Opportunities and Threats of Artificial Reforestation in Steppe Zone of Eurasia

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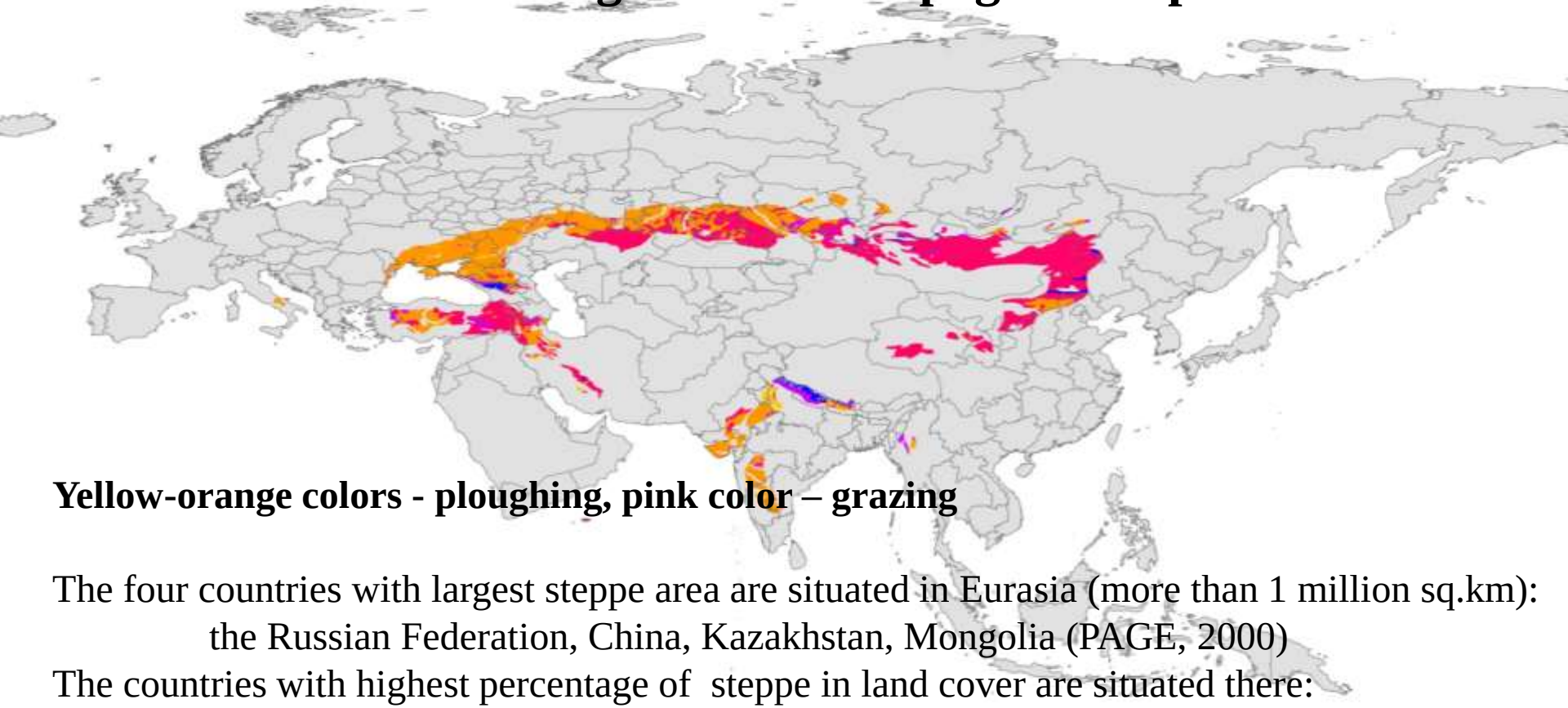
Eurasian Steppes and Grasslands
Causes and Degree of Anthropogenic Impact



Yellow-orange colors - ploughing, pink color – grazing

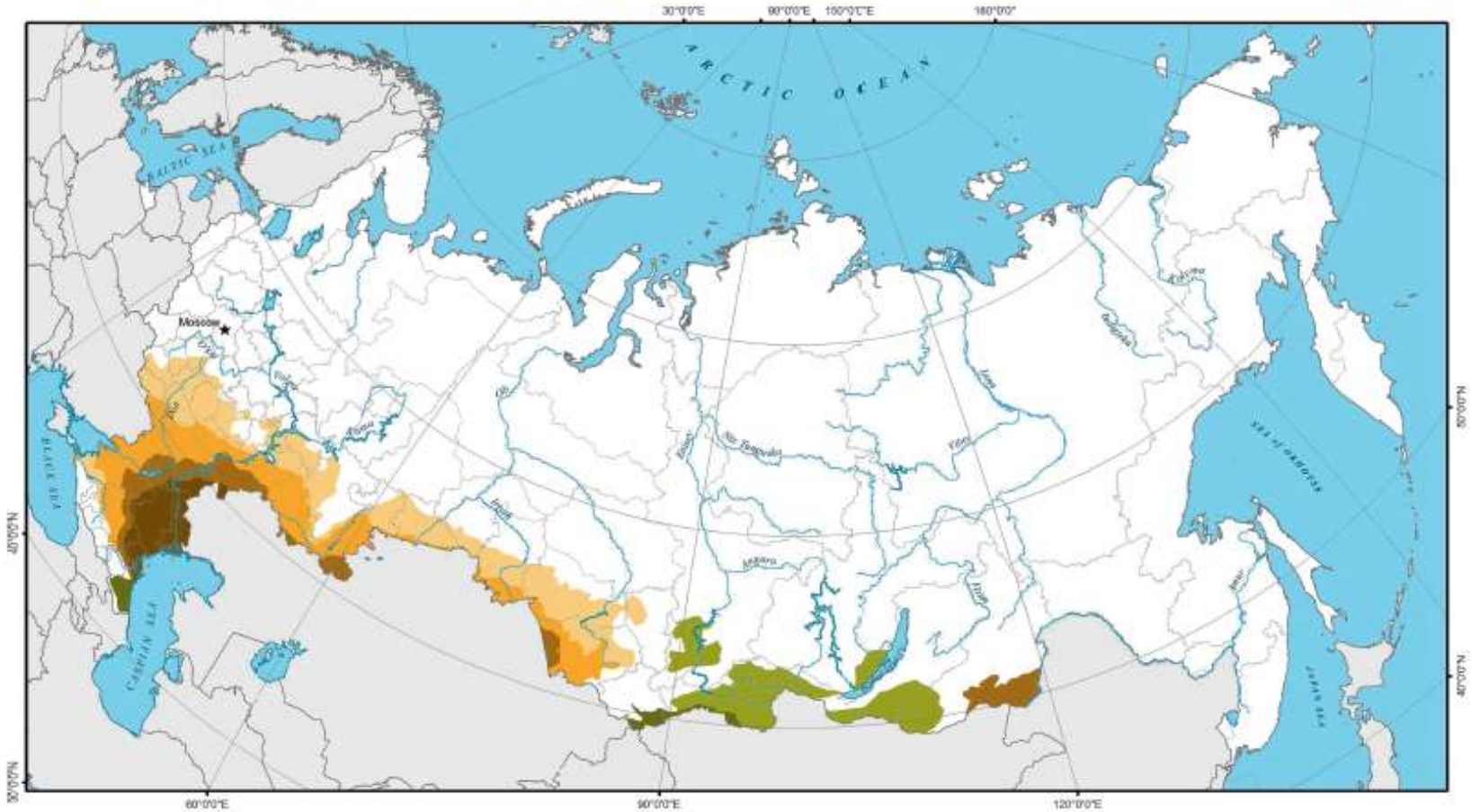
The four countries with largest steppe area are situated in Eurasia (more than 1 million sq.km):
the Russian Federation, China, Kazakhstan, Mongolia (PAGE, 2000)

The countries with highest percentage of steppe in land cover are situated there:
Mongolia (83%), Kazakhstan (61%)

The main factors of land cover change in Eurasia Steppe Zone:
ploughing, urbanization, desertification, fires, grazing, landscape fragmentation

Data source: GIS OUR EARTH, MSU

Russian Part of Eurasian Steppe Zone



Source: *Ogureeva et. al.*, 1997

Land Use Change Models in Russian Steppe Zone

Forest-steppe zone and northern part of genuine steppes

the most transformed part of the Zone with highest population density in Russia and the most affected by infrastructural, industrial and urban development

Steppe has been turned into arable land as early as at the end of 19th century.

Now the percentage of arable land is more than 60%.

In European part, to the west from the Volga River, old-field is less than 1% of former arable land. Protected areas is very small.

This steppe type is strongly affected by afforestation, but also by settlements and suburb expansion.

Genuine bunchgrass steppes

rangelands for centuries and massively reclaimed into croplands at the beginning of 1950s (so called "celina period")

After 1991, significant part of arable land were abandoned and transformed to old-field.

Afforestation and urbanization are less important factors. Some parts of the area are affected by mining, oil and gas production. Old-fields occupy more than 5% of former arable lands.

Desertified steppe

croplands only through irrigation, rangelands for seasonal grazing are widespread

High mountain cryophytic steppes

only seasonal grazing. Mining became one of the main threats Siberian mountain steppes

Three stages of afforestation in Russia since the end of 19th century till now (1)

1898 – paper "Our steppes earlier and now" by V.Dokuchaev, 'Road map' to increase crop productivity in steppe zone and food security
Afforestation and optimal environmental friendly land use model in Russia (forest plantation, cropland and water reservoirs)

'Kamenaya Step' Federal *Zakaznik* (Voronezh Region) has been afforested since 1898.

Three stages of afforestation in Russia since the end of 19th century till now (2)

'Soviet period' (1930s-1990s) – Stalin's *plan preobrazovaniya prirody* – transformation of genuine and dry steppe zone to agricultural landscape and protection from wind erosion

Proposed area under forest plantation – 1,179 sq. km.
Proposed width of belts is 3-100 m with length of 170-1080 km.
The total length of forest belt was planned as 5,320 km.

Forest belt in Forest-steppe zone in Penza Region

Three stages of afforestation in Russia since the end of 19th century till now (3)

- Post-Soviet Period – degradation of forest plantation, even the half of them are completely degraded

Afforested areas in genuine steppe and dry steppe zone

Saratov Region

Volgograd Region

Opportunities and Threats of Afforestation in Steppe zone

Ecological

Opportunities

Accumulation of snow
Decrease of wind speed
Wind erosion protection
ECONET
Increase of biodiversity

Threats

Fire danger
Invasive species
Degradation of margin parts of cropland
Artificial ecosystems

Legal

Opportunities

Legalization of optimal land-use model in steppe zone
Assessment of ecosystem services of virgin steppe zone and forest plantation

Threats

Status of programs of afforestation
Absence of regulations for steppe protection on agricultural lands

Socio-Economic

Opportunities

Increase of crop productivity
New workplaces and decrease of unemployment
New areas for recreation

Threats

Future expenditures on exploitation
No effective expenditures for afforestation in dry steppe and deserted steppe zone

Case One: Belgorod Region (Central Part of Russia)

Agricultural land is 18,290 sq. km or 80% of total area.

Крупнейшие меловые склоны на карте Белгородской области: подписаны названия административных районов; меловые склоны показаны темными пятнами

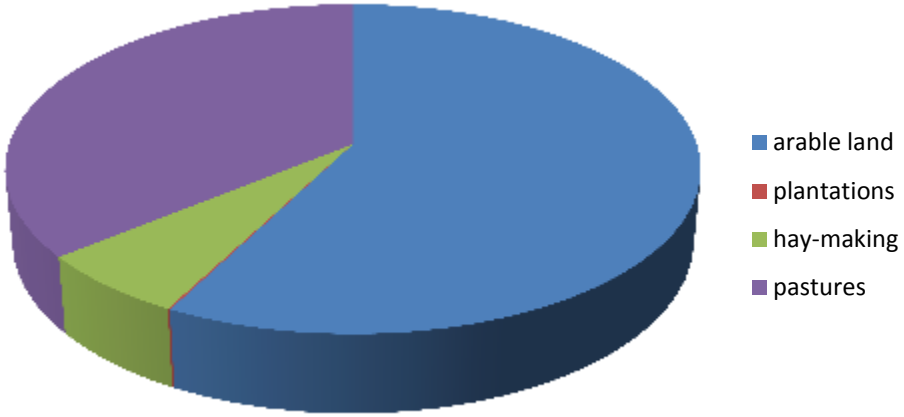
By ‘Green Capital’ special programme it is proposed to increase the share of forest to 10%.

The main threat is ploughing of chalk slopes.

Case Two: Orenburg Region (South part of the Urals)

Agricultural land is 104,750 sq. km or 80% of total area.

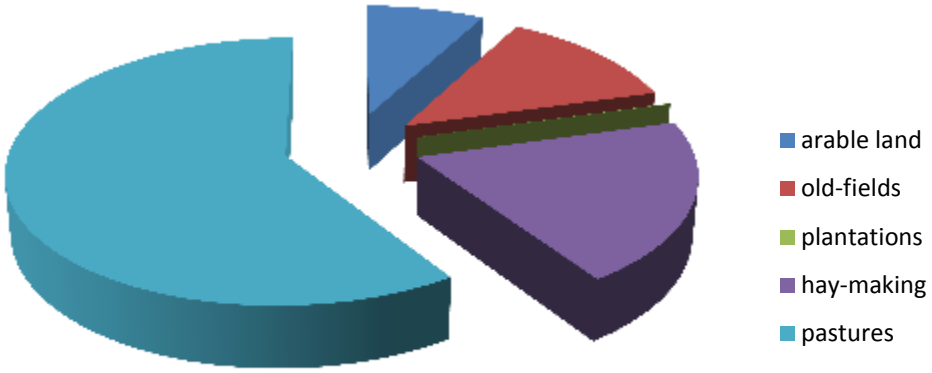
The main driver for afforestation in the regions is Plan for *Kyoto Forests* (100 sq. km).



Main tendency of land-use change is of the returning old-fields to arable farming.

Case Three: Zabaikalsky Kray (Eastern Siberia)

Agricultural land is 6,663 sq. km or 8% of total area.



Main Tendency in Modern Russian Agriculture
Increasing Role of European Steppe Regions and Decreasing of Siberian Regions

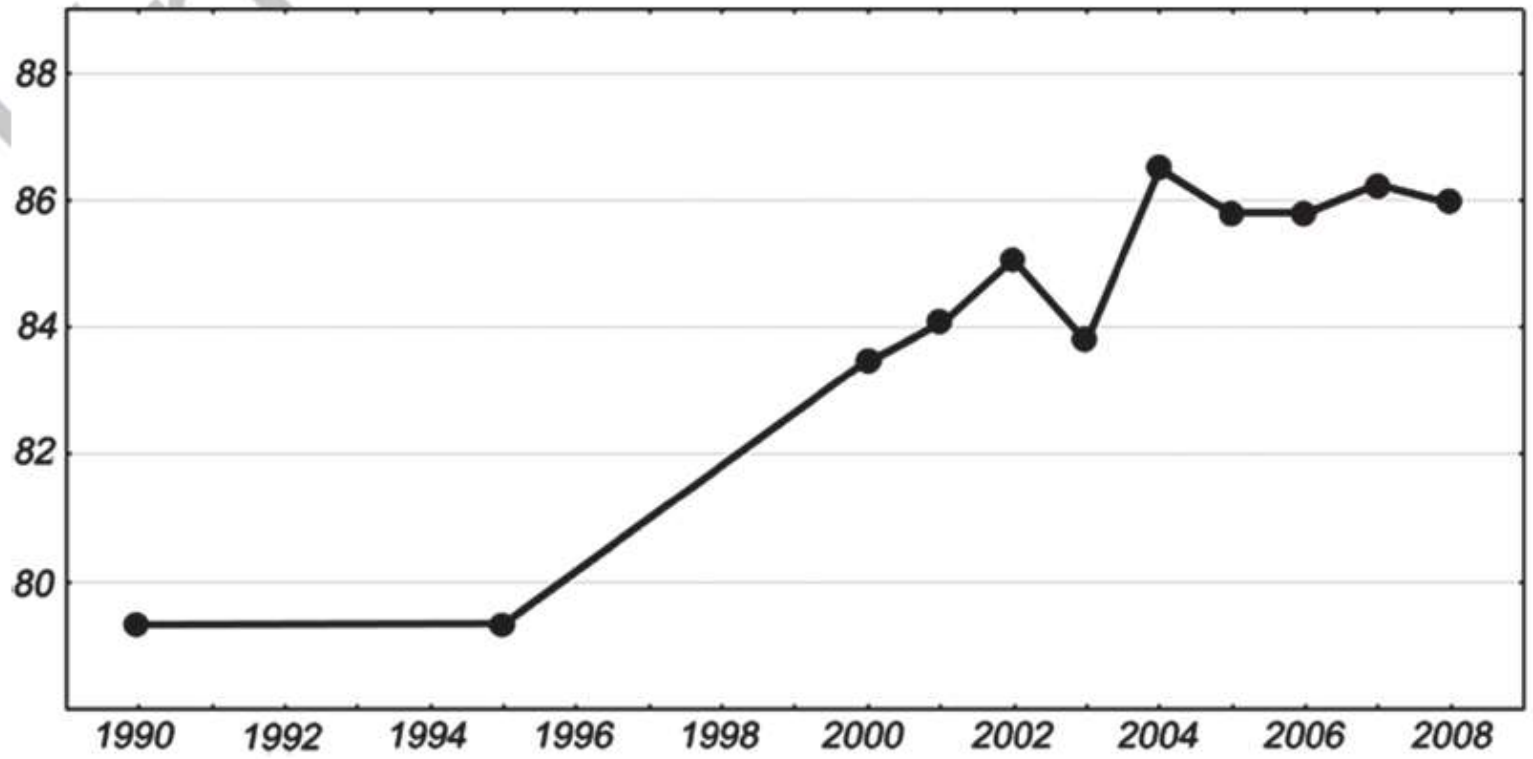


Fig. 2.7 Share of the Steppe Region in the total national grain production of Russia (35 provinces), (as% of the total) during the period 1990–2008

Source: *Smelyansky, Tishkov,* 2012

Conclusions

- Afforestation should became a significant driver of land-use change in forest-steppe zone in context of global change in some regions of Russia, especially in the European part of steppe zone.

- There are only economic (financial) limits for application of afforestation policy in Russian steppe zone.

- The planning of forest plantation in steppe zone is very important part of landscape planning with controversial consequences.

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