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Managed Forest Land in the National GHG Inventory of the Russian Federation: current state and future improvements

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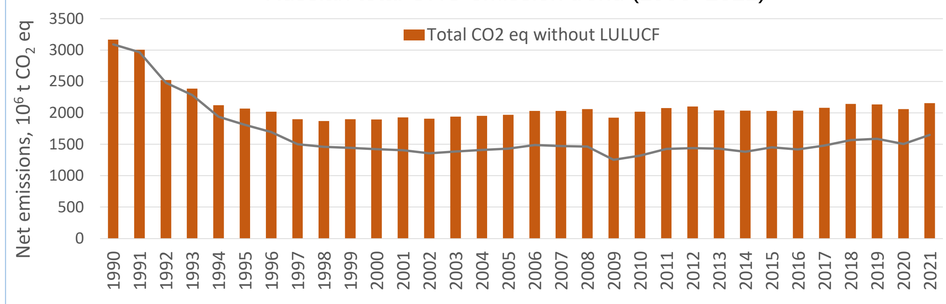
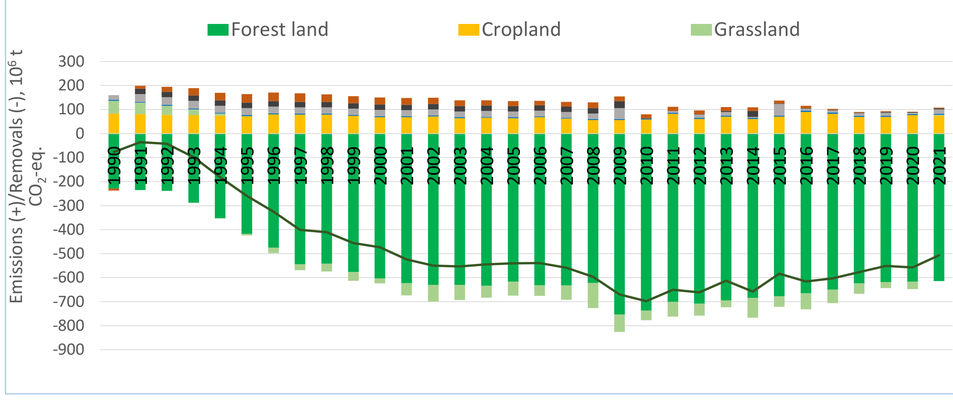
Trends in LULUCF

Russian total GHG emission trend (1990–2021)



According to the Russian NIR 2023, total GHG emissions in 2021 amounted to 2061.1 Mt CO_2eq. excluding LULUCF and 1503.5 Mt CO_2eq. including LULUCF. Therefore, the LULUCF sector offset 27% of the anthropogenic emissions from the Energy, IPPU and Waste sectors in 2021. Compared to 1990, total anthropogenic emissions in Russia have decreased by 34.9 % without the LULUCF sector and by 51.3 % including it.

Russian GHG net balance trend in the LULUCF by category (1990–2021)

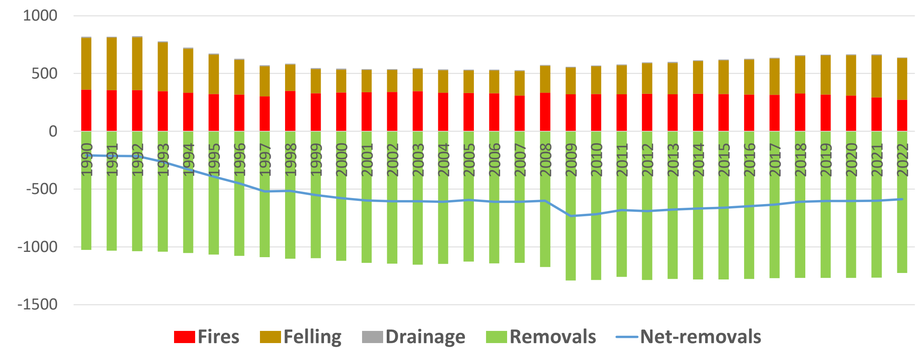


Throughout the period 1990-2021, GHG absorption in the LULUCF prevailed over emissions. In 2021, it provided net absorption of 506.6 Mt CO_2-eq. Forest land is the main contributor to net GHG removals, with grassland accounting for a smaller share, while cropland, harvested wood products (HWP) and the other managed land remain net sources. The overall trend in the LULUCF sector between 1990 and 2021 was driven by the following key factors:

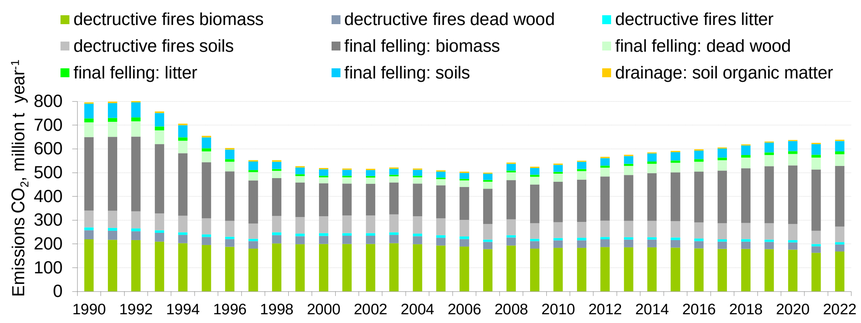
- increased sequestration in managed forest areas due to reduced harvesting and increased area of managed forests;
- accumulation of soil organic carbon in lands converted from Cropland to Fodder Land due to the increase in their area.

Trends in Forest Land Remaining Forest Land

GHG emissions and removals trend in managed forests of the Russian Federation, Mt CO_2eq.



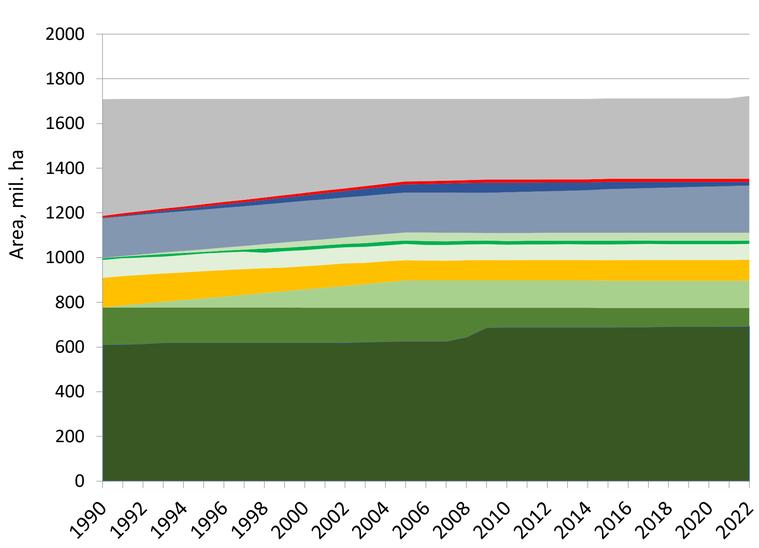
CO_2 emission trend in managed forests of the forest fund



Managed land

Spatial distribution of managed and unmanaged forest land

Composition of Russian land by land use category



In Russia about 53% of lands are considered as managed. Unmanaged land (47% of the territory) include:

- 12% of forest land (23% of total forest land);
- 1% of grasslands (17% of total grassland);
- 13% of wetlands (99% of total wetlands);
- 21% of other land about 90% of which is tundra.

Russia's managed forests comprise forest land of the forest fund (apart from reserve forests), protected areas (PAs), forests on defence land, as well as forests on the land of settlements.

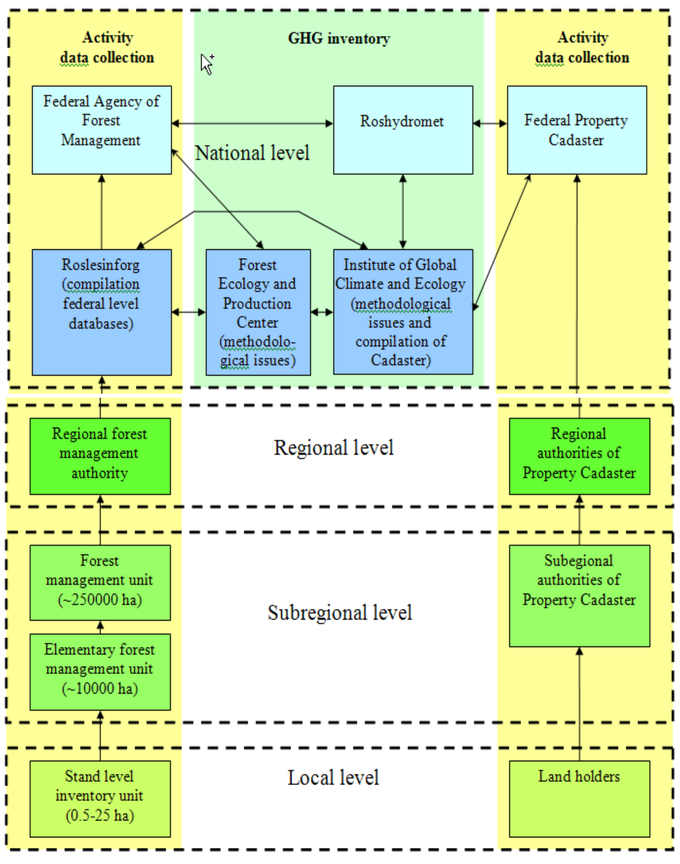
Managed forest land currently covers 691.3 million hectares, that accounts for 77.1 % of all forest land in the Russian Federation. Total managed forest land increased by 81.8 million hectares from 1990 to 2021 due to conversion from unmanaged forest land. Managed forests are defined as forests where systematic anthropogenic activities are carried out in order to fulfill the necessary social, economic and ecological tasks to ensure rational, continuous and sustainable forest management, reproduction, protection, conservation and monitoring of forests. Targeted activities on the use, conservation, protection and reproduction of forests, carried out and regulated by national legislation, form the basis of sustainable forest management. In the Russian Federation, forest management is defined as a system of anthropogenic (economic) activities for the rational management and use of forests in order to fulfill their respective ecological (including biological diversity), economic and social functions in a sustainable manner. Forest management includes the set of the following activities: regular accounting, quantitative assessment and analysis of the state, spatial, temporal and resource dynamics of the forest fund; reforestation and forest maintenance; protection and defense of forests from fires and other causes of forest plantation death; determination of the optimal size of forest harvesting (estimated cut); clear-cutting and thinning, harvesting of non-timber raw materials and other forest products. All specially protected natural areas, including forests, are considered as “managed”.

Forests where according to the national legislation there is no obligation to implement a full set of the above measures (including measures to protect and extinguish forest fires) are excluded from managed forests.

The conversion of forest land from unmanaged to managed can also occur as a result of corporative forest management projects. This is the case of IPJSC RUSAL's forest fire protection initiative implemented on 504,986 hectares. The project area belonged to the zone where firefighting activities were not carried out if fires did not threaten infrastructure and settlements. Starting from 2019, the Company conducts aerial patrolling of the territory. Therefore, from 2019, the net absorption of forests in the area including GHG emissions from transport use is accounted for in the NIR

Sources of data and methods

Elements of the Russian Federation's national system for estimating GHG emissions and removals in the LULUCF sector, including the collection of activity data



In order to estimate GHG emissions and removals in forests Russia applies gain-stock IPCC method. Activity data are taken from the State Forest Registry (SFR) and based on ground and satellite. These data include information about forest areas and growing stock by dominant species and age groups, as well as data on areas of various categories of deforested land (burnt area, felling area, etc.).

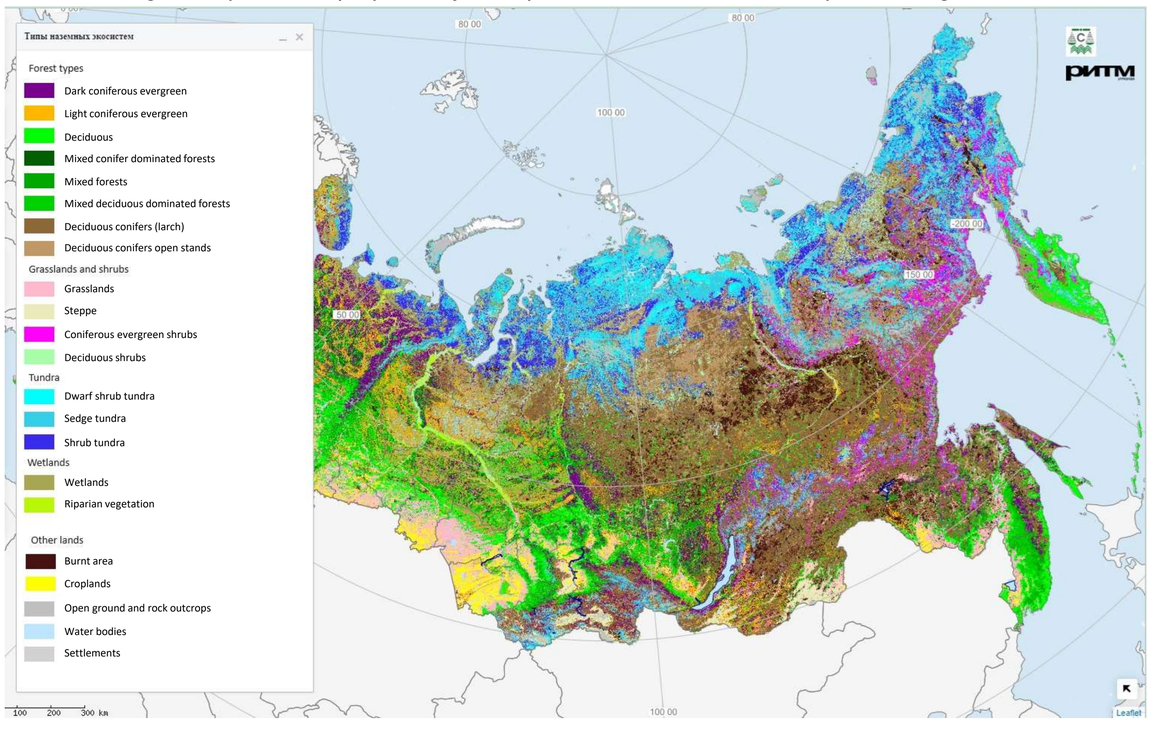
The calculations are performed at Tier III and based on the RFCBA model. The Regional Forest Carbon Budget Assessment (RFCBA) developed by the Centre for Forest Ecology and Productivity of the Russian Academy of Sciences (Zamolodchikov et al. 2011, 2013) uses the gain-stock IPCC method, involving the calculation of carbon accumulation and loss because of disturbances in the main pools (biomass, dead wood, litter and soil organic matter).

We used conversion coefficients for different tree species and age groups of tree stands published in Schepaschenko et al. (2017), except for stone birch and Siberian dwarf pine, which are given from another source (Zamolodchikov et al. 2003). Evaluation of direct greenhouse gas emissions (CO2, CH4, N2O) from different types of fires was carried out according to the formula presented in the 2006 IPCC guidelines. Emissions of CO2, CH4 and N2O from the drainage of organic forest soils were estimated using the method and coefficients in the IPCC wetland guidelines (IPCC 2013).

Therefore, indirect anthropogenic effects such as CO2 fertilization and GHG emissions from increase in natural disturbances are included. However due to infrequent updating of forest registry these effects are included in the GHG inventory only partly.

Future Improvements

Digital map of lands prepared by the Space Research Institute - http://carbon.geosmis.ru/



Russia is currently implementing a Major Innovation Project of National Importance for creating a national system of GHG monitoring, which involves the refinement of the national GHG inventory and the updating of the activity data on forests and other land categories. This may lead to full inclusion of indirect effects on managed lands. In addition, it is planned to use of remote sensing data to track changes in land use. The Space Research Institute of the Russian Academy of Science is developing software for processing and interpreting remote sensing data to collect the information for track changes in land use. The Center for Ecology and Forest Productivity of the Russian Academy of Sciences updated coefficients for the annual change in carbon stocks per unit area in different types of managed ecosystems under different management regimes and disturbances. Methodological approaches are being developed to use the results of the first cycle of the national forest inventory (NFI) in combination with remote sensing data.