Winner of climate change? Reflections on the role of urban Russia

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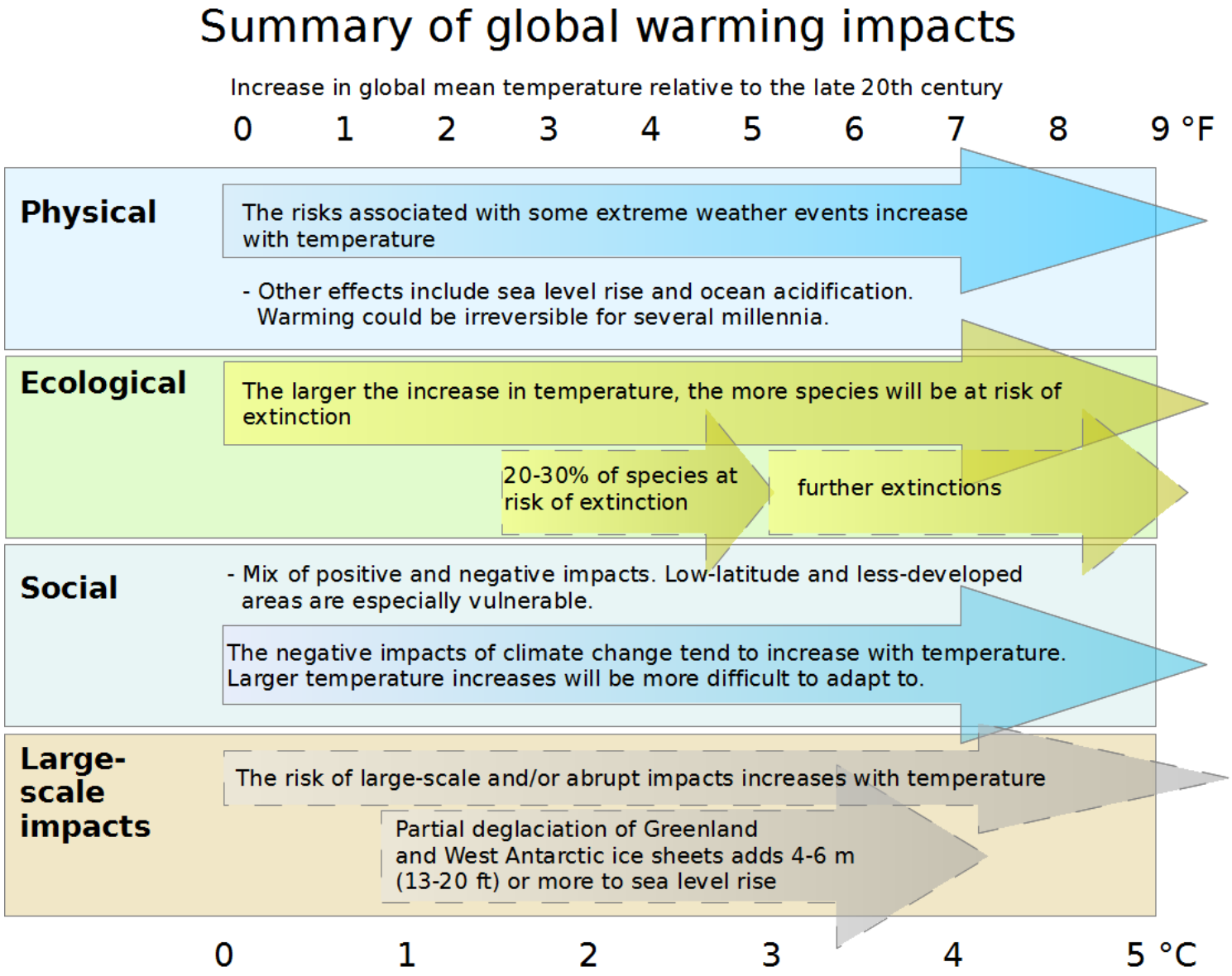
Seminar "Global Urban Sustainability and Justice: Insights, facts, visions and challenges for a green-blue future of cities around the globe"
Royal Swedish Academy of Agriculture and Forestry, Stockholm, Sweden, 01.12.2017

Content

1. Introduction

The consequences of global climate change are mostly portrayed as negative for environment and society, due to the warming in temperatures…

1. Introduction



Source: https://en.m.wikipedia.org/wiki/Effect_of_global_warming

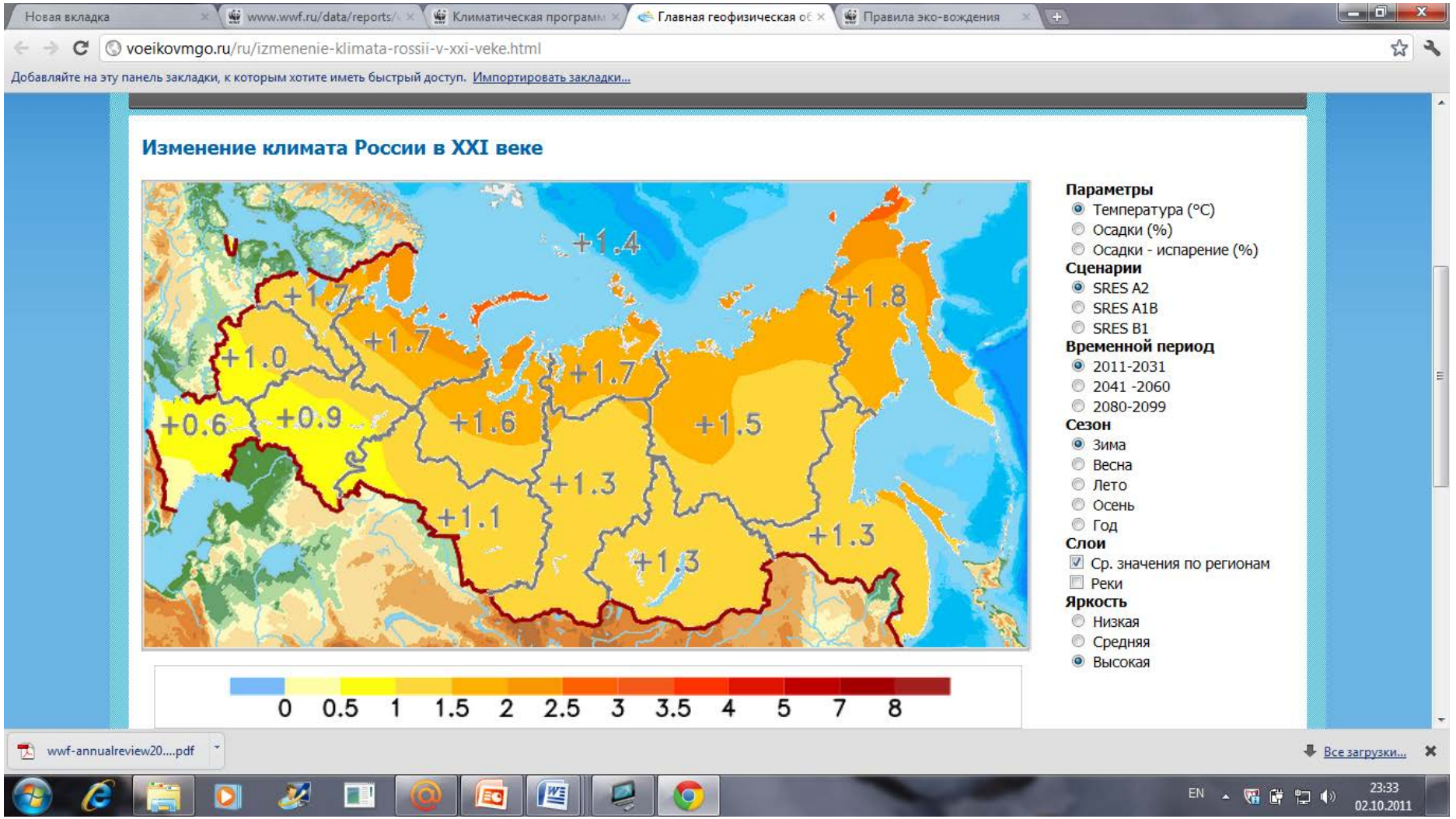
1. Introduction

Background

- Worldwide cities begun to address climate change concerns for the present and future
- It involves different stakeholders and suggest long-term engagement for people in specific urban localities
- Assessing urban vulnerability attempt to measure and determine how severe the impacts of climate change for environments and people might be

Research goal

- to understand social and political milieu and to analyse variety of consequences for human and environment
- is climate (-change) an important driver of (also economic) stability or poses only negative changes for environmental and human systems, especially in sensitive regions such as the Russian North



"…because of its geography, Russia is mostly insulated from the main risks of global warming, and could even benefit…"

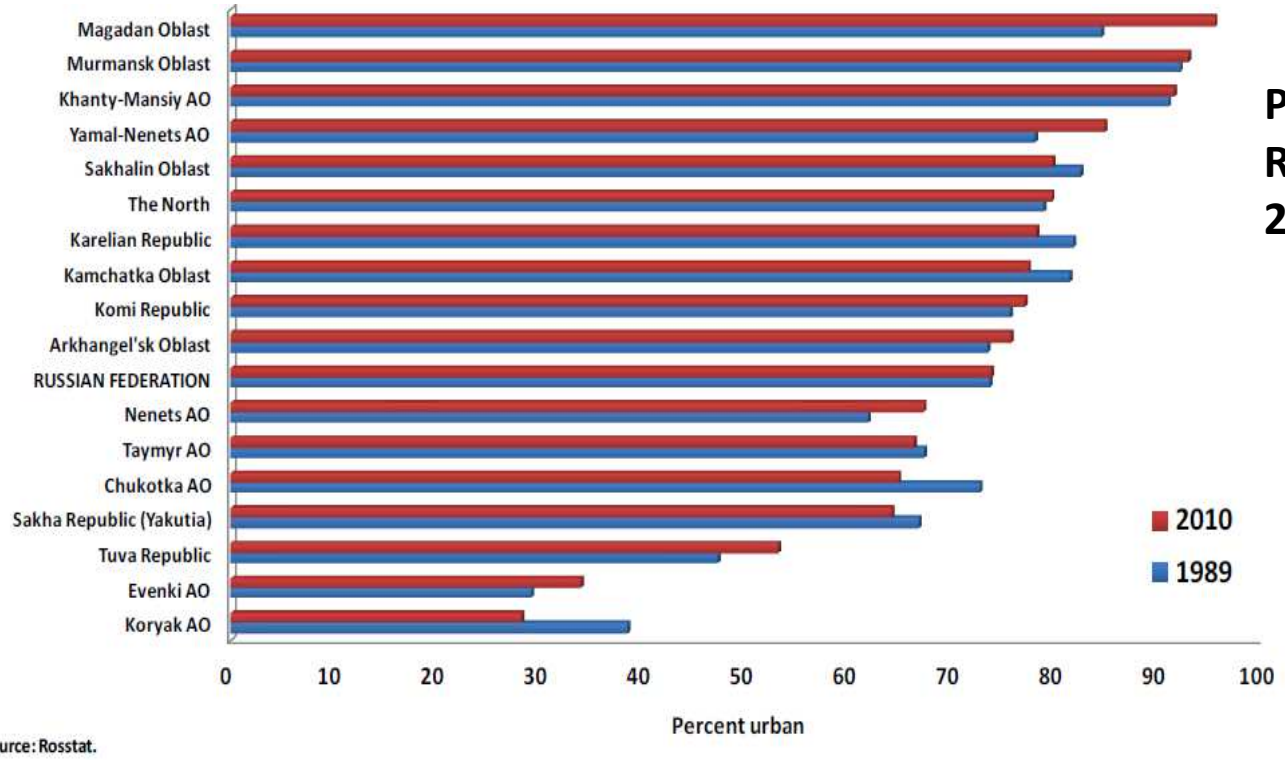
Is it through?

2. Russia and the North: study area

11.9 million sq. km or 66% of the Russian Federation (NPA-Arctic, 2011)

Russian North = territories belonging to the North (including Far North) **+** territories equivalent to the regions of the Far North (some climatically disadvantage territories in Siberia)

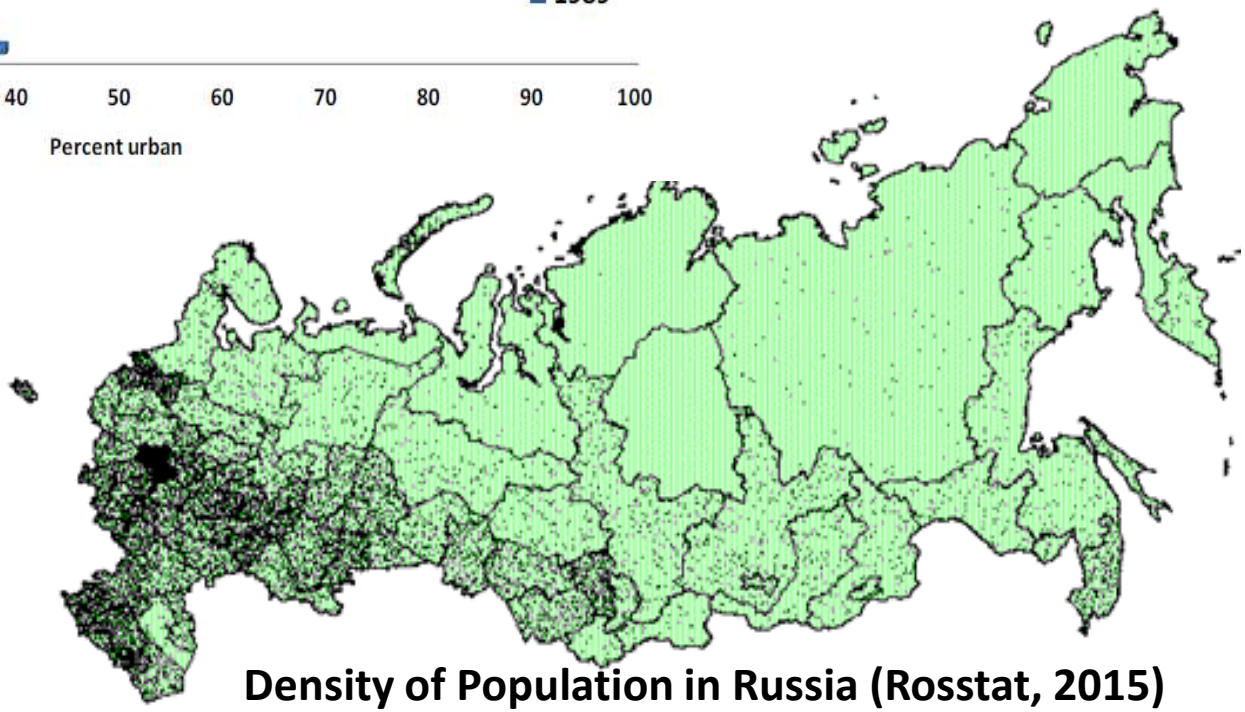
2. Russia and the North: study area



Percent urban in the Russian Arctic, 1989 and 2010

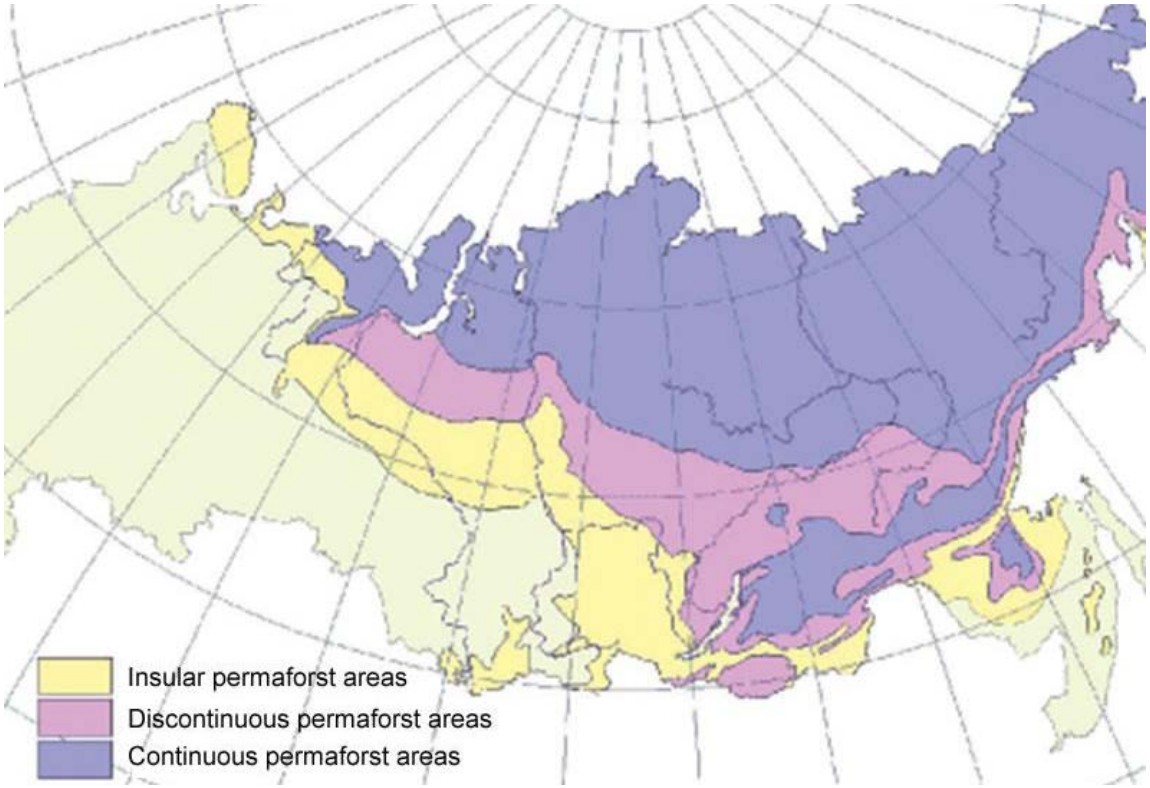
Source: Rosstat.

8.4 people per sq. km average
> 40 people per sq. km in Central Region
< 3 people per sq. km in Far East



Density of Population in Russia (Rosstat, 2015)

2. Russia and the North: study area



Permafrost areas in Russia
(NPA-Arctic, 2011)

Permafrost up to 1500 m in depth…

Buildings on piles as one of the elements of urban space planning

3. Russia's climate politics and different perceptions

- 2009 Russia was ready to reduce emissions 20–25% from its 1990 emission levels by the year 2020;
- when Russia underlined the Kyoto protocol it came in force on 16 February 2005. Russia ratified the agreement three months earlier.

different perceptions

agreement causes emission cuts – good for environment

"It is good for environment" (rehabilitation of polluted and abounded areas)

It helps to improve country's international image and gain political or economic leverage

it leads to restrictions in industrial economy that would harm Russian economy

2013 - Russia decided to discontinue participation in the protocol, because "the other major producers of green-house gases did not have ratified it

Top 5 emitter of CO2 of the global total (2015):
China 28%, US 15%, India 6%
Russia 5%, Japan 4%

3. Russia's climate politics and different perceptions

There are several main concerns about climate change in Russia:

- **limited public awareness and interest in the topic** mostly due to the long history of rejecting the idea that humans could be significant driver of climate change and an idea from soviet past that industrial progress is the most important thing

- **limited participation of multiple stakeholders in policy formation** mostly due to lasting hierarchical management

- since the soviet time **environmental planning and management directives came from within centralized government** and rarely were local initiatives

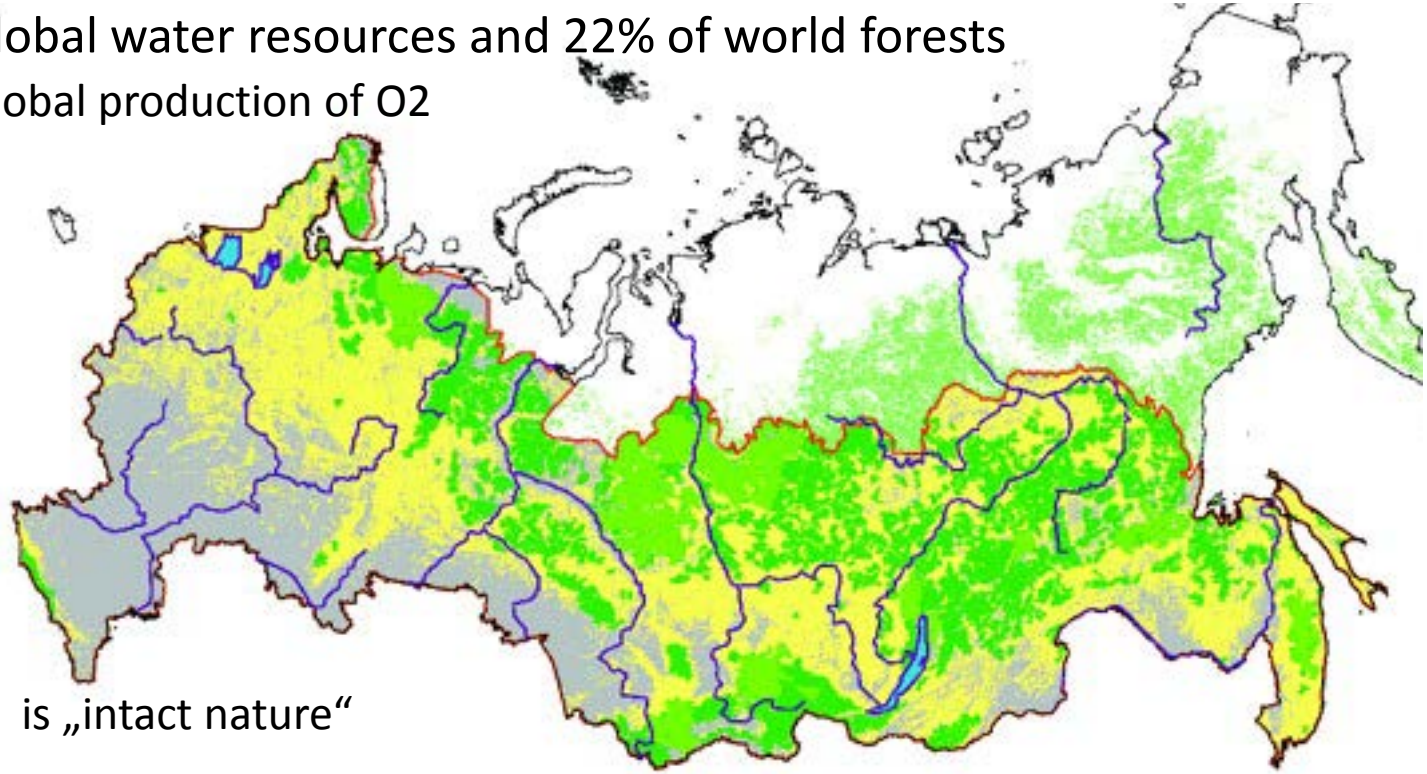
- also leading **scientists (climatologists) are critical** about the role of anthropogenic factors in climate change

- r**isks for economic growth** (could be hampered by the protocol obligations)

- **Public opinion:** 82% Russians were aware of climate change and 53% believed it was real — that marks climate skepticism on the part of almost half of the population (Public Opinion Fund, 2014).

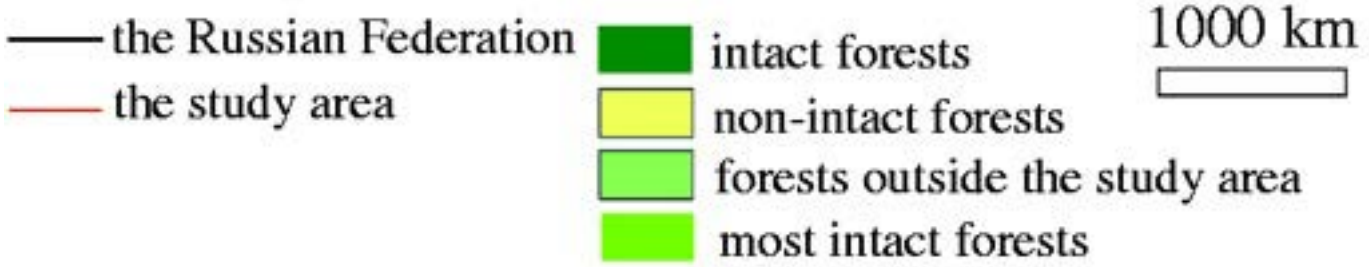
3. Russia's climate politics and different perceptions

- 20% of global water resources and 22% of world forests
  - 24% of global production of O2



11 Mio. km² is „intact nature"

Russia's contribution to environmental purification and global stability (environmental donor for the whole world)



Source: Aksenov D. et al. (2002) Atlas of Russia's intact forest landscapes. In Global Forest Watch Russia. Moscow.

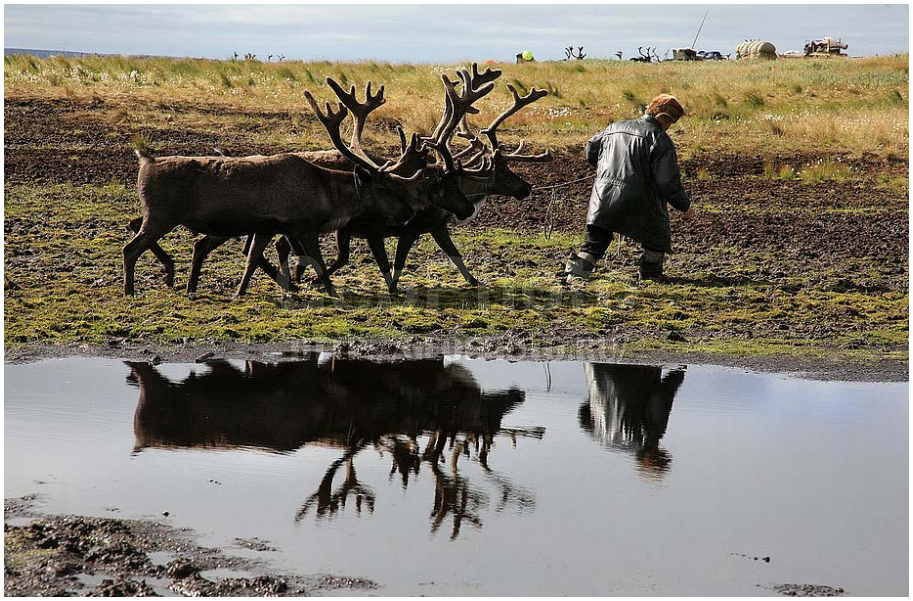
4. Influence of climate change
4.1. Will Russia emerges as a winner?

"…global warming and ice melting in the Arctic are beneficial for the use of the region for economic purposes"

International Arctic Forum: Arctic – territory of dialog. Archangelsk, 30 March 2017

1. development of the Northern sea route
2. melting ice and frost will also open up new fossil-fuel deposits for exploitation
3. open the ice-bound Arctic Ocean to ships carrying oil and liquefied gas
4. ***remote northern Russian towns*** *which have been experiencing economic depression in the transition period may turn to* ***economic and social revival***
   - *additional working places*
   - *infrastructure development*
   - *better funding of social projects due to municipal and regional budget arising*

4. Influence of climate change
4.2. Will Russia emerges as a winner?



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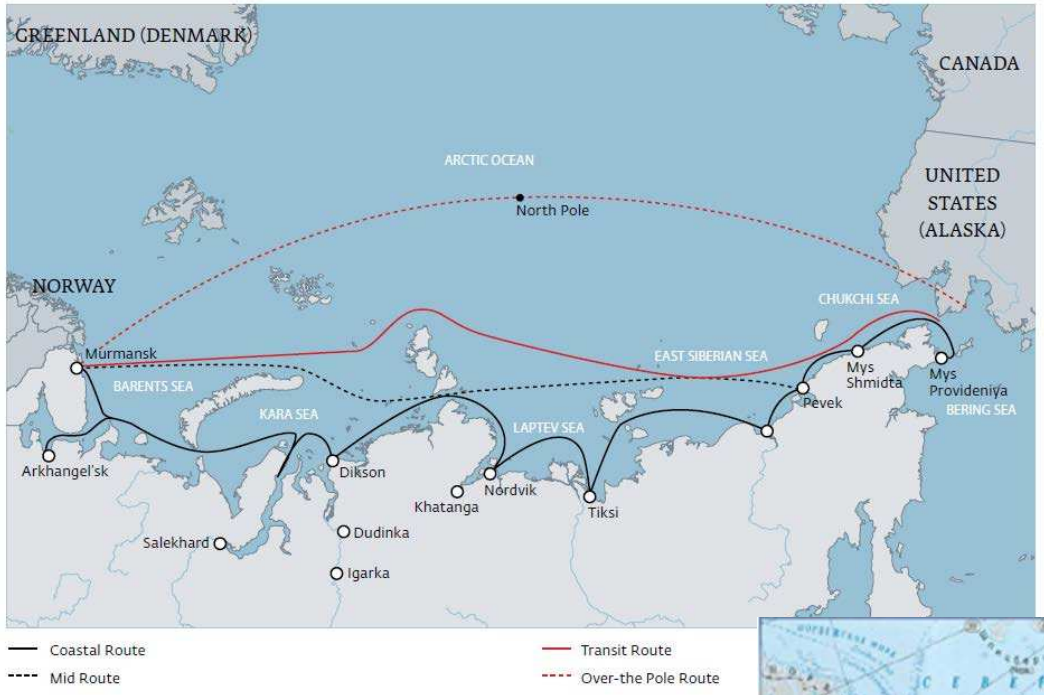


Variants of the Northern Sea Route – shipping corridors (Heininen et al., 2014)

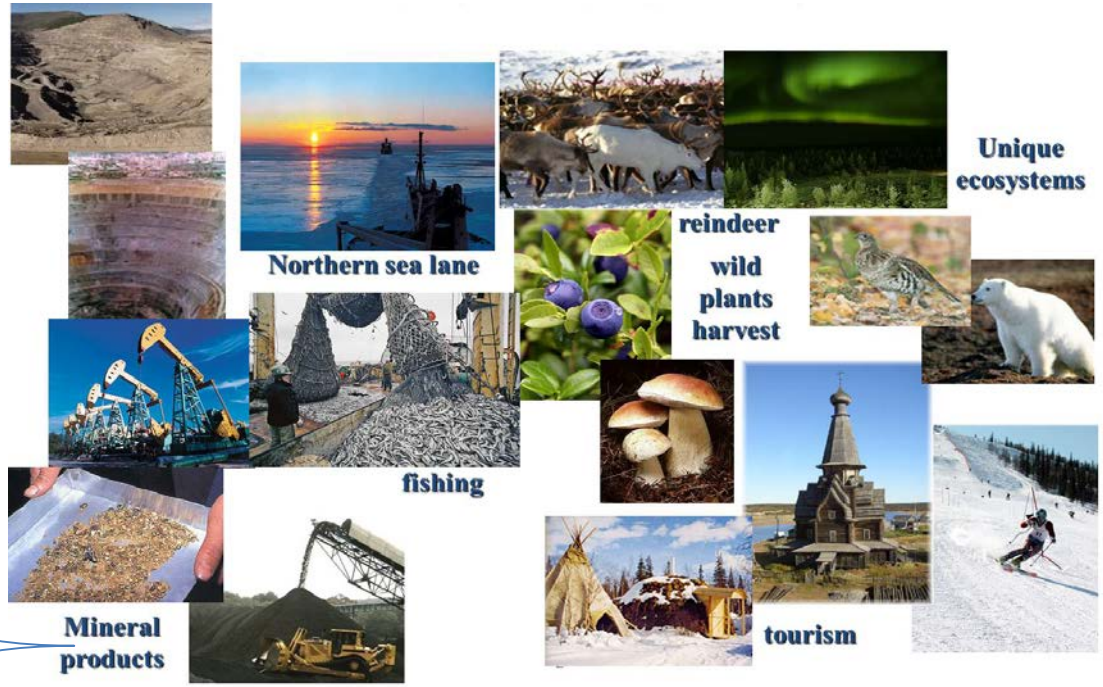
may cut travel time from Europe to Asia by 40% and allows Russia to export its vast natural resources much faster

Basic centers of transport development (Strategic planning of the development of the Artcic zone of the Russian Federation, 2013)

4. Influence of climate change
4.1. Will Russia emerges as a winner?

Other benefits…

- increased productivity and stocks of some fish species due to migration of southern species
- reduced heating costs
- increases in hydro- and wind power potential
- expanded forests
- increased growing season
- development of summer tourism.



!!! may lead to an increase in anthropogenic stress on the Arctic ecosystems !!!

4. Influence of climate change
4.1. Will Russia emerges as a winner?

Benefits from this process:

- Since much of Russia is covered in permafrost and tundra, making it unpleasant place to live, global warming may improve situation …
- warming could add more than 3 mln. sq. km to Russia's arable land
- this is in stark contrast to most countries, whose farmland would shrink as the climate warms
- **But!!!** Since agriculture in southern Siberia could benefit from a warmer climate, reindeer herding in northern Siberia, would suffer...

4. Influence of climate change
4.2. …negative consequences

Environment

- 1955-2015: annual average air temperature in the Russian North increased by 1.2°C
- an increased evaporation level
- changes in the annual river runoff, a rising sea level, shoreline erosion, flooding risks
- During the same period, the mean temperature of upper layer of permafrost increased by 3°C
- Permafrost degradation leads to disruption of engineering infrastructure and buildings;
- Urgent and costly repairs of sewage disposal systems, water supply networks, water treatment plants;
- Incidents / breakdowns of sewerage disposal networks;
- Depreciated quality of drinking water and water in open reservoirs

4. Influence of climate change
4.2. …negative consequences

Environment

- Change in air quality
- Change in water quality
- Climate change + air pollution = double strike!!!

Pulp and paper factories

Primary processing of apatite-nepheline

iron ore wastes

non-ferrous metallurgy (refenery)

Excesses of the maximum allowable atmospheric concentrations (national environmental standards) in some industrial centers of the Russian North (Rosgidromet 2012)

numerator – year average, denominator – maximal registered; "-" pollutant of low importance for the city

Pollutant	Official treshold values in Russia in mg/m^3	Monchegorsk	Nickel	Arkhangelsk	Norilsk
Suspended substances	0.15/0.5	0.66/1.20	0.03/0.80	0.76/0.80	**0.77/3.20**
Sulfur dioxide	0.05/0.5	0.55/5.64	1.06/4.80	0.28/1.23	**2.33/29.66**
Carbon oxide	3.0/5.0	0.29/2.40	0.15/0.40	0.37/2.80	**0.06/3.00**
Nitrogen dioxide	0.04/0.085	0.51/1.65	0.30/1.88	0.54/3.18	**0.84/25.70**
Formaldehyde	0.003/0.035	1.53/0.60	0.60/0.37	2.00/0.83	**2.10/4.14**
Benzo(a)pyren	0.1 mkg/100 m^3/-	1.30/-	0.50/-	4.80/13.20	**0.20/0.60**
Hydrogen sulfide	-/0.08	-	-	0.09/3.36	**0.16/3.62**
Carbon bisulfide	0.005/0.03	-	-	1.70/1.00	-
Phenol	0.003/0.01	-	-	0.40/0.99	**0.37/5.10**
Chlorine	0.03/0.1	-	-	-	**0.93/3.30**
Methyl mercaptan	-/0.0001	-	-	7.80/83.00	**0.60/0.37**
Furfural	**0.05/0.08**	-	-	**0.20/4.40**	-

4. Influence of climate change
4.2. …negative consequences

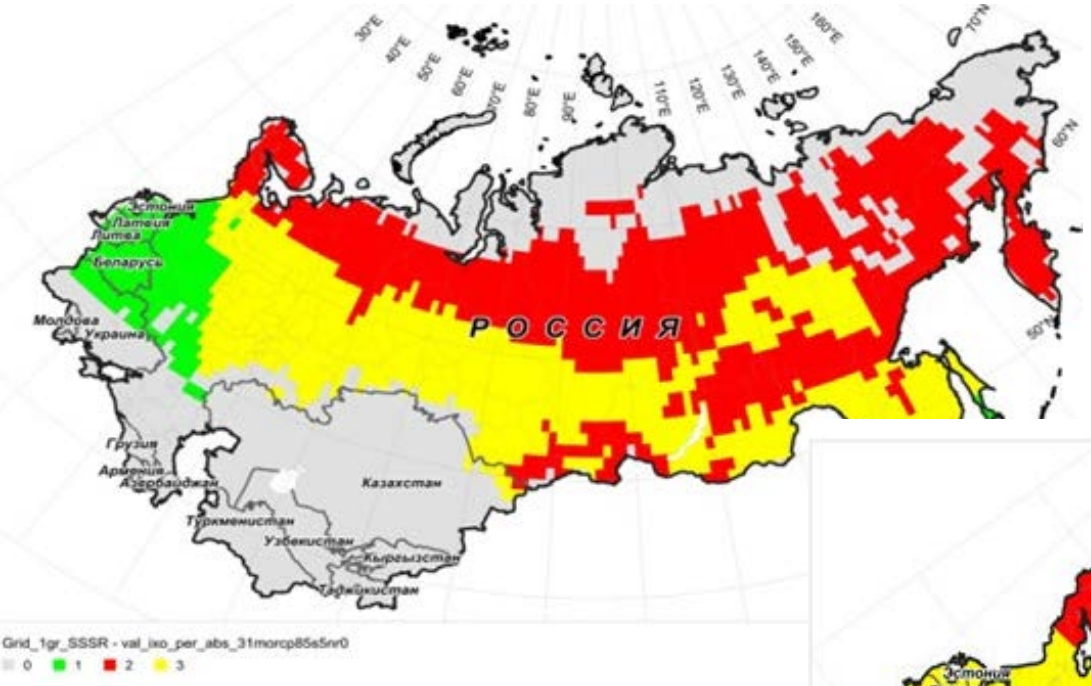
Human heath

- Infections diseases – Infrastructure break-down in cryolite zone!
- Climate change in Russian Arctic increases the risks of the emergence of zoonotic infectious diseases such diseases as tick-borne encephalitis, tularemia, brucellosis, leptospirosis…
- intestinal diseases
- Impact of heat waves and cold spells

Incidents of thick-borne encephalitis in the Archangelsk Oblast and Russia

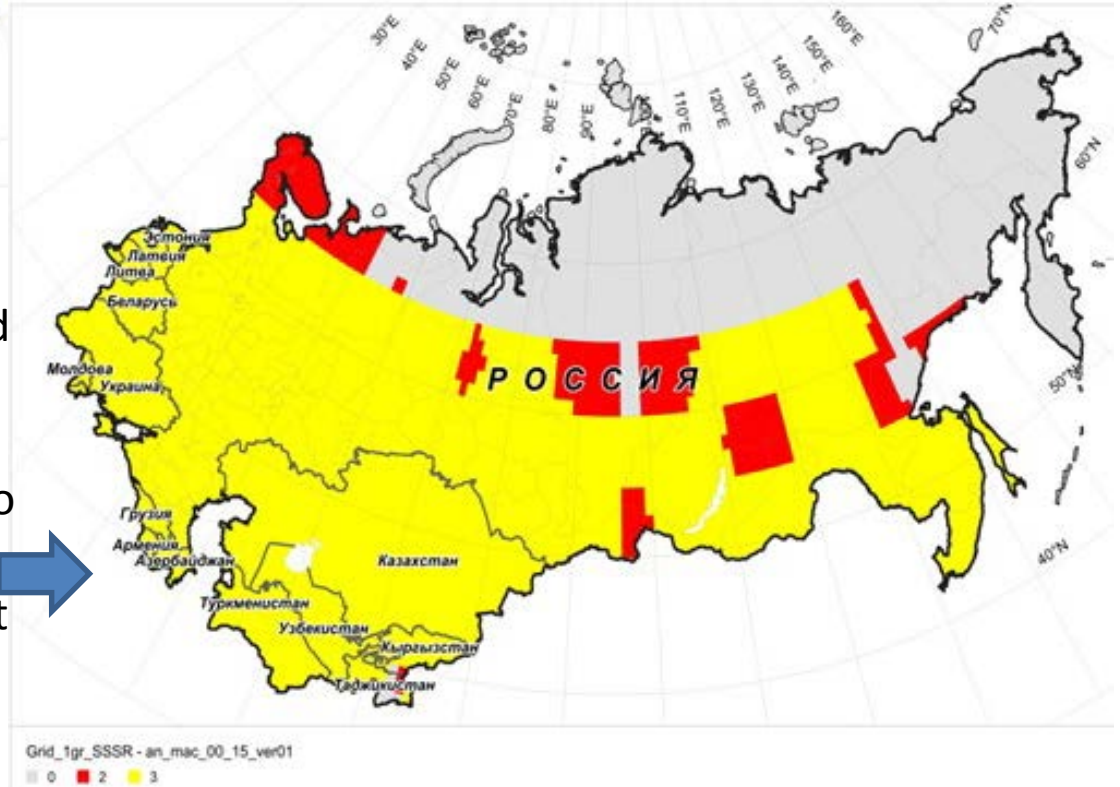
Tokarevich et al., 2011

4. Influence of climate change
4.2. …negative consequences



Prospective estimate of climate-induced changes in Ix. persulcatus habitat under the extreme climate change scenario until 2080-2099. 0 – no change; 1 – reduction in habitat area; 2 – expansion of habitat area; 3 – habitat at present time (Yasiukevich, 2013).

Prospective estimate of climate-induced changes in An. maculipennis habitat under the assumption that average global temperature rises by +1.5°C 0 –no mosquitoes of this species, 2 – expansion of habitat area; 3 – habitat at present time (Yasiukevich, 2013).



4. Influence of climate change
4.2. …negative consequences

Low temperatures as health risk factor

- Cold discomfort
- Cardio-vascular system
- Respiratory tract
- Mortality from frostbite - in Russia, about 1,500 people die from frostbite every year, predominately, males over 20 y.o.

Indicator: respirator diseases (up to 60% from all diseases) chronical bronchitis / respiratory infections / occupational diseases

Disease — **Cost**

Up to 23,9% of GDP losses for some northern regions

health effects caused by ambient pollution by population of some cities of the Russian North (per 1,000 adults)

Pathology	Average in Russia	Norilsk	Monchegorsk	Nickel	Arkhangelsk	Vorkuta
Respiratory diseases	745	1692.0	1625.1	1485.0	1304.8	1415.2
Skin diseases	93.5	180.4	175.2	125.0	158.9	87
Blood diseases	19.8	39.2	38.0	35.2	18.5	37.9
Oncological diseases	2.2	10.8	9.2	6.1	8.1	4.1
Inborn diseases (per 1,000 infants)	4.8	35.0	24.6	13.7	27.2	28.8

4. Influence of climate change
4.2. …negative consequences

Indigenous peoples of the Russian North
(50,000, live in rural areas)

- Problems with traditional hunting
- Influence on traditional lifestyle and subsistence of indigenous population
- Change in food – dietary problems?
- Early melting of ice
- Increase in injury rates among reindeer breeder

Geographical and cultural isolation
(far from urban centers)

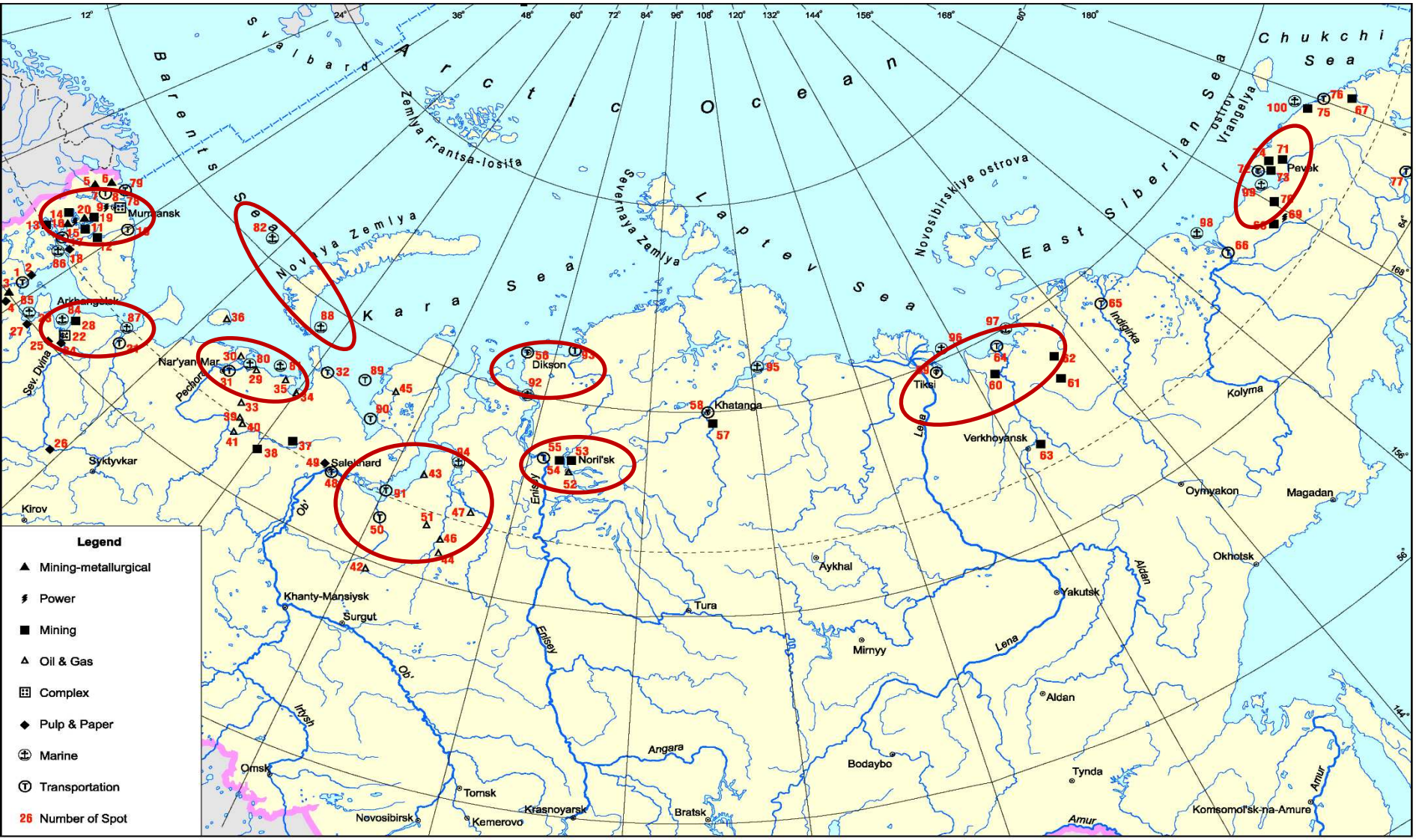
4. Influence of climate change
4.2. …negative consequences

Traditional nature management possible conflicts matrix (Dushkova et al., 2017)

Economic activity in traditional land management	Potential types of nature management/type of impact on traditional				
	Industrial	Marine transport	Terrestrial transport	Settlement	Recreational
Reindeer breeding	+/pollution		+/pastures fragmentation		+/poaching
Marine fishing and hunting		+/pollution, noise			Disturbances of sea animal populations
Fishing	+/pollution			+/pollution	+/depletion of fish resources
Hunting	+/habitats disturbances (chemical, noise pollution)		+/habitats fragmentation	+/poaching	+/depletion of hunting resources
Wild plants picking	+/pollution			+/depletion of resources	+/depletion of resources

4. Influence of climate change
4.2. …negative consequences

The main areas of anthropogenic impact on the territory of traditional land use



300 0 300 600 900 км

5. Sustaining Russian Arctic cities: vulnerability and adaptation capacities

Adaptation strategy:

- already developed since soviet time (NBS, urban green etc.)
- Compact built environment
- Migration flows
- Recourse-based technological innovation
- Knowledge flows and local-regional networks
- International cooperation

5. Sustaining Russian Arctic cities: vulnerability and adaptation capacities

Adaptation strategy:

NBS and urban green infrastructure already developed since soviet time:

- availability of urban green to every inhabitant
- creation of the most part of the urban green areas (large parks/squires)
- 1950th - All-Russian Society for the Promotion and Protection of urban green planting
- norms for minimum amounts of public green space for each settlement

direct health benefits from urban green

significantly lower prevalence of early childhood asthma, skin irritation and some chronic pathologies

reduced morbidity and increased general health (incl. self-perceived)

1) up to 20 % reduced morbidity rate in the city forest areas

2) psychological benefits from contact with nature (reduce stress)

5. Sustaining Russian Arctic cities: vulnerability and adaptation capacities

Artefacts of Soviet urban design in modern northern cities: squire with the radial path system and greening the roads as a main sanitary protective tool of the soviet urban green strategy

5. Sustaining Russian Arctic cities: vulnerability and adaptation capacities

Main approaches to green infrastructure development at the North cities of Russia according climate conditions

1) **Arctic deserts** – greening with the help of greenhouses

2) **Tundra** – greenhouses and public green spaces with special infrastructure (heated sport grounds etc.)

3) **Forest tundra and taiga** – with some features typical for moderate climate zones but with special wind-proof functions

5. Sustaining Russian Arctic cities: vulnerability and adaptation capacities

Green space of the common use in the city of Arkhangelsk (total amount in number)

City district / territorial okrug	Parks	Squires	Small Squires	Boulevard	Alleys	Biodiversity (trees and shrubs)		
						Total number of species	Aboriginal/ exotic species	Conifero-us/hard-wood
Varavino-Faktoriya	-	8	-	1	-	14	7/7	0/14
Isakogorsky and Tsiglomensky	1	3	-	-	-	10	7/3	4/6
Lomonosov-sky	1	4	6	1	-	18	8/10	4/14
Maymaksan-sky	1	1	-	-	-	no data	no data	no data
Oktyabrsky	2	14	9	10	-	34	11/23	6/28
Mayskaya Gorka	-	1	-	1	1	10	7/3	4/6
Severny	-	1	-	-	-	8	7/1	0/8
Solombalsky	-	4	-	2	-	24	11/23	3/21

6. Conclusions

1. The Russian leadership considered the changing climate **beneficial** —making more natural resources available for extraction in the Arctic region, expanding territories suitable for agriculture, and enabling new shipping routes along the Arctic coast.

2. The **benefits** of climate change were even included in Russia's climate doctrine (Climate Doctrine, 2009), however, nowadays the official government position became more careful about such positive effects.

3. Negative consequences:

- *environment* (permafrost degradation leads to disruption of engineering infrastructure and buildings, urgent and costly repairs of sewage disposal systems, water supply networks, water treatment plants; Incidents / breakdowns of sewerage disposal networks; climate change + local pollution = double danger)

- *human health* (increasing risks of the emergence of zoonotic infectious diseases, intestinal diseases, impact of heat waves and cold spells)

- *indigenous peoples* of the Russian North (problems with traditional hunting, Influence on traditional lifestyle and subsistence).

4. Adaptation strategy: already developed since soviet time (NBS, urban green etc.)

5. The dilemma about choosing which modernization approach is better – to continue privileging the interests of the large oil and gas industry or to offer new opportunities for innovative economic development.

Thank you for your attention!

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