Laptev, East-Siberian, Chuckchi and Bering shelf seas and by the semi-landlocked White Sea, all belonging to the Arctic Ocean.

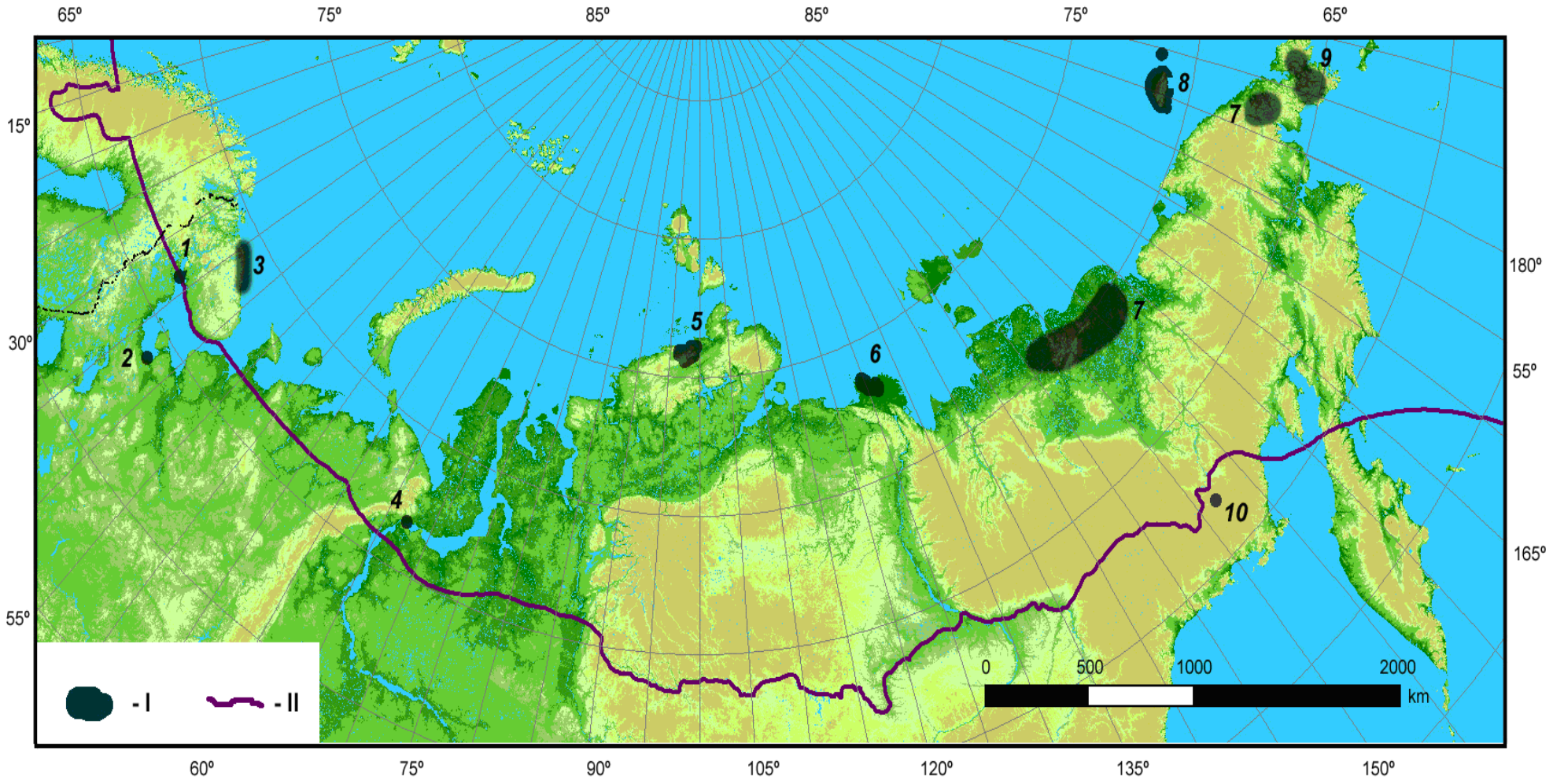
The Seas of the North of the Russian Federation

Sea	Area, thousand, km2	Volume, thousand, km3	Deeps, middle/max m	The flow of the rivers into the sea cub. km/year	Salinity , upper layer	The biggest tides, m	The length of the Coast, km
Barents	1424	316	222/600	163	32-35	6,1	6645
White	app. 90	6	67/350	215	23-28	10	2000
Kara	883	98	111/600	1315	32-34	0,8	9047
Laptev	662	353	533/3385	…	20-30	0,5	10557
East - Siberian	913	49	54/915	260	20-32	0,25	3016
Chukchi	595	42	71/1256	…	24-32	1,5	
Bering	2315	3796	1640/5500	…	28-35	8,3	

The potential for monitoring in Russia

- Scientific research institutes
- Specially protected natural areas
- Universities and training centers
- Network of research and weather stations
- Trained professionals and experts

The main scientific stations in the Russian Arctic



I - Stations

1 - White Sea Biological Station of Moscow State University
2 - Onega Bay of the White Sea
3 - Kola Peninsula
4 - Ecological Research Station (Labytnangi)
5 - Taimyr Island
6 - Samoilovsky Island
7 - Tundra of Yakutia and Chukotka
8 - Wrangel Island
9 - Chukchi Peninsula
10 - Orotuk Station

II - Boundary CAFF

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The main scientific stations in the Russian Arctic

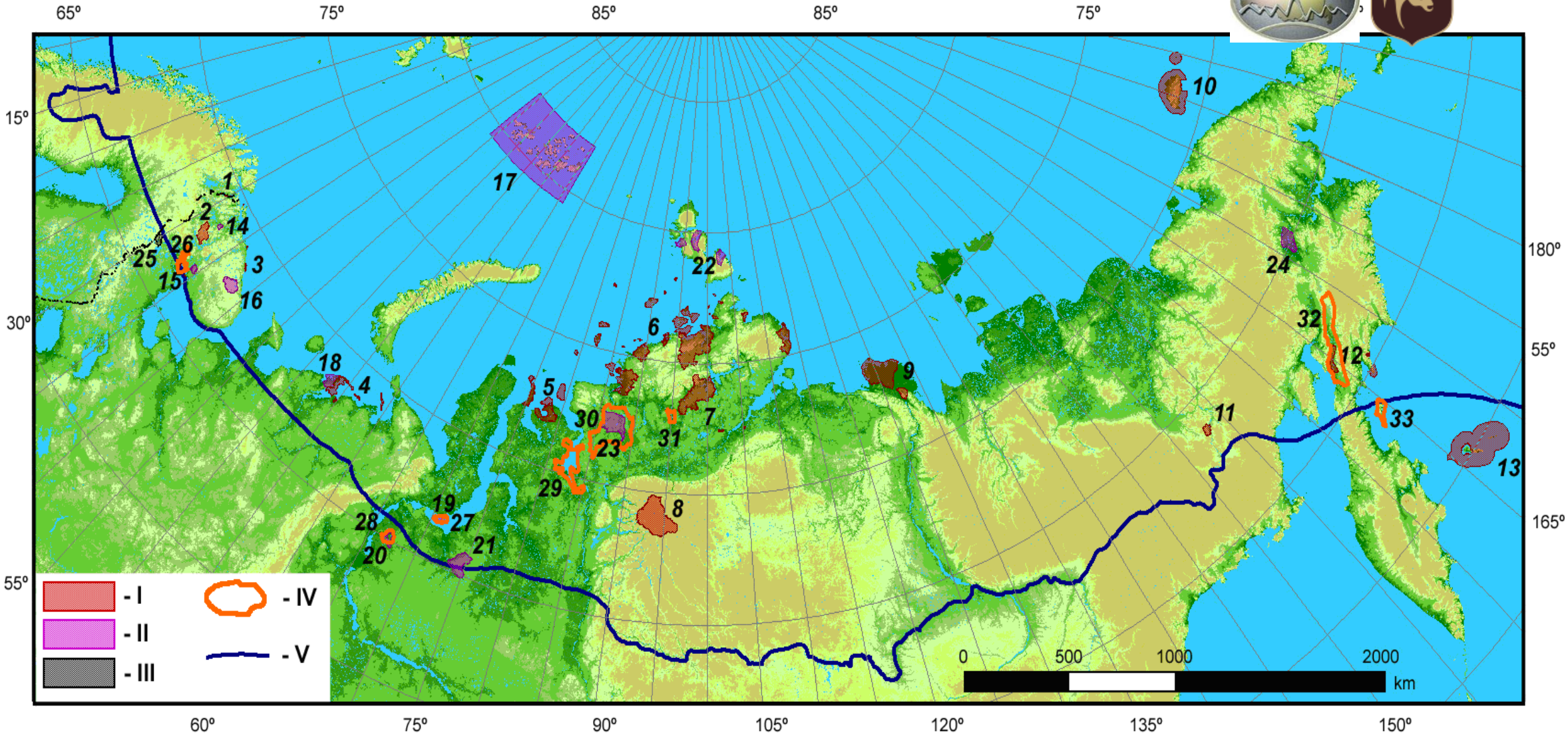
Seven stations from ten are still working,

And only 3 of them have maintained full set of infrastructure and have permanent staff.

The data are mainly published before middle of 1990th

Station on Samoilovsky Island

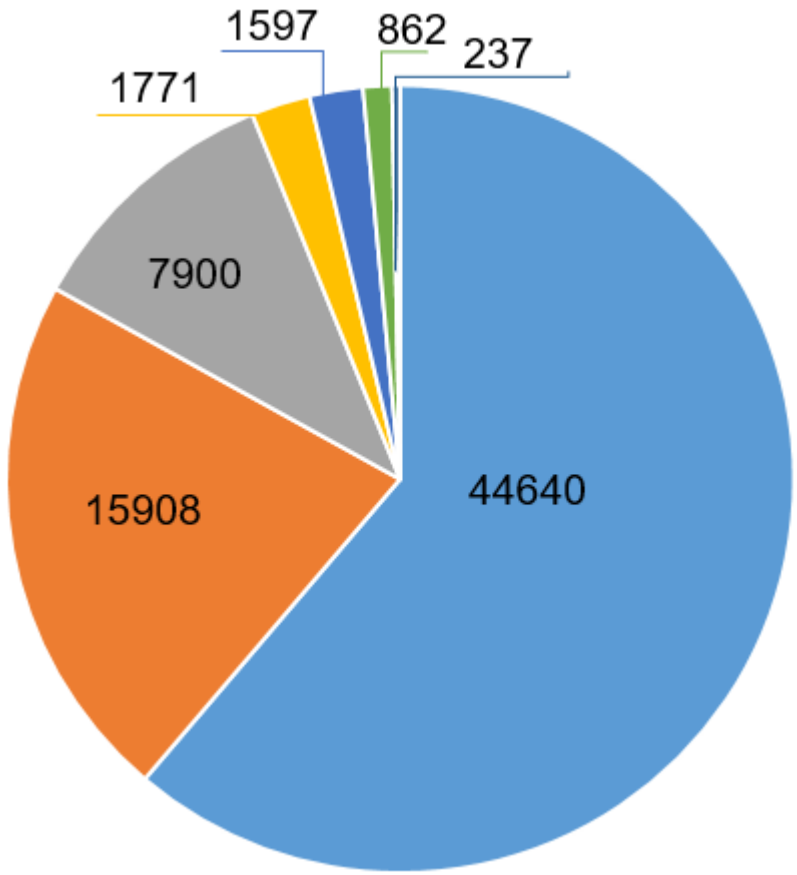
Input of Russian SPNAS to the coastal monitoring



I - State nature reserves:^ 1-Pasvik; 2-Lapland;3-Kandalaksha, 4-Nenets; 5-Gydan; 6 – Great Arctic; 7 – Taimyr; 8 – Putoransky: 9 – Ust-Lensky: 10 – Wrangel Island; 11 – Magadan; 12 – Koryak; 13 – Komandorsky/ **II - State Federal wildlife refuges:** 14 – Tulomskaya, 15 – Kenozero, 16 – Murmansk, 17 – Franz-Joseph, the 18 – Nenets, 19 – Nizhneobskiy, 20 – Kunovatskiy, 21 – Nadym, 22 – Severozemelsky, 23 – Purinski, 24 – Lebyazhy ; **III - National parks:** 25-Paanajärvi **IV – Ramsar sites** : 26-Kandalaksha Bay, 27 - Islands of the Ob Bay of the Kara sea, 28-Lower Dvuobye, 29-Brekhov Islands, 30-Mesopotamia and valleys of the Pura and Mokorito rivers, 31-Delta of the Gorbita river, 32 - Parapolsky Dol, 33-Karaginsky Island; **V - Boundary CAFF**

Monitoring components: Indigenous people

Community based monitoring is based **on partnerships with indigenous organizations and communities** and is to collect and integrate traditional environmental knowledge into follow-up activities.



EthnoExpert experience

- **ECORA** - project of the Global Environment Facility (GEF), 2004-2009 - Nenets of Kolguev Island
- **Monitoring of ecosystem services** in the construction and operation of the Sabetta port. **Yamal LNG** is a group of Nenets reindeer herders in the conditions of industrial development of the territory.

gef GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

Input of Russian scientific organisations

- National Arctic Scientific and Educational Consortium
- Institute of Biological Problems of the North of the Far Eastern Branch of the RAS
- Institute for Biological Problems of Cryolithozone Siberian Branch of RAS
- Museum of the World Ocean
- P. P. Shirshov Institute of Oceanology of the Russian Academy of Sciences
- Lomonosov Moscow State University
- Federal Research Centre Kola Science Centre of the Russian Academy of Sciences
- North-Eastern Federal University
- The Federal system of nature Reserves
- North Federal University
- EthnoExpert

Actual research programs in the Russian Federation 2017-2018

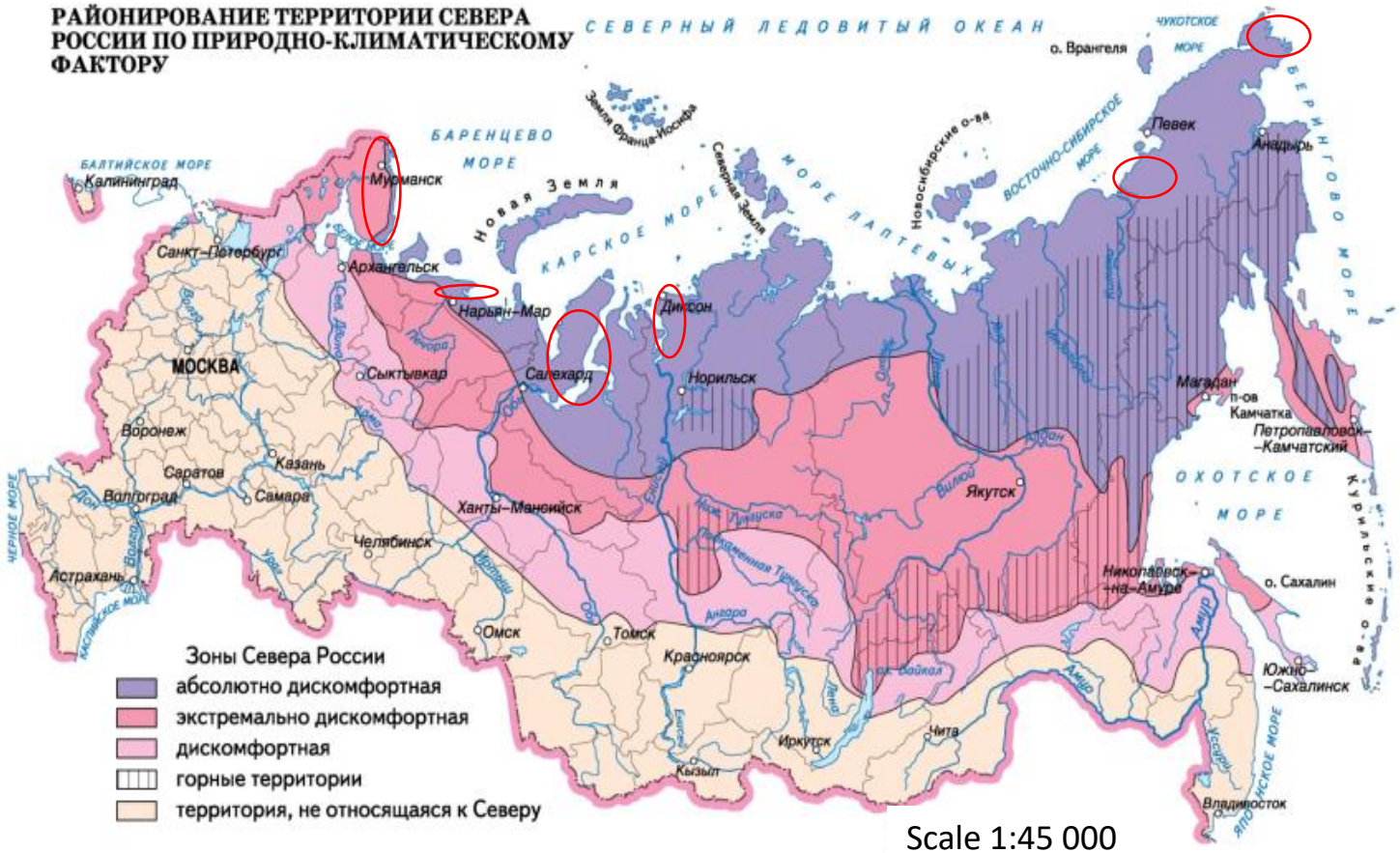
- Changes in the freshwater balance of the Arctic ocean during global warming, their impact on sea ice and on increasing warming in the Arctic.
- Spatial and temporal changes in the lichen flora and bryoflora the Russian Arctic and adjacent territories and their connection with global natural processes and anthropogenic transformation of the environment
- Bottom fauna of the outer shelf and continental slope Of the Russian Arctic seas: biodiversity, community structure, vertical zoning, connection with relief
- Influence of anthropogenic impacts on the structure and functioning of the soil layer of the Arctic ecosystems as a regulator of greenhouse gas exchange
- Age-old changes in the bottom ecosystems of the Arctic seas of Russia, the current state and forecast.
- Large Arctic lakes in the context of global and regional changes in the environment and climate
- Assessment of the state of organic substances of Arctic marsh ecosystems-climate change descriptors
- Benthic shelf of the seas of the Western sector of the Russian Arctic as an indicator of the state of marine ecosystems in modern conditions
- Pelagic ecosystems of the Siberian Arctic seas in the conditions of modern climatic changes: structure, productivity, substance flows
- "Greening" of the tundra as a driver of modern dynamics of Arctic biota
- Adaptation of Arctic limnosystems to rapid climate change

Obligations of the Russian Federation

- **CBD** - biodiversity
- **UNFCCC** – more rapid warming of the Arctic – the outcome oif the latest assessment
- **CMS** – migration species
- **Ramsar** – agreement between Ramsar and CAFF
- **Arctic Council**

Monitoring of Arctic Coastal Ecosystems: risks

- Direct and indirect effects of climate change
- Oil and gas activities
- Mining activities
- Shipping
- Commercial fishing
- Community activities
- Long range and local contaminants
- Invasive alien species



Scale 1:45 000 000

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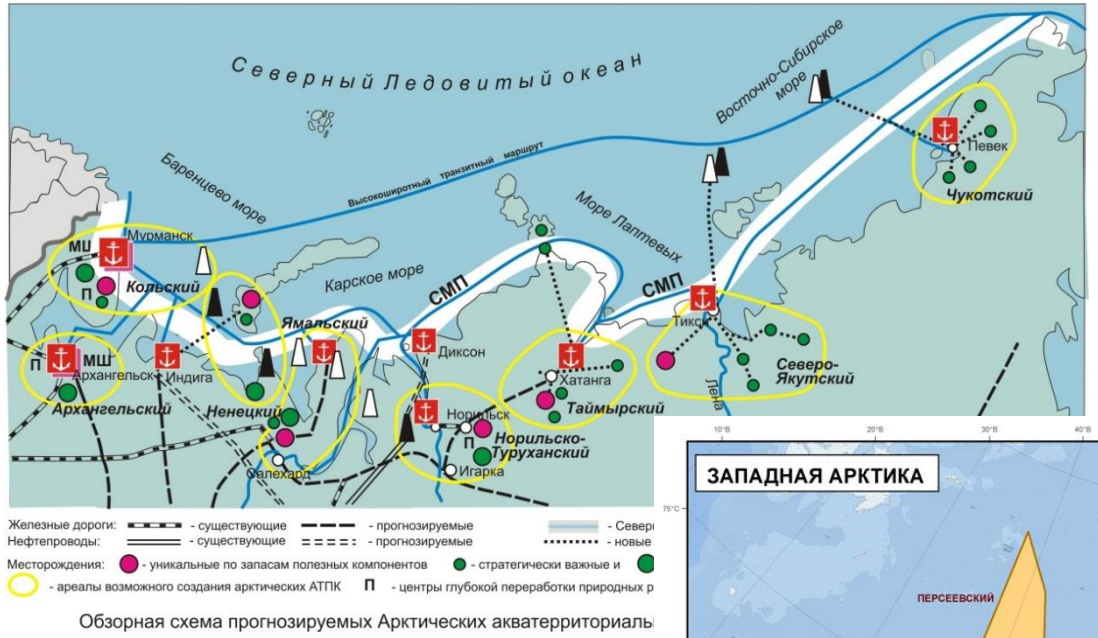
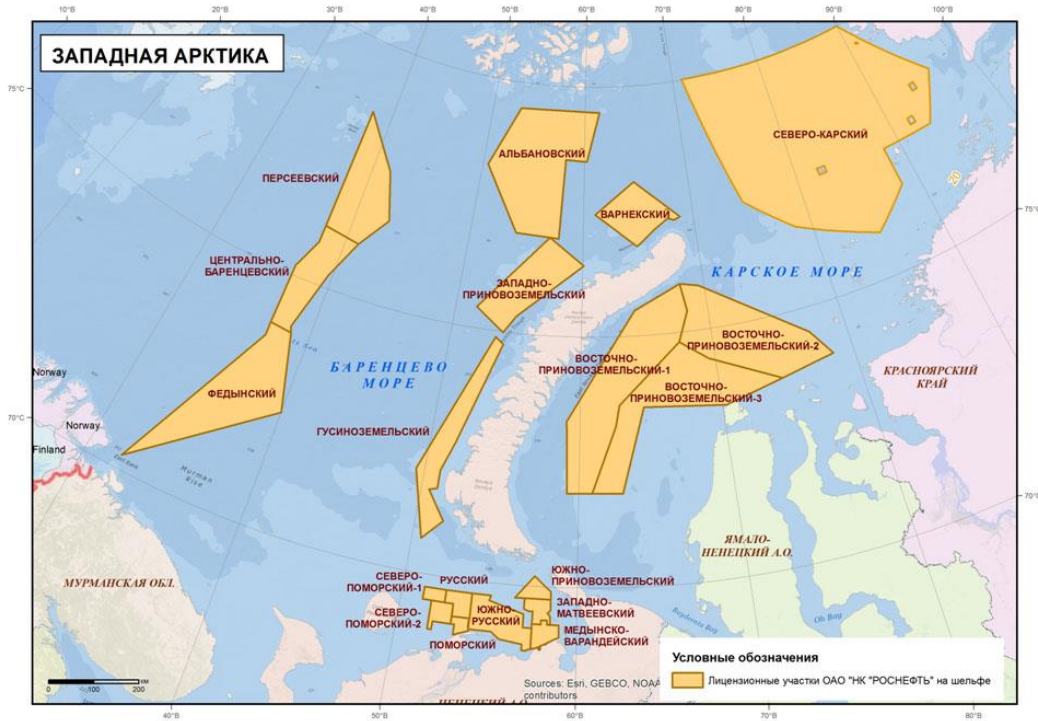
Monitoring of Arctic Coastal Ecosystems: risks

- Accumulated environmental damage
- The rapid industrial development and infrastructure (for example Northern Sea Route)
- Weak control over the environment situation in the Arctic
- Decrease of the resources for monitoring





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Monitoring of Arctic Coastal Ecosystems: impacts

Characteristic of the entire arctic zone:

- Fragmentation
- Changes in Food chains
- Pollutants integration into the ecosystem cycles
- Invasive species
- Cryogenic erosion

Monitoring objectives

The overall monitoring objective for the Coastal Plan is to **monitor, assess and report change** in the biodiversity of Arctic coastal ecosystems across the circumpolar area.

CAFF approach – the key species as focal ecological components in connection to indigenous people and other uses

Monitoring objectives in Russia:

- Assessment of ecosystem status by indication on three levels:
- Species, Populations, Ecosystems (including biotic and abiotic parameters)
- All this thing goes on the background of global and national climate monitoring of the long-existing data. All these data are available for everyone.

Monitoring base-line: example of flora

Primary inventory of the state of vegetation cover in General and populations of protected species in particular is the main condition for monitoring. Currently, the objects of monitoring are only vascular plants, which is explained not only by a better study of the flora, but also by a greater proportion of species with relatively narrow habitats (including endemics).

Arctic group of the Komarov Botanical Institute RAS carried out the floristic studies in more than 320 experimental site since 1950-years of Russian Arctic.

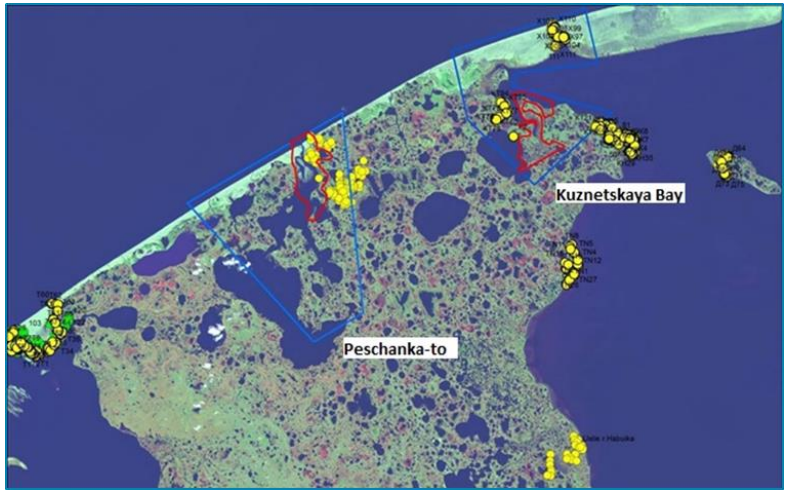
Siberia – 90, Taymyr – 50+,Yacutia – 60,Yamal+Gydan –27, Urals –12, Kanin Peninsula –12.

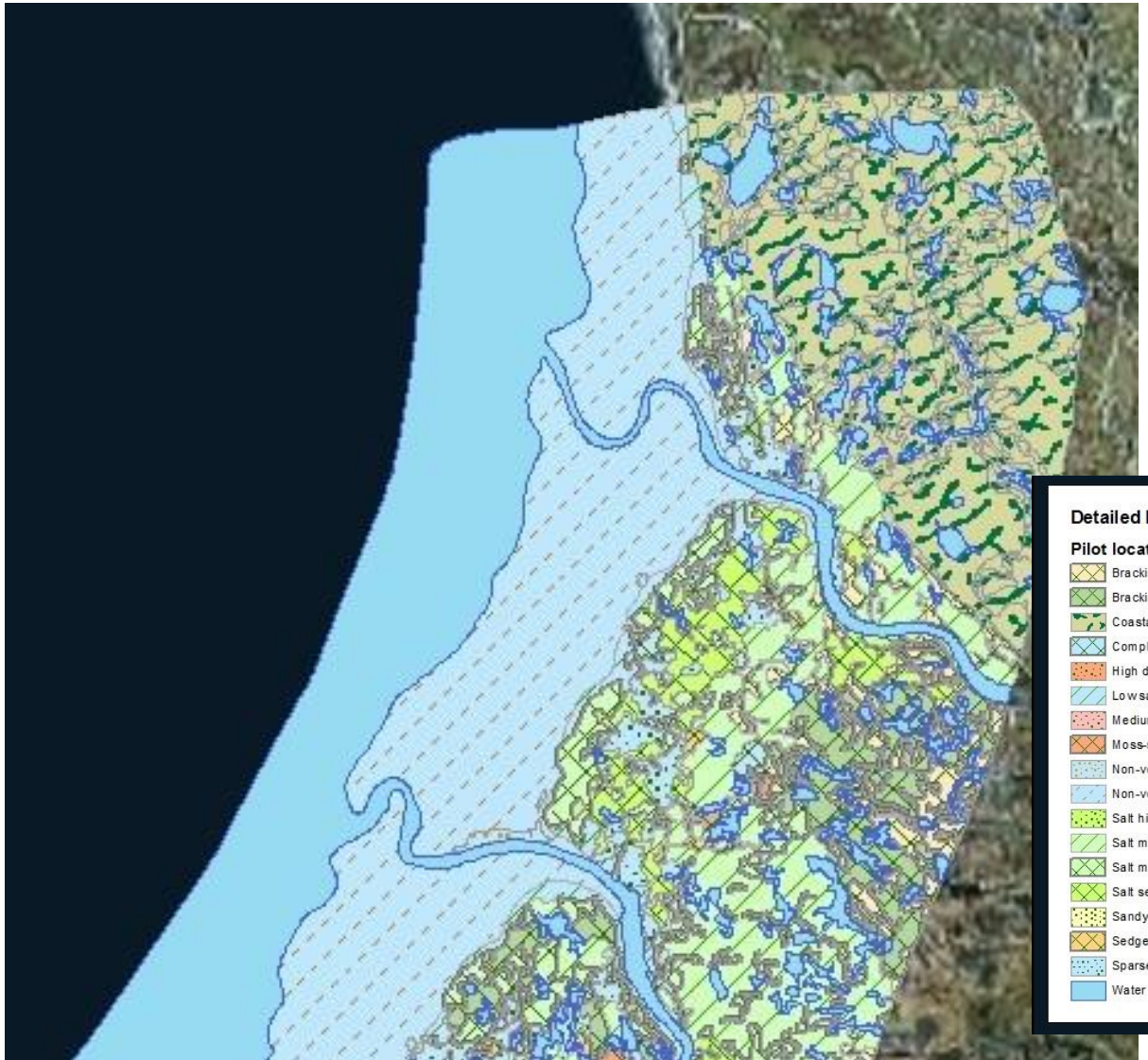
Total amount of vascular plants ≥ 2000 species

TAYMYR peninsula: descriptions of 148 experimental areas; check-list of vascular plants,, distribution maps - 927 species and subspecies; 2855 photos of 718 species and subspecies

Possible solution: predictive ecosystem mapping

The case study - Nenets Autonomous okrug





Detailed level sensitivity mapping: Coastal habitat types

Pilot location: Khaypudyrskaya Bay

- Brackish middle marshes on mud-clay substrate with organic layer
- Brackish mudflats in estuaries and fjords
- Coastal tundra
- Complex salt marshes on structured mud soils
- High dunes and sandy terraces
- Low salt marshes on mud flats within intertidal areas
- Medium dunes and slopes of high dunes
- Moss-small sedge meadows on peat
- Non-vegetated intertidal/subtidal areas on sands
- Non-vegetated saline mud flats (watt)
- Salt high marshes on sand substrate
- Salt middle marshes on muddy substrate with organic soil, and permanent creeks and pools
- Salt middle marshes on peat deposit
- Salt sedge meadows on mud-clay substrate with organic layer
- Sandy ridges with brackish vegetation
- Sedge meadows on deep peats
- Sparsely vegetated intertidal/subtidal areas on the sand substrate
- Water

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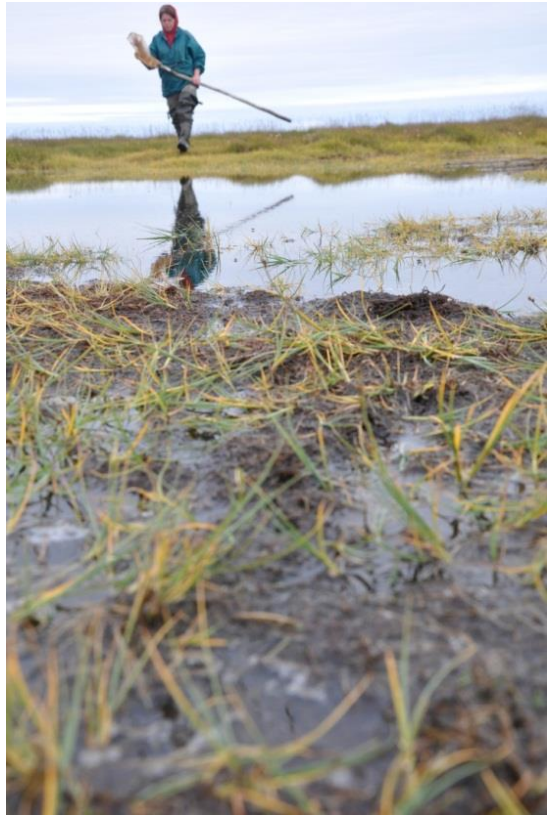
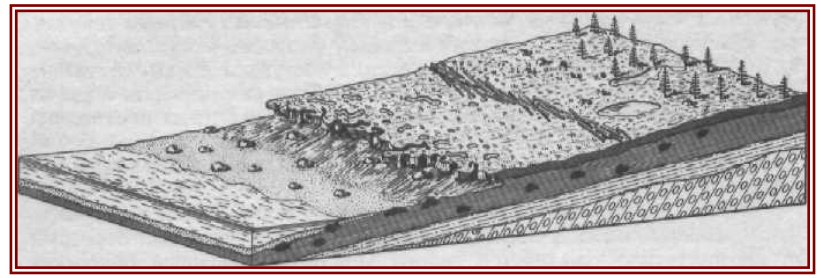
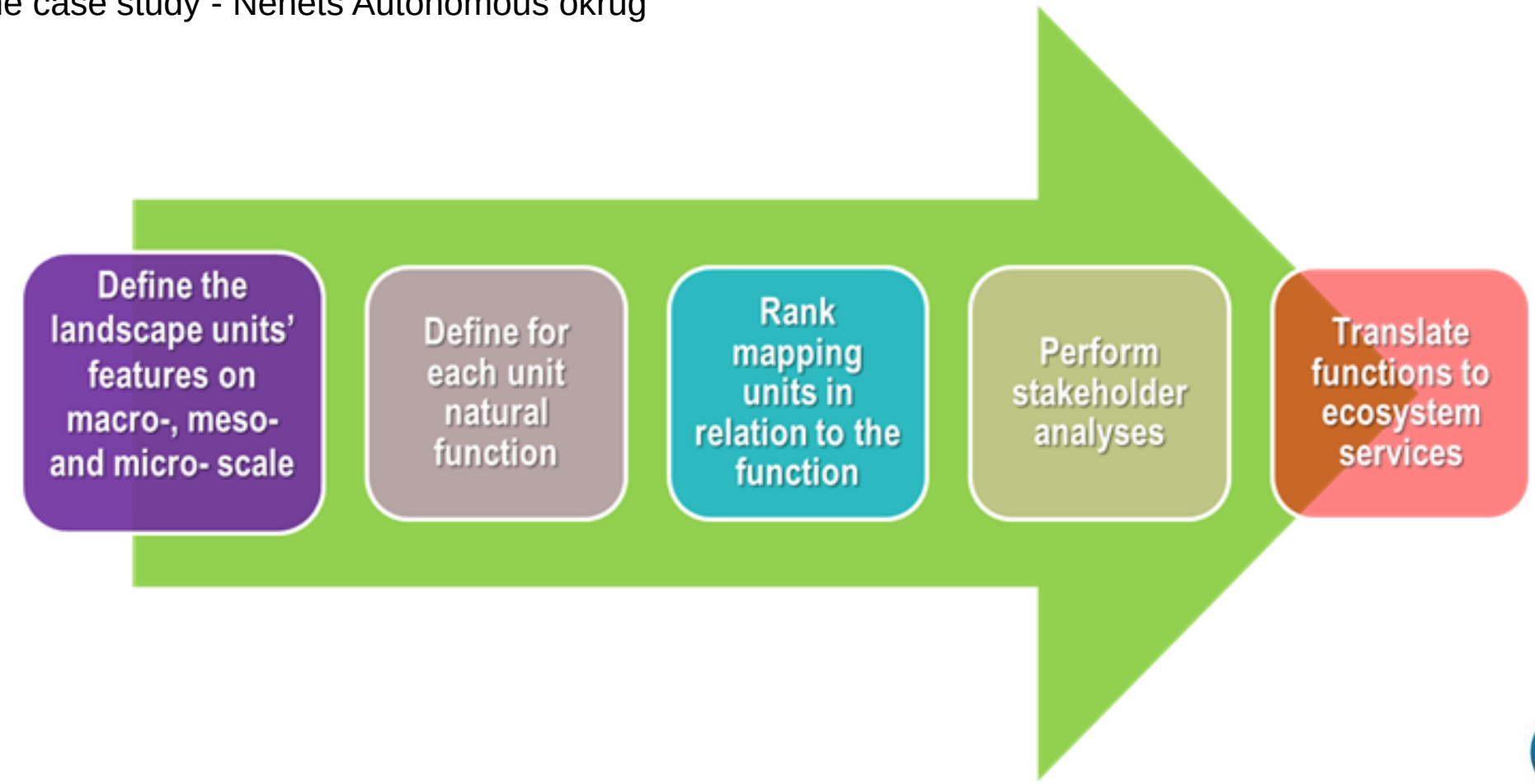
Monitoring object - coastal plant communities
Focal Ecological Component - plant species, invertebrates species etc.





Predictive ecosystem mapping as background for decision making

The case study - Nenets Autonomous okrug



Wetlands INTERNATIONAL

The possible solutions and proposals:

To retrieve baseline data along with the CBMP implementation plan

To identify the realistic set of focal ecological components to be addressed

To identify possible data sources among listed organisations

To set up national coordination program as maximum

To support experts from the national expert group as minimum

Good solution for Russia – demand for **NATIONAL REPORTING** from Arctic Council

Coastal expert group in Russia – volunteering experts

- **Liudmila Sergienko** - expert from Russia, Coastal Expert Monitoring Group, Petrozavodsk State University
- **Maria Gavrilo** - Head of the Natural Heritage Commission, Association Maritime Heritage
- **Anatoly Kochnev** - Institute of biological problems of the North, DVO RAS
- **Vasily Spridonov** - P. P. Shirshov Institute of Oceanology, RAS
- **Vadim Mokievsky** - P. P. Shirshov Institute of Oceanology, RAS
- **Tatiana Minayeva** – associate expert of Wetlands International
- **Igor Semenov** – CEO of EthnoExpert

Морское наследие России

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Thank you for your attention

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