Desertification and land degradation in Russian North-East Asia

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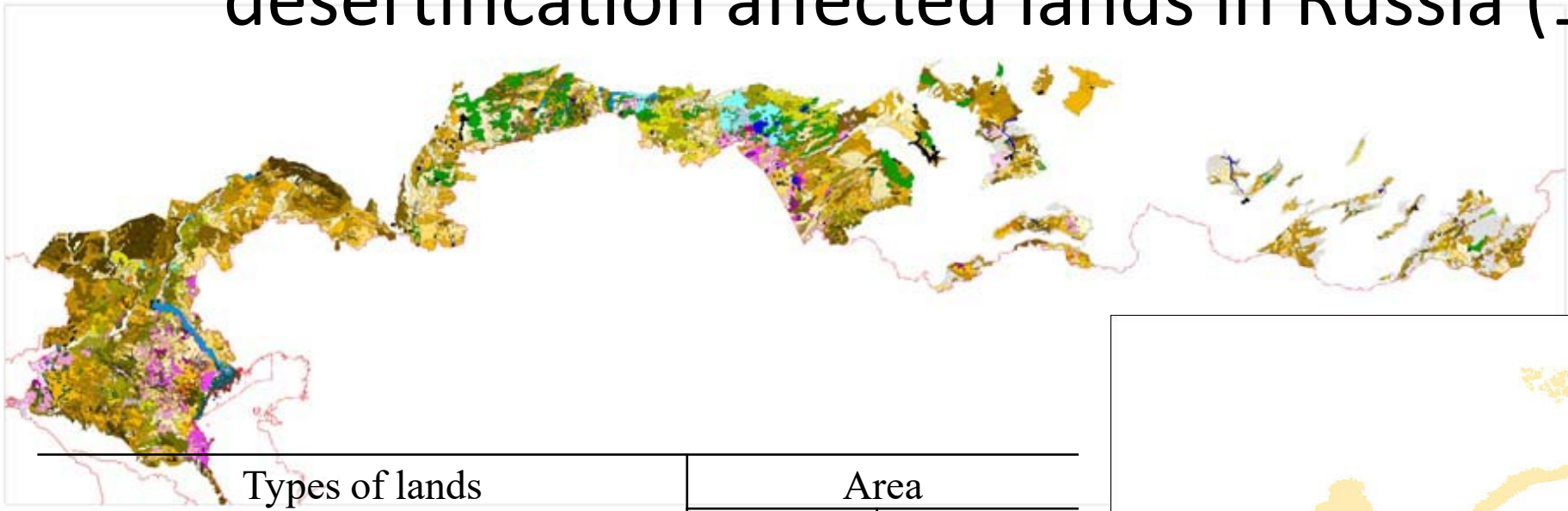
Russia is huge country with a “belt” of desertification affected or risky areas of 1 220 000 sq. km or 7.2% of the territory of Russian Federation. Almost 80% of primary agricultural production is produced here.

History of combating desertification in Russia (key dates)

- **1891:** strongest drought over the southern part of Russian Empire occurred and the study of drivers was entrusted to prof. V.V. Dokuchaev, a founder of modern Soil Science ("Special expedition of the Forest Department to test and account for various methods and techniques of forestry and water management in the steppes of Russia“)
- **1948-1953**: State programme for afforestation of steppe areas of USSR
- **1982-1990**: Food programme (subprogramme on desert development) of USSR
- **2003**: Russia ratified the UNCCD. Development of regional plans for combating desertification

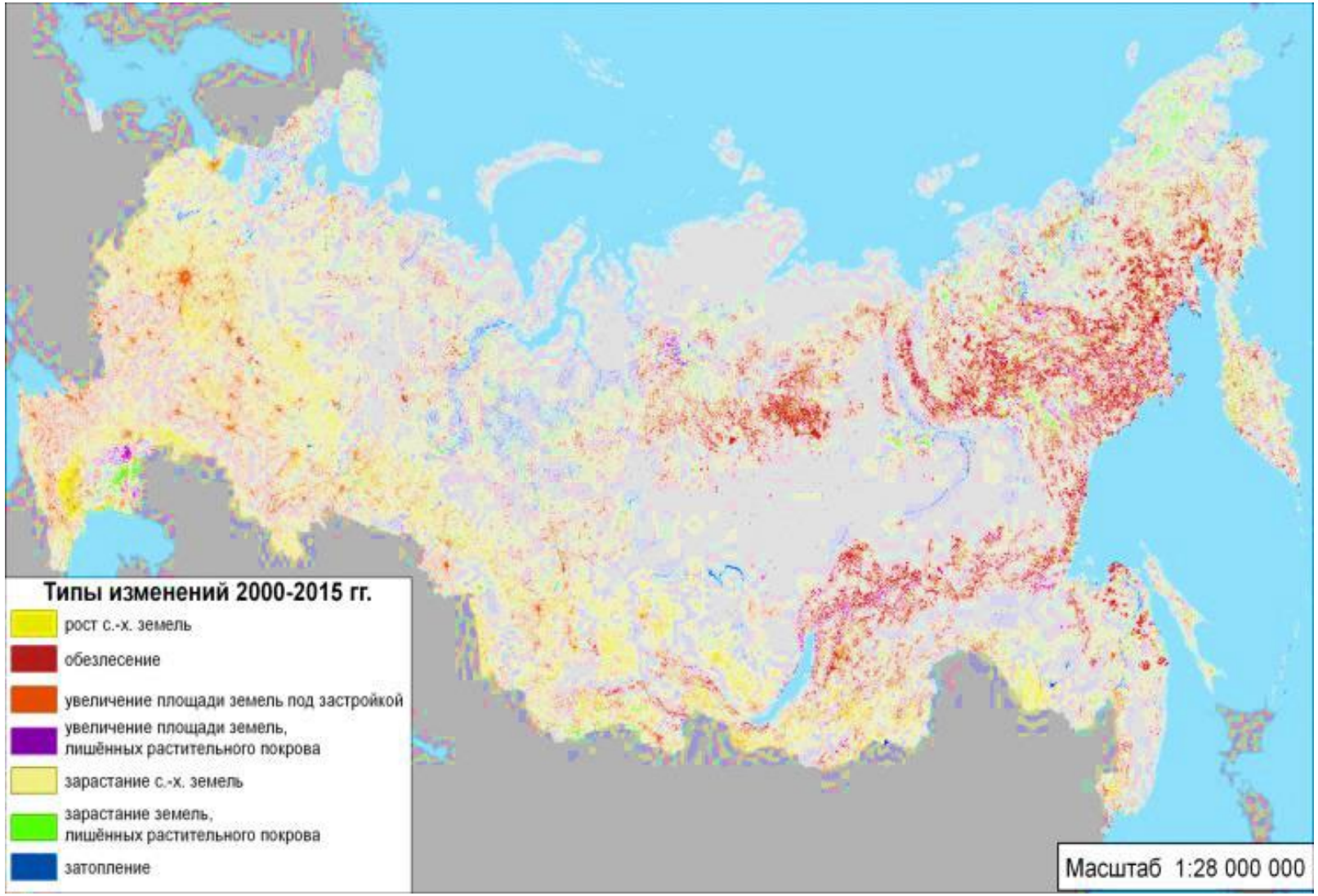
Desertification assessment, mapping and zoning of desertification affected lands in Russia (1999-2006)



Types of lands	Area	
	km^2	%
Total mapping area	1576093	100
Lands prone to desertification (actual desertification)	1190257	75.52
Other lands under desertification risk (potential threats)	169111	10.73
Lands not prone to desertification	14606	0.93
Other lands under progradation	99246	6.30
Lands not included in consideration (water surface and mountainous regions)	102873	6.53

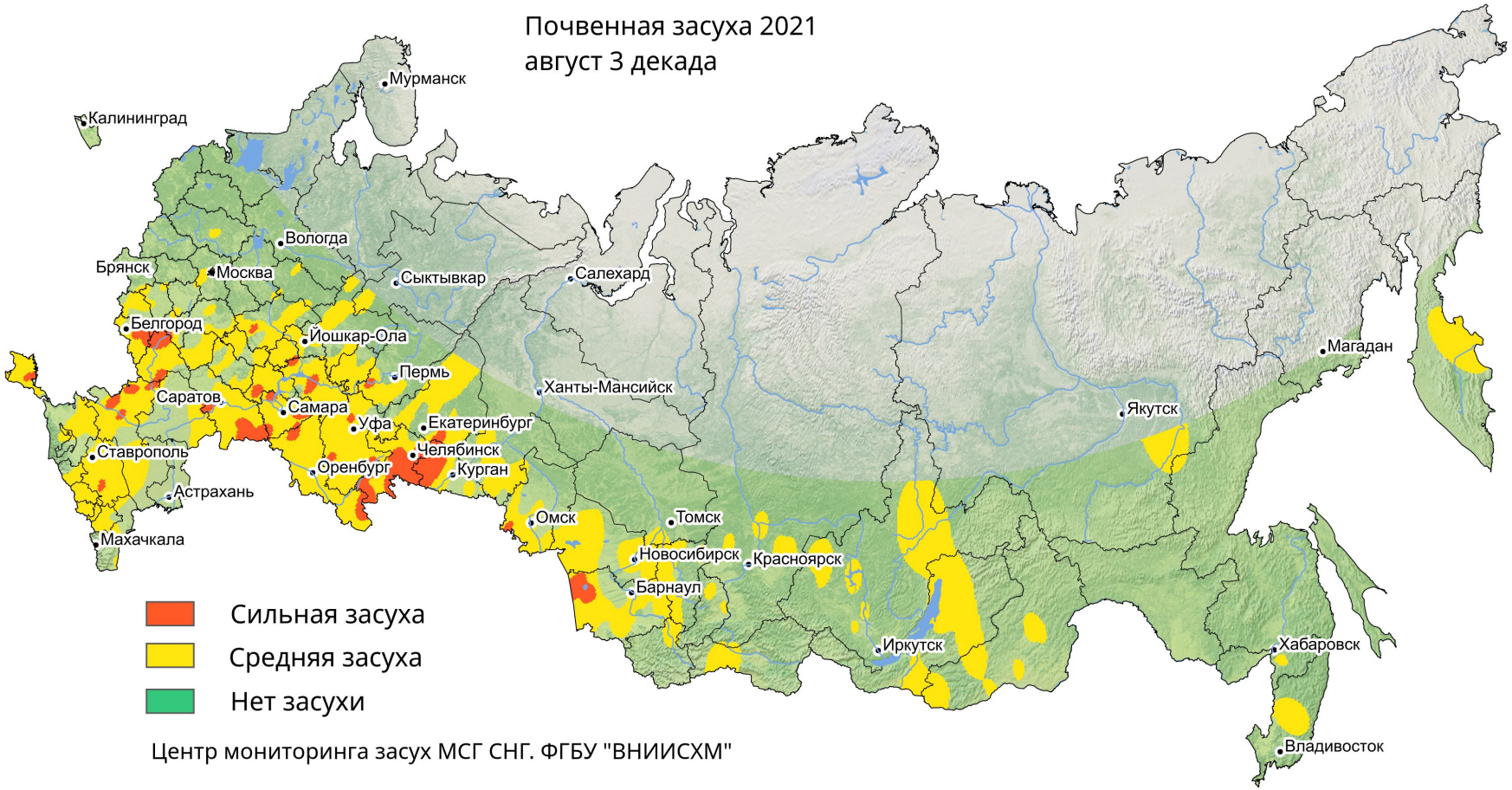
By Kust et al., 2001, 2006, 2011

Changes of land use in Russia (2000-2015)



By Kust et al., 2017

Soil drought, 2021



Russia is not an arid country. Desertification affects semi-arid and dry sub-humid regions: forest steppes, meadow steppes, and even southern taiga forests

The territories prone to active or potential desertification are fully or partially defined in the following 11 administrative subjects of **Asian part of Russian Federation**:

Kemerovo, Kurgan, Novosibirsk, Omsk, Tyumen, Chita regions (oblasts),

Altai, Krasnoyarsk territories (krays),

Khakassia, Tuva, Buryatia republics

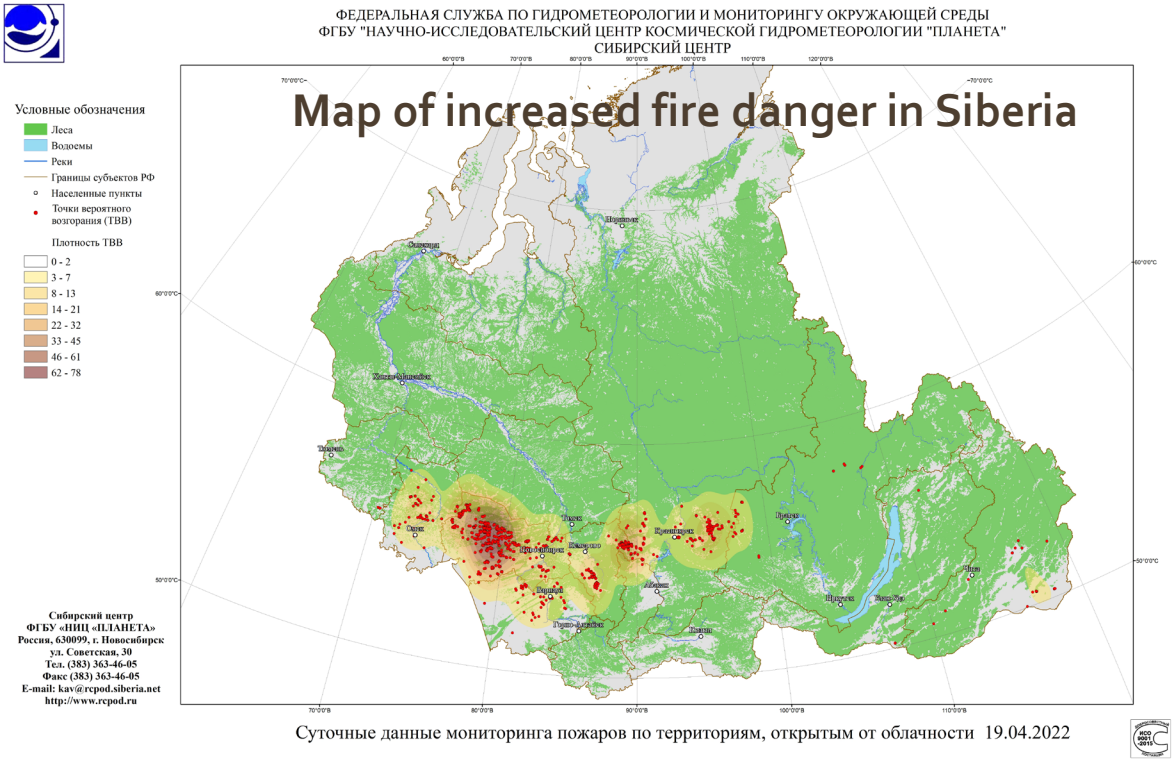
Key risks of desertification :

- **Water table rise** as a result of construction of water facilities, long-term irrigation or extension of irrigated areas, and of natural geologic and/or climatic processes;
- **Irrigation with mineralised water**;
- **Geochemical migration of salts** around irrigated lands to adjacent areas;
- **Drying of land surface** caused by water table fall as a result of artificial river regulation or construction of drainage systems and of natural geologic and/or climatic processes
- **Pasture degradation** in fragile lands (saline, alkalised, sandy, steep slopes, etc)
- **Plowing** of fragile soils;
- Use of **heavy agricultural vehicles** on arable lands;
- **Forest and steppe fires**
- **Deforestation**
- **Technogenic and urbogenic** degradation of soil and vegetation.

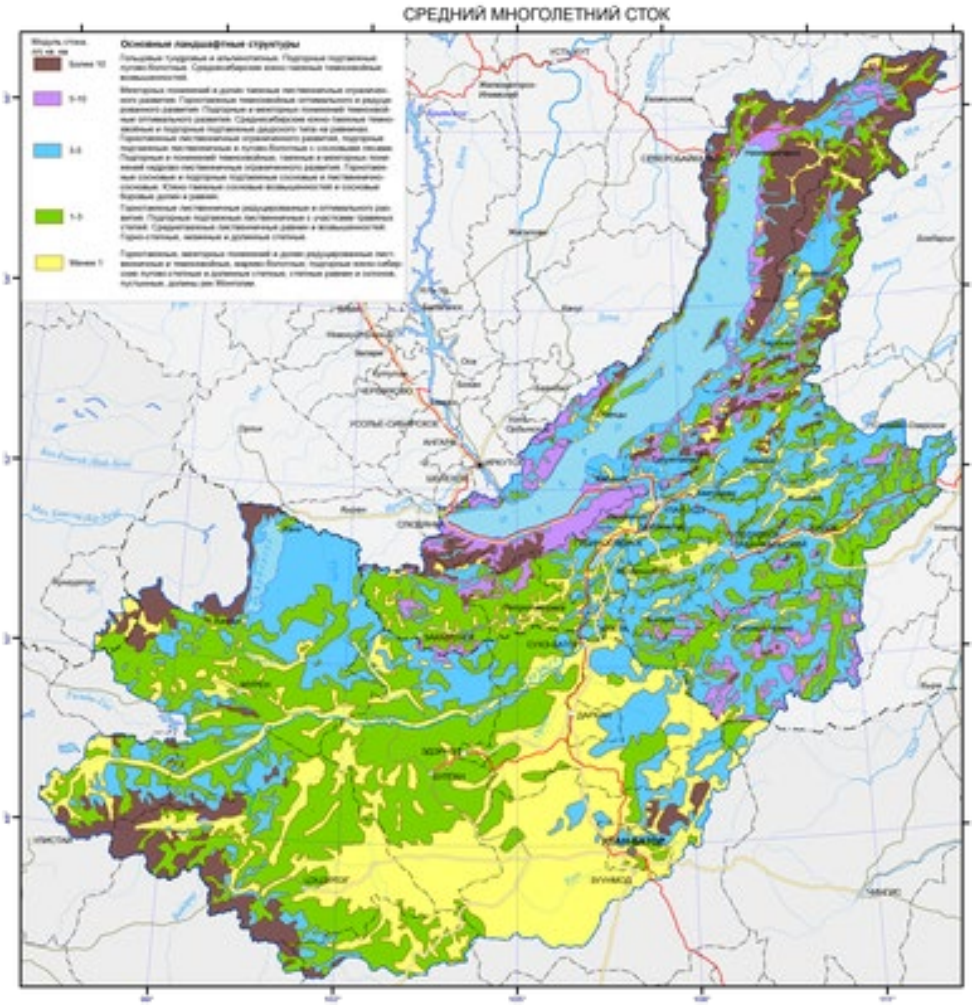
Progradation phenomena associated with modern processes of natural and artificial recovery of previously degraded lands :

- **Natural recovery of vegetation** on abandoned lands and degraded rangelands;
- An **increase in pastures productivity** due to reclamation;
- **Recovery of forest vegetation**;
- **Soil desalinisation and dealkalinization as a result of** amelioration.

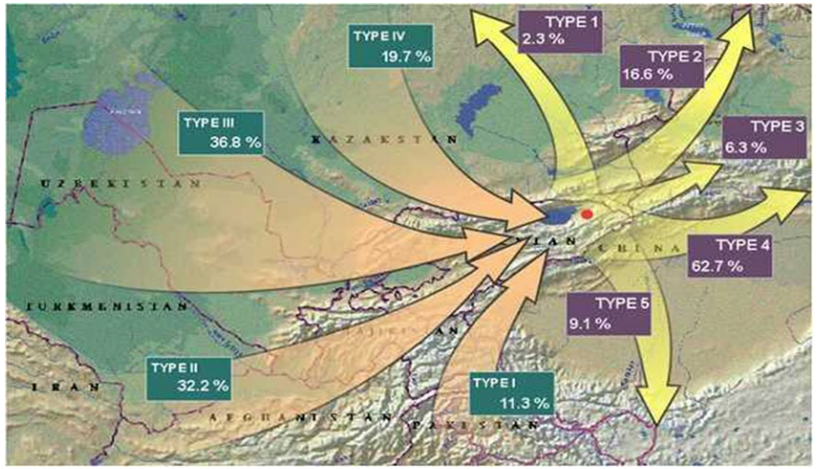
Fire



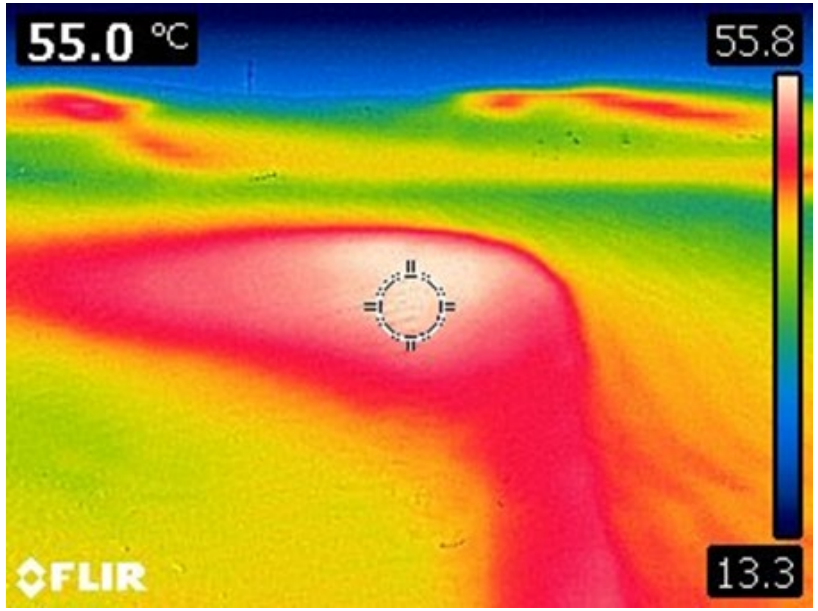
The average annual flow of Zabaikalie region



Increasing the frequency of dust storms, transboundary migration of matter

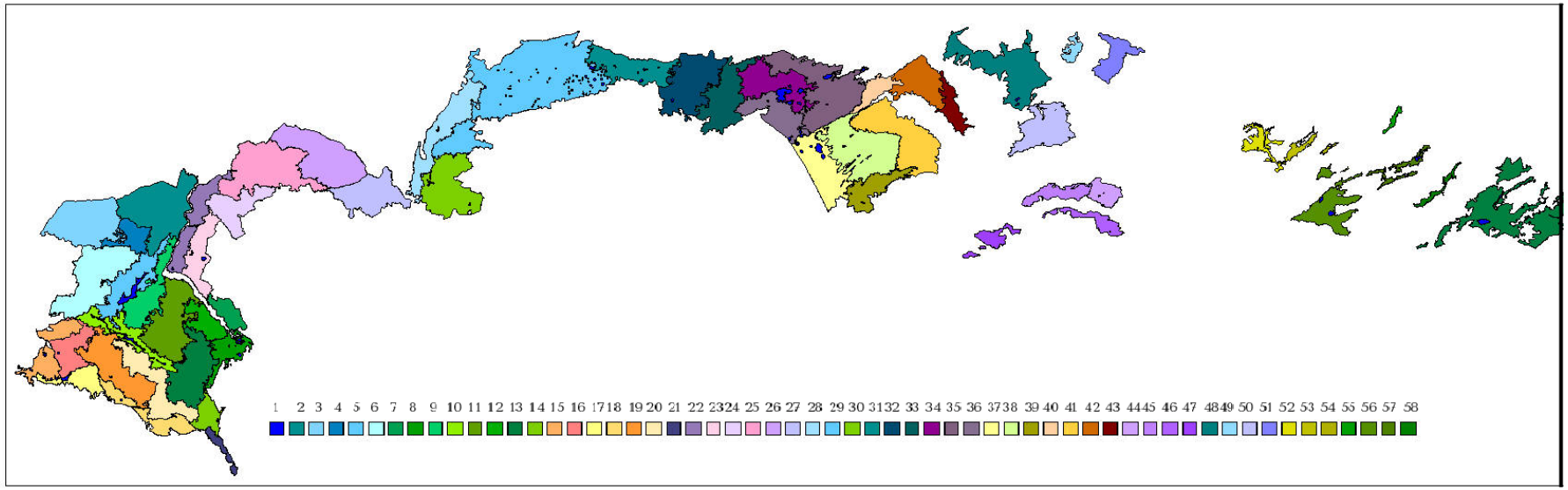


Map of thermal fields for aerosol observations in desert landscapes



Geographical zoning of desertification

The scheme includes 15 desertification provinces subdivided into 58 districts differ in combinations of desertification risks, trends and rates, and in regional peculiarities of land use.



Criteria to determine desertification provinces and districts

- **Types (trends) of desertification and their variability**
- **Desertification causes**
- **Rate of land degradation**
- **Type of economic activity and corresponding losses of natural resources**
- **Costs of restoration and rehabilitation measures**
- **Costs of life support**
- **Biogeochemical peculiarities**
- **Medico-geographical peculiarities**

Desertification trends most common in Russia:

- **Water erosion** (incl. gullies and surface wash)
- **Formation of loose and deflatable surfaces** (result of wind erosion)
- **Salinization**
- **Alkalinization**
- **Overcompaction** of soils
- **Under-flooding**
- **Decrease of productivity of natural vegetation** (mainly on pastures and in forests).
- **Fire**
- **Dust storms, transboundary migration from other countries**

Progradation trends:

- **Steppe vegetation recovery;**
- **Recovery of forests and shrubs**;
- **Desalinization and dealkalinization of soil**

The top-priorities in combating desertification

✓**Indicators** for prediction and **monitoring of desertification** and droughts

✓Ranking and assessment of regions prone to desertification; natural and socioeconomic **zoning of desertification**

✓**Economic motivating methods** and encouragement to combat desertification and droughts

✓Development of **technologies** adapted to various natural, economic, and social conditions

✓Measures for the protection of settlements, including agroforestry

✓Development and application of measures **to prevent human and livestock diseases**

✓Knowledge **management**, awareness, and **information exchange**;

✓Restoration and development of **traditional indigenous methods** of environmental land use

Our experience in other countries for the dissemination and harmonization of approaches

- Central Asia
- Caspian Region
- Altai Region
- Caucasus Region
- NEAN

The LDN methodology is actively used in Russia and in the neighboring territories that affect our landscapes

Ministries and departments – potential participants in the process of achieving the goals of the LDN in Russia

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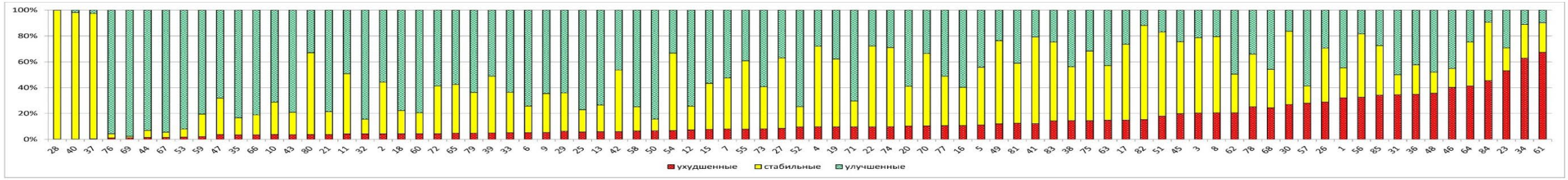
С 1931 года
Ф·Н·Ц
АГРОЭКОЛОГИИ РАН

Index LDN - integral assessment of degraded lands (%) (estimation of condition and dynamics)

а)



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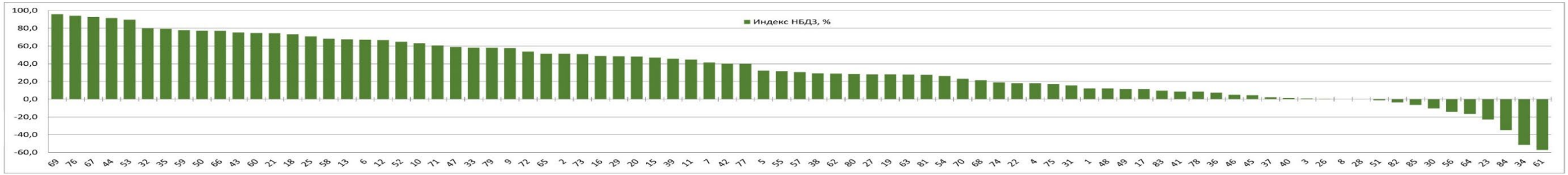

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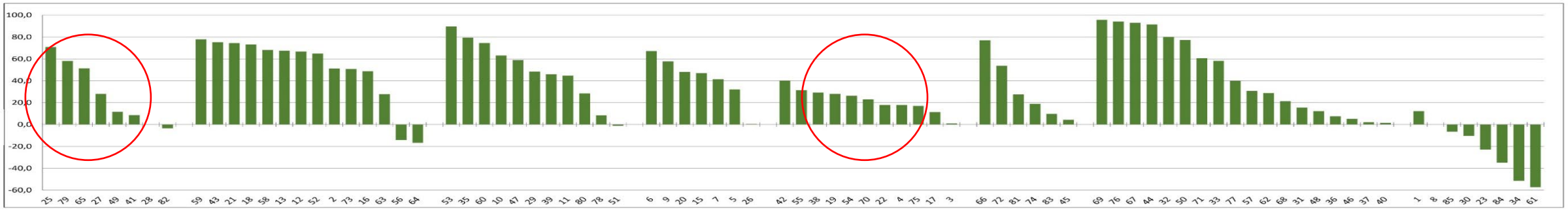
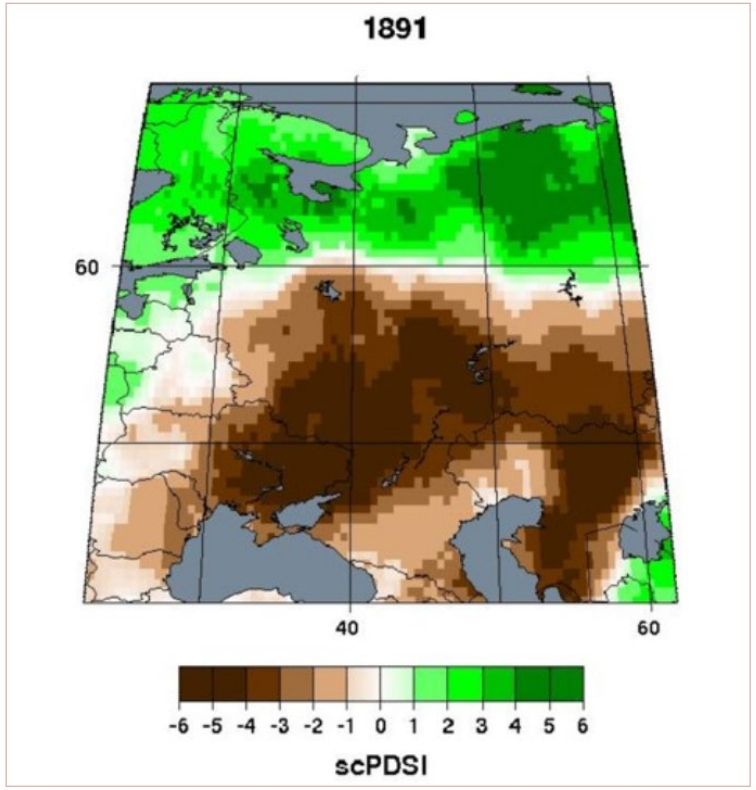


ДВФО ПФО СЗФО СКФО СФО УФО ЦФО ЮФО

Monitoring and early warning



Reconstructions of droughts according to paleogeographic studies, IG RAS

ИСПОЛНИТЕЛЬНЫЙ КОМИТЕТ
СОДРУЖЕСТВА НЕЗАВИСИМЫХ ГОСУДАРСТВ

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OF THE CIS (MSG)

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Всероссийский НИИ
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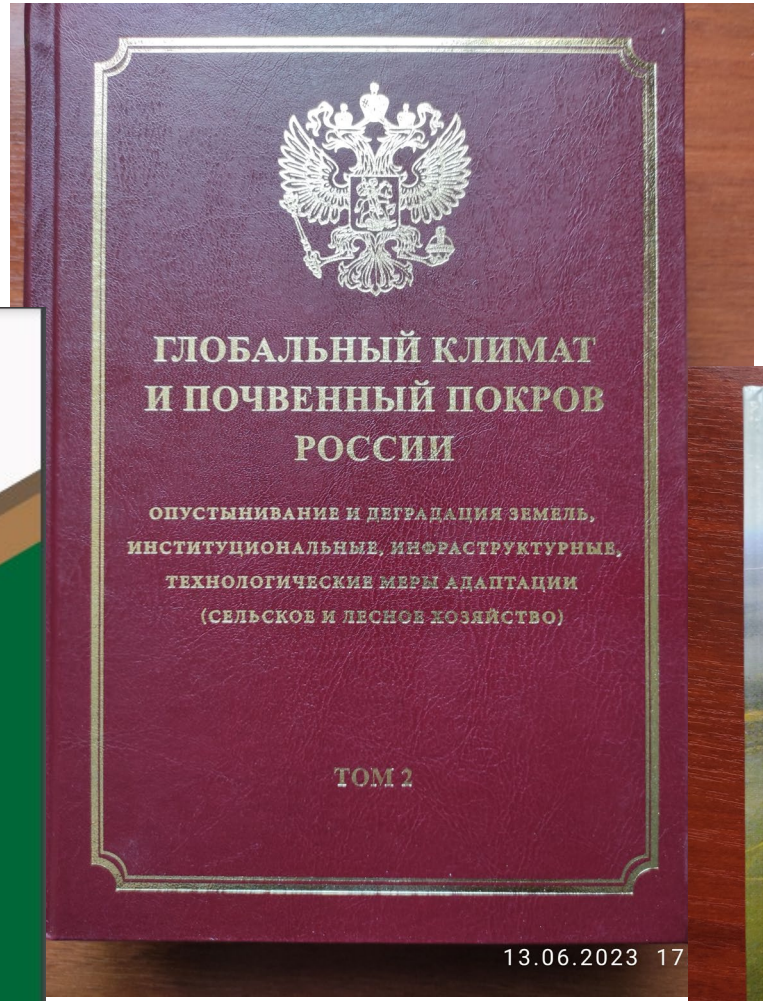
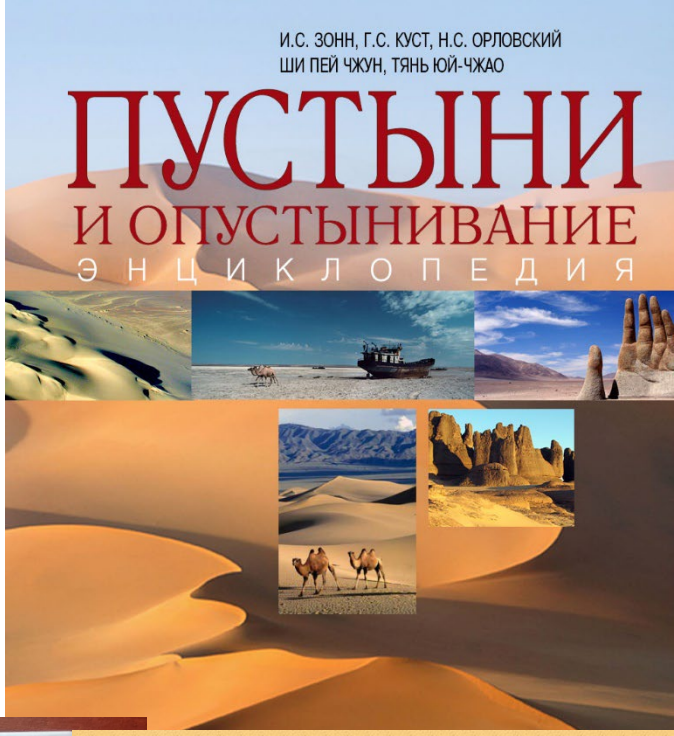
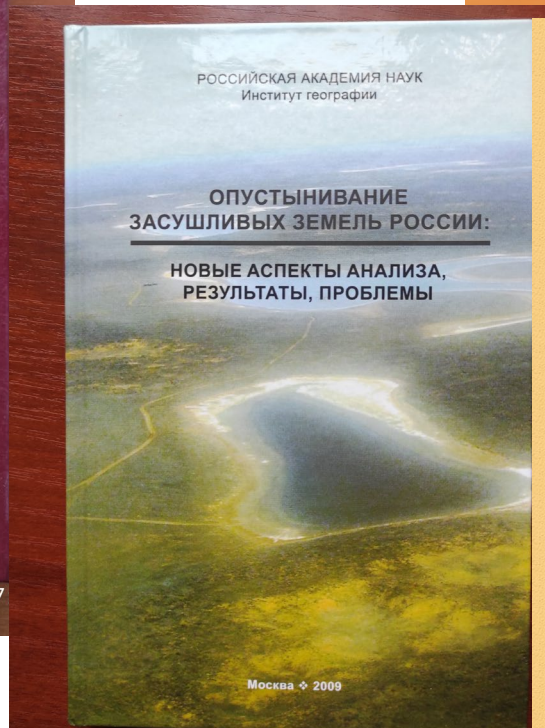
The Drought Monitoring Center of the Interstate Council for Hydrometeorology operates on the basis of the Federal State Budgetary Institution "All-Russian Research Institute of Agricultural Meteorology" (Federal State Budgetary Institution "VNIISHM") of Roshydromet.

Publication







Suggestions for cooperation

- Garmonization of LDN indicators for participating countries
- Identification of drivers and risks
- Optimizing methods to combat desertification
- Development of models of sustainable land management basing on the LDN approach
- Active cooperation and communication in participating countries

Thank you for attention