International Institute for Applied Systems Analysis
IIASA www.iiasa.ac.at

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS

The Food and Land Use Coalition

2019 Report of the FABLE Consortium

Pathways to Sustainable Land-Use and Food Systems

Published by International Institute for Applied Systems Analysis (IIASA) and the Sustainable Development Solutions Network (SDSN) 2019

The full report is available at www.foodandlandusecoalition.org/fableconsortium.
For questions please write to info.fable@unsdsn.org

Disclaimer
The 2019 FABLE report was written by a group of independent experts acting in their personal capacities. Any views expressed in this report do not necessarily reflect the views of any government or organization, agency, or programme of the United Nations.

Recommended citation: Strokov A., Potashnikov V. and Lugovoy O. (2019), "Pathway to sustainable Land-Use and Food Systems in the Russian Federation by 2050" In: FABLE 2019, *Pathways to Sustainable Land-Use and Food Systems,* 2019 Report of the FABLE Consortium, Laxenburg and Paris: International Institute for Applied Systems Analysis (IIASA) and Sustainable Development Solutions Network (SDSN), pp. 264-277.

Design, layout and production by Phoenix Design Aid A/S, a CO2 neutral company accredited in the fields of quality (ISO 9001), environment (ISO 14001) and CSR (DS 49001) and approved provider of FSC™ certified products. Printed on environmentally friendly paper without chlorine and with vegetable-based inks. The printed matter is recyclable.

2019 Report of the FABLE Consortium

Pathways to Sustainable Land-Use and Food Systems in Russian Federation by 2050

Russia

Anton Strokov[1], Vladimir Potashnikov[1], Oleg Lugovoy[1]

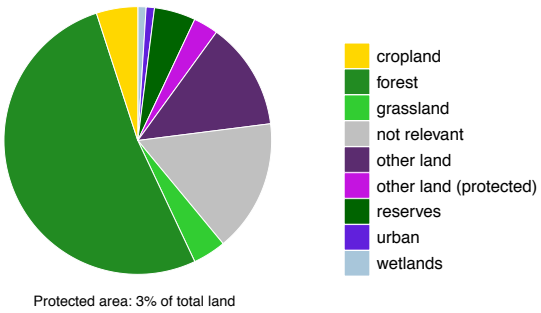
[1]Russian Academy of National Economy and Public Administration (RANEPA), Moscow, Russia
*Corresponding author: strokov-as@ranepa.ru

Land and food systems at a glance

A description of all units can be found at the end of this chapter

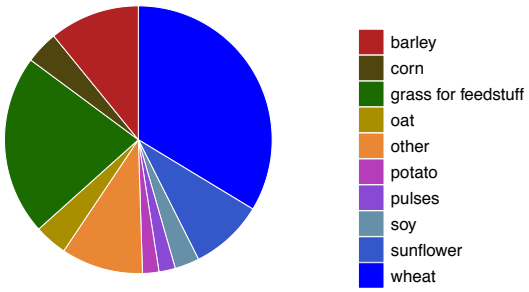
Land & Biodiversity

Fig. 1 | Area by land cover class in 2015



Source: Rosreestr (2015)

Fig. 2 | Share of harvested area by crop in 2015



Source: Rosstat (2015)

Annual deforestation in 2015:
1,382 kha = 0.15% of total forest area

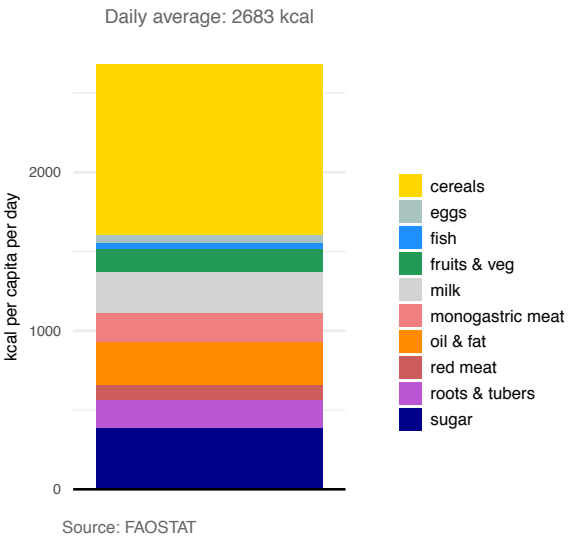
(National greenhouse inventories, 2019)

Endangered species: 872
in Russian Red Data Book

(Popov et al., 2017)

Food & Nutrition

Fig. 3 | Daily average intake per capita at the national level in 2010



Source: FAOSTAT

Share of
undernourished
in 2015:
2.5%

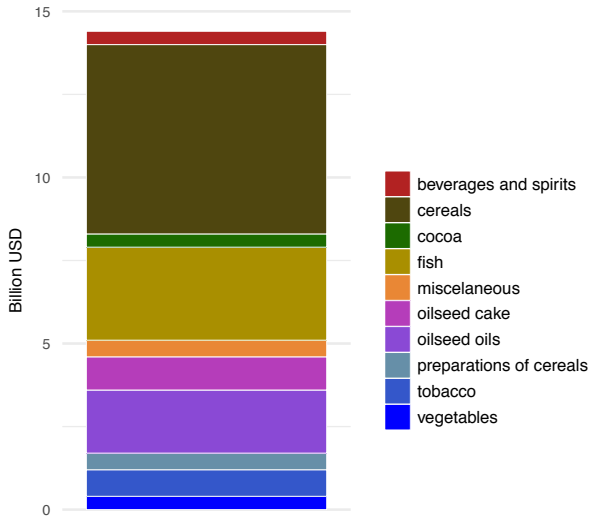
(World Bank, 2019)

Share of obese
in 2016:
1.2%

(Russian Health Ministry, 2019)

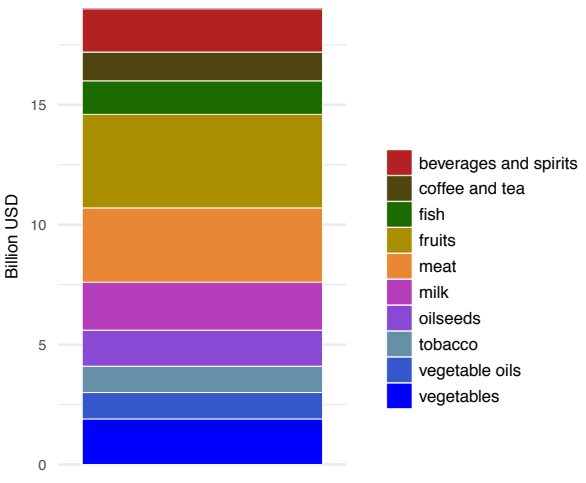
Trade

Fig. 4 | Main agricultural exports by value in 2015



Source: International Trade Center

Fig. 5 | Main agricultural imports by value in 2015



Source: International Trade Center

Deficit in agricultural trade balance in 2015: USD 10.2 bln (0.75% of GDP)

(Intracen, 2019)

8th most important importer of milk products in 2015, 9th in fruit

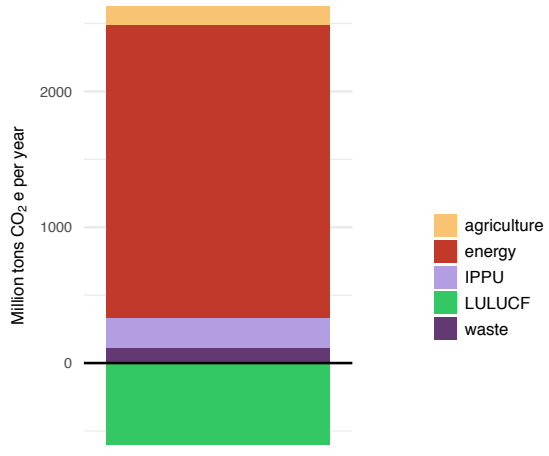
(Intracen, 2019)

10th most important fish exporter in 2015, 8th in cereals, and 11th in vegetable oils

(Intracen, 2019)

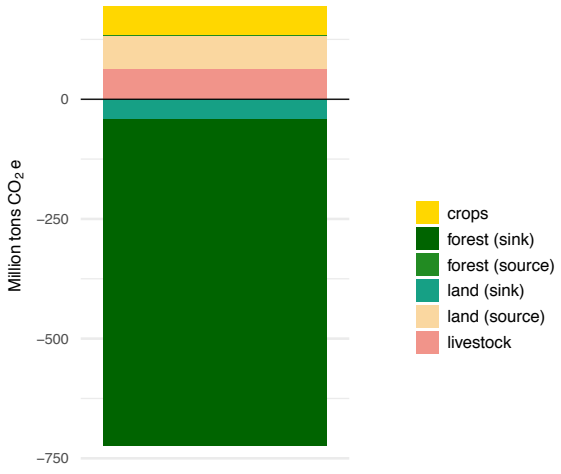
GHG Emissions

Fig. 6 | GHG emissions by sector in 2015



Source: National greenhouse gas inventories (2015)

Fig. 7 | GHG emissions from agriculture and land use change in 2015



Source: National greenhouse gas inventories (2015)

Main assumptions underlying the pathway towards sustainable land-use and food systems

For a detailed explanation of the underlying methodology of the FABLE Calculator, trade adjustment, and envelope analysis, please refer to sections 3.2: Data and tools for pathways towards sustainable land-use and food systems, and 3.3: Developing national pathways consistent with global objectives.

GDP GROWTH & POPULATION

	GDP per capita	Population
Scenario definition	GDP is expected to increase by 165% from USD 1,660 bln in 2015 to USD 2,745 bln in 2050 (SSP2 scenario selected).	Population is expected to decrease by 1.2% between 2015 and 2050 from 143.9 mln to 142.2 mln (UN Instant Replacement scenario selected).
Scenario justification	This is a conservative assumption compared to projections from the Ministry of Economy of Russia which assumes a 164% increase in real GDP by 2036 relative to 2020 (Ministry of Economy of Russia, 2018).	This is in line with findings of most other population projection trends for Russia. The official projections by Rosstat (Federal statistical agency of Russia) show a 1.8% decrease in population by 2036 relative to 2020 in the median scenario (Rosstat, 2019).

TRADE

	Imports	Exports
Scenario definition	The share of total consumption which is imported decreases: - from 6% in 2010 to 3% in 2050 for milk, - from 34% in 2010 to 17% in 2050 for sugar, - from 20% in 2010 to 4% in 2050 for chicken meat, and - from 27% in 2010 to 5% in 2050 for pork. The share of total consumption which is imported remains constant at 2010 levels for the other commodities.	The exported quantity increases: - from 13.7 Mt in 2015 to 59.2 Mt in 2050 for wheat, - from 0.3 Mt in 2015 to 4.2 Mt in 2050 for corn, - from 5.8 Mt in 2015 to 32.1 Mt in 2050 for barley, - from 0.5 Mt in 2015 to 5.4 Mt in 2050 for sunflower oil, and - from 0.2 Mt in 2015 to 1.5 Mt in 2050 for soy oil. The exported quantity remains constant at 2010 levels for the other commodities.
Scenario justification	Declining imports for some products reflects the development of a domestic Federal agricultural program which in recent years has had a positive influence on the growth in milk and meat (Ministry of Agriculture, 2019). This is not applied to: 1) beef, as it is expensive to produce domestically and incomes are declining; 2) fruits, since the climate does not support the production of certain fruits; and 3) tomatoes, since they are cheaper to produce elsewhere.	Based on historical trends and the current government's programs focused on doubling the value of agricultural exports by 2024 (Government of Russia, 2016).

Scenario signs = no change → small change ↗ large change

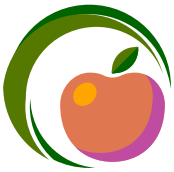
LAND

	Land conversion	Afforestation
Scenario definition	We assume that there will be no constraint on the expansion of agricultural land beyond existing protected areas and under the total land boundary.	We do not assume active afforestation.
Scenario justification	There is no evidence of clearing forests for cropland or pasture in the last 20 years or signs that this will change in the near future (National greenhouse inventories, 2019): we assume that Russia will continue to be a major exporter of timber and that there will be some supporting programs for protecting forests and reforestation (National greenhouse inventories, 2019) and that the cattle and sheep stock will remain constant. This last assumption is supported by the declining historical trends of the cattle herd, and the limited sheep herd that is mostly located in the Caucasus region where there is extensive pasture production system.	Some argue that the area of the forests in Russia is actually increasing on its own (mostly in remote, undeveloped areas). According to FAO ((2012), page 18) Russian forest area may increase from 5 to 8 Mha by 2030 from compared to 2015 levels.

BIODIVERSITY

	Protected areas
Scenario definition	Protected areas remain constant between 2015- 2050.
Scenario justification	The model numbers show that the potential area for biodiversity protection would be approximately 44% to 50% of the Russian territory but official numbers in 2015, report that protected areas only represent 3% of the total territory (Rosreestr, 2019).

Scenario signs = no change → small change ↗ large change



FOOD

	Diet	Food waste
Scenario definition	Between 2015 and 2050, the average daily calorie consumption per capita remains constant at around 2,500 kcal.	Between 2015 and 2050, the share of final household consumption which is wasted decreases from 10% to 5%.
Scenario justification	According to the Russian National Strategy for healthy life 2025 (Ministry of Health, 2016), consumption should be reduced by 2025: by 10-15% for alcohol, tobacco, salt; by 30% for saturated fatty acid; and by 10% for products with added sugar. However, since there is no clear strategy to trigger this change, we have not implemented these recommendations.	Since we lack official projections for food waste, we only consider this to be one possible assumption.

PRODUCTIVITY

	Crop productivity	Livestock productivity	Pasture stocking rate
Scenario definition	Between 2015 and 2050, crop productivity increases: - from 2.4 t/ha to 6.7 t/ha for wheat, - from 2.3 t/ha to 5.5 t/ha for barley, - from 1.2 t/ha 1.5 t/ha for rapeseed, and - from 10 t/ha 13 t/ha for potato.	Between 2015 and 2050, the livestock productivity increases: - from 141 kg/TLU to 275 kg/head for beef, - from 600 kg/head to 2 t/head for pork, and - from 5.3 t/head to 9.8 t/head for cow milk.	The average livestock stocking density remains constant at 0.23 TLU/ha pastureland between 2015 and 2050.
Scenario justification	We assume that Russia will continue to improve cropland productivity based on historical crop yield trends. There are, however, currently no sources, either official or in the literature, to prove this.	While we could not identify any source, either official or in the literature to confirm this assumption, we think that Russia will continue to experience high productivity growth in the future driven by technological development to improve its competitiveness on international markets.	While we lack official numbers for this variable, trends over the last few years show a relatively small decrease in the cattle herd and an increase in the sheep herd and a stable pasture area (Rosstat, 2019).

Scenario signs = no change → small change ↗ large change

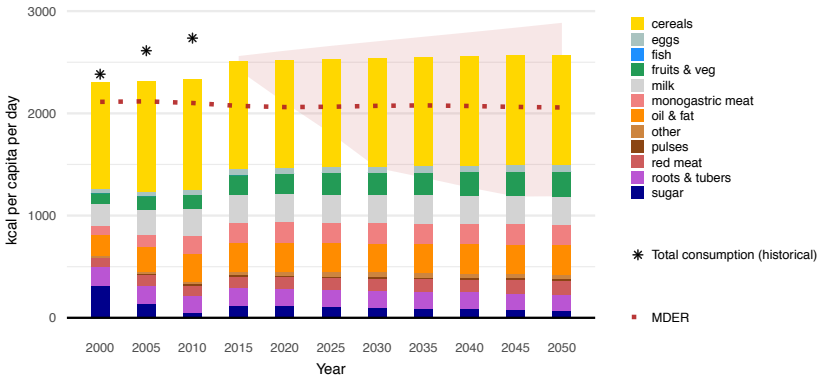
Results against the FABLE targets

The results for FABLE targets as well as "other results" are based on calculations before global trade harmonization.

Food security

Fig. 8 | Computed daily kilocalorie average intake per capita over 2000-2050

Note: The Minimum Daily Energy Requirement (MDER) is computed based on the projected age and sex structure of the population and the minimum energy requirements by age and sex for a moderate activity level. Animal fat, offal, honey, and alcohol are not taken into account in the computed intake.



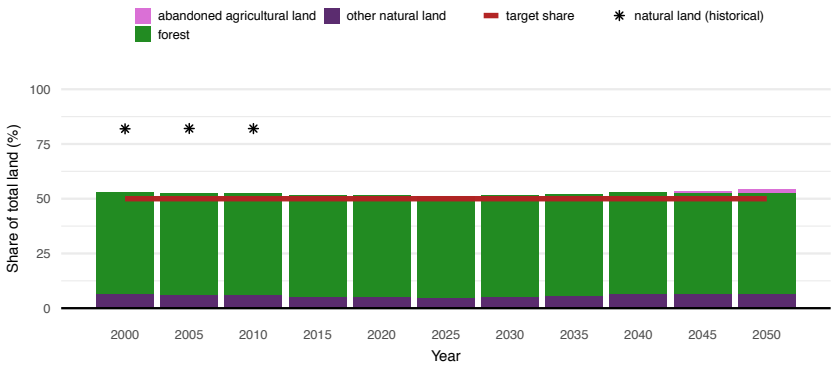
Historical data source: FAOSTAT

Our results show that average daily energy intake per capita increased between 2000-2015 period. After 2020, calorie intake reaches 2,550 kcal/cap/day and stabilizes over time. The computed diet does not meet the Russian National Strategy for healthy life 2025 recommendations for reducing fat and sugar consumption.

The computed average calorie intake in 2050 is almost 20% higher than the Minimum Dietary Energy Requirement (MDER) at the national level in 2050.

Biodiversity

Fig. 9 | Computed share of the total land which could support biodiversity over 2000-2050



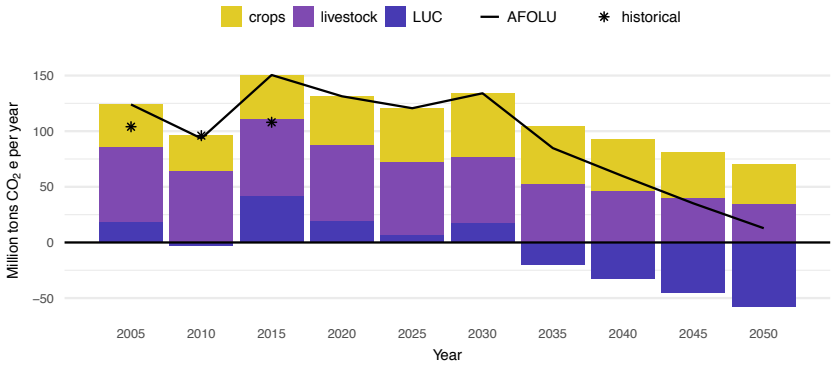
Historical data source: FAOSTAT

Our results show that the Share of Land which could support Biodiversity conservation (SLB) over the observed period is above 50%. This is made possible by the large forest and tundra areas that cover more than 50% of Russian territory. The majority of forests and tundra land are uninhabited as they are located in Northern or Far Northern regions that are relatively separated from most economic activities.

Compared to the global target of having at least 50% SLB by 2050, our results are above the target.

GHG emissions

Fig. 10 | Computed GHG emissions from land and agriculture over 2000-2050



Historical data source: FAOSTAT

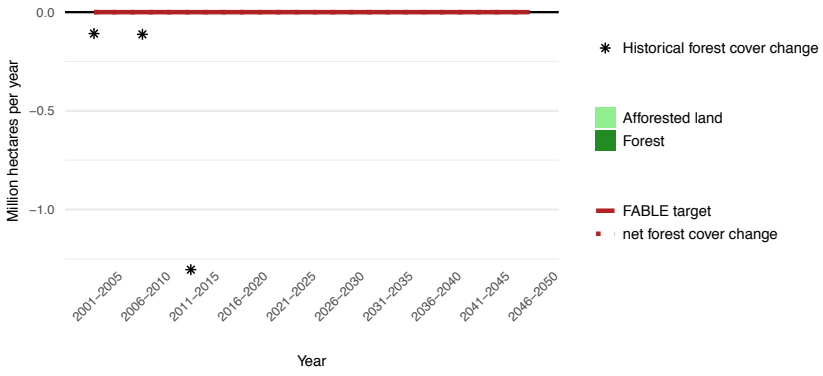
Note: AFOLU (Agriculture, Forestry and Other Land Use) is the sum of computed GHG emissions from crops, livestock and Land Use Change (LUC), emissions and sequestration from forestry are not included. Historical emissions include crops and livestock.

Our results show annual GHG emissions from AFOLU between 92 and 150 Mt CO2eq/year from 2005-2015, then a decreasing trend for the remainder of the projected period. For the historical period, our results match official data on agricultural emissions which fluctuate between 96 and 120 Mt CO2eq/year from 2000-2015. AFOLU GHG emissions are projected decrease over the period 2015-2030 from 160 to 98 Mt CO2e/year. This is mostly driven by GHG emissions from livestock and carbon sequestration on abandoned pastures and cropland.

Our results meet the target of reducing emissions from agriculture and reaching zero or negative GHG emissions from LULUCF by 2050 at the national level.

Forests

Fig. 11 | Computed forest cover change over 2000-2050



Source historical data: National greenhouse gas inventories (2019)

The FABLE Calculator shows no forest cover change for Russia: there is no deforestation and no afforestation target was implemented. The forest area remains constant at 800 mln ha for the whole period of simulation. The National greenhouse gas inventories (2019) show historical deforestation of about 100 kha/year over 2000-2010 and a peak of deforestation of 1 Mha/year over 2011-2015. However, this deforestation might be caused by factors which are not yet covered in the FABLE Calculator such as forest fires, mining, and logging.

Compared to the global target of having zero or positive net forest change after 2030, our results show zero net forest cover change over the whole period.

Other relevant results for national objectives

Table 1 | Other Results

Variable	Unit	2000	2005	2010	2015	2020	2030	2040	2050
Cropland (historical)*	Mha	52.9	52.1	53.7	57.7				
Cropland (calculated)*	Mha	43.0	45.5	44.7	54.5	61.4	78.8	60.3	42.4

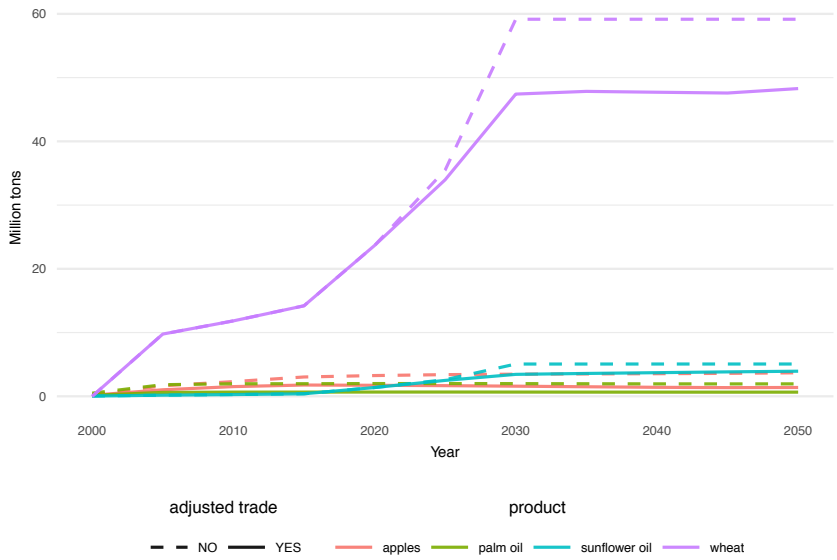
*selected commodities are: corn, peas, rice, oats, rye, barley, millet, sorghum, wheat, onion, potato, tomato, vegetable other, sunflower, soy, and rapeseed
Source historical data: Rosstat, 2019

In this table we group selected crops and compare aggregated area with the model projections and official historical data of Russia. The crops are: corn, peas, rice, oats, rye, barley, millet, sorghum, wheat, onion, potato, tomato, vegetable other, sunflower, soy, and rapeseed. For many crops, our estimates for the historical period are lower than the cropland area reported by Rosstat. The official data is about 20% higher than the model results in 2000-2010 period and only 6% higher in 2015.

According to the Russian program on the development of rural territories up to 2030, Russia would like to increase its cropland without specifying the amount. Some media report that the grain area will increase by a maximum of 3-4 Mha over the next 5 years. Our own assumption is that Russia could also increase its oil crops acreage as it is currently the most profitable sector in Russian agriculture. Between 2010-2030, the model projects a strong expansion of cropland area but after 2030 the model projects a drop in cropland area due to high yield development. We have not seen such projections in any official Russian documents.

Impacts of trade adjustment to ensure global trade balance

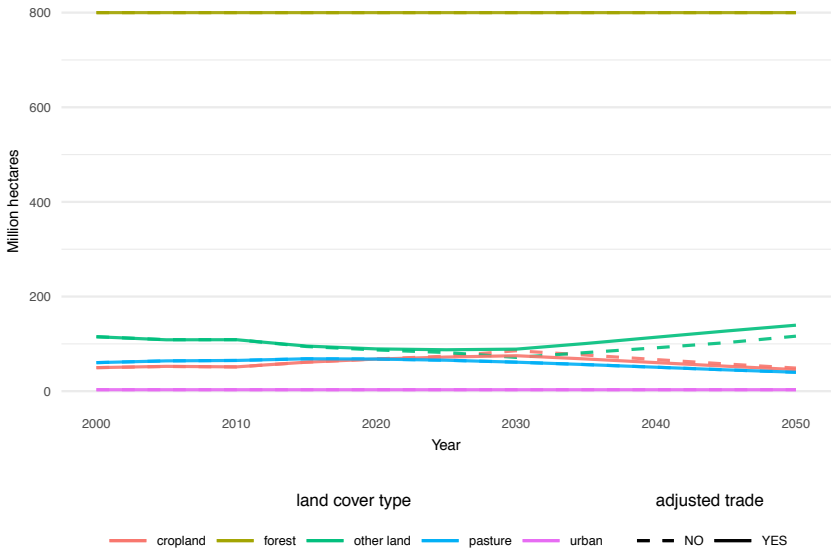
Fig. 12 | Impact of global trade harmonization on main exported/imported commodities over 2000-2050



Trade adjustment leads to lower exports of wheat and sunflower oil. By 2030, exports for wheat are reduced by 25% and sunflower oil by almost 50%. The historical trend is much more ambitious with 21 Mt of Russian wheat exports in 2015 and 43 Mt of wheat exports in 2018 (in the Calculator it is 14 Mt in 2015 and 23 Mt in 2020) and 1.4 Mt of sunflower oil exports in 2015 and 2.1 Mt in 2018 (in the Calculator it is 0.4 Mt in 2015 and 1.3 Mt in 2020).

Trade adjustment also reduces imports for palm oil and apples. Starting in 2005, imports for palm oil with no trade adjustment are 3 times higher than with the trade adjustment. Beginning in 2025, apple imports without trade adjustment are more than two times higher than with the trade adjustment.

Fig. 13 | Impact of global trade harmonization on land use over 2000-2050



After trade adjustment, cropland area declines by about 10-15% and other land increases. This is explained by higher crop exports without trade adjustment.

Discussion and next steps

The main assumptions in this analysis are consistent with current development trends in Russian agriculture and future government programs, including development of agricultural markets (up to 2030), the program of rural territorial development (up to 2030), and improvement of export capacity to meet expected increases in pork, poultry, grain, and oil crop production and greater trade with large markets such as China. We implemented these growth assumptions in the FABLE Calculator to evaluate how land use, GHG emissions, trade, and diets will change. The estimates show a flat trend in the emissions from agricultural activities until 2030 and a reduction afterwards. There is a possibility to decrease cropland in Russia after 2030 if accompanied with parallel improvements in productivity growth, reduced GHG emissions from agriculture, and avoided emissions from land-use change.

The main advantage for Russia in the land-use change sector is that its development pathway for agriculture is disconnected from that of the forestry sector. This is the result of geographic separation: most agriculture is in the south and southwest (the Black Sea and Caspian Sea basins) and the west (near the border and the Volga river basin), while most intensive forestry extraction comes from the northwest and the far east. Therefore, we do not expect cropland expansion in areas where forests are located. However, cropland expansion is still possible in areas where cropland was abandoned after the fall of Soviet period but where climatic and soil conditions are favorable and there is good infrastructure.

One limitation of this analysis is that currently we do not take into account 700 Mha of land in the FABLE Calculator because it is mostly composed of territory that is not related to agricultural and food systems and is not well covered by statistical data. It may be important for carbon sequestration and biodiversity; therefore, it will be reconsidered in the next phase of the project. Russia has a large access to natural marine resources and is one of the leading global producers and exporters of fish, which is also an important component of Russian diets. It would be also good to include the fish sector in the FABLE Calculator.

Soil organic carbon is also not included in this analysis. The problem is that Russia has a large area of unused cropland that is included in the estimates from soil emissions on cropland. This is because Rosreestr (Land registration palace of Russia) shows cropland area at around 100-110 Mha and Rosstat (Federal statistical agency) shows cropland (sawn) area at 80 Mha as well as around 10 Mha of fallow land (also according to Rosstat). Therefore, when the report (National greenhouse inventories, 2019) shows emissions from soils at approximately 60 mln CO2eq per year we do not know if these come only from the ploughed (sawn) land or if they also include land that is not sawn but included in the registration books of Rosreestr. This needs to be clarified in order to have proper emissions estimates from ploughed land and emissions (or probable sequestration) of carbon in abandoned (or unused) cropland and pastures. When this has been carried out at the federal level, Russia should proceed in developing a database for regional emissions (sequestration) on agricultural land.

According to official Russian reports on GHG emissions from agriculture, land-use change and other sources (National greenhouse inventories, 2019) the main methodological problem is a large deviation between estimates of GHG emissions de facto (field experiments) from models. In the report, Russia has some items which have relatively close estimates, such as those of enteric fermentation emissions, which have a deviation of 1-2% between experiments and model. However, some items have an almost 100% deviation, such

as emissions from peatland used in agriculture. This last case is also relevant for large areas of Russian forests and pastures. Therefore, more research is needed (beyond FABLE) including case studies of different aspects of emissions from abandoned and remote areas in Russia. This is essential not only for Russia's balance of GHG emissions, but for other countries as well.

The current assumption of the model used in the FABLE Calculator is that with further land intensification in agriculture the emissions from agriculture and land-use change are likely to decrease in the long term. We view this as a topic of ongoing debate, meaning that for different cases it might not work. The current FAO data shows that, for Brazil and China, cropland area, crop yields, fertilizers, and manure applied to cultivated soils or pastures increased at the same time, bringing higher emissions from agriculture. In Russia, the cropland area increased by almost 10% and chemical fertilizer use increased by 70% from 2007-2017 but did not cause high GHG emissions. This is because Russia still uses two to three times less fertilizer per hectare compared to China and Brazil and because cropland expanded to former agricultural land that had been abandoned for several years. That means that in temperate zones the additional land increase for agriculture might be more environmentally friendly that in tropical agriculture. That would be interesting for a whole-world analysis to test for some policies based on the carbon footprint of imported agricultural raw materials and food. An important topic of discussion among Russian authorities and researchers is the possibility of becoming a net exporter of pork and chicken. According to some Russian news sources (Dyatlovskaya, 2019), in 2019 Russia will export around 20-30 kt of chicken meat to China, with a possible growth up to 150 kt in the near future.

The main challenge for Russia in developing a pathway for low agricultural carbon emissions are: 1) optimizing fertilizer consumption by using seeds which consume a larger share of fertilizer for plant growth (currently it is around 50-60%); 2) improving manure management and storage systems in regions with intensive pig and poultry production; 3) switching from intensive feedlots to more grassland grazing for cattle, which will reduce environmental impact in terms of enteric fermentation emissions.

Russia is one of the few countries that has the option to develop a rather intensive form of agriculture or remain with the current relatively extensive one. In fact, there is a large difference among Russian regions (oblast and republics – first administrative level) in their agricultural development and regional policies. Currently there is no official pathway or a document which integrates the development of agriculture and healthy diets together with sustainable land-use systems, emissions from agriculture and land-use change. To start working in this direction we would suggest organizing a working group to see how to integrate different work streams of specific ministries and researchers to reveal the necessity of such integrative programs of development. One of the first decisions for such a program (pathway) would be the collection of data such as emissions from farms, the implementation of sustainable agricultural practices like growing legumes, returning crop residues to the soil at harvest, growing draught resistant crops, breeding cattle on pasture areas, or processing manure for energy. Russia could think of implementing advertisements to promote such practices and for guaranteeing a number of marketplaces (or retail stores) for products from farms that are using one of these mentioned sustainable practices. This would help to more accurately estimate emissions from different types of farms, and technologies they use, and create an environment

where farmers and consumers know that the government is creating the correct market signals for a sustainable development and healthy-food-consumption pathway.

Regarding current instruments or measures of Russian agricultural policy, we see two main measures which should be improved or even eliminated. First, the Russian government provides large subsidies for companies (farms) with intensive cattle feeding which creates additional methane emissions. There are, however, other farms where cattle are put to pasture, which produce much lower emissions. In our view, it is unnecessary to support farms that create additional emissions when there are other more economical practices that are also more environmentally friendly. Secondly, the Russian government uses a system of penalties for farms with uncultivated cropland. In our view, the government should not interfere with the economic decisions of farmers. Rather, farmers should be allowed to decide what to do with their own lands. Instead, the government could develop certain monitoring methods to observe what is happing on abandoned and unused fields or pastures in order to create and support the environment for improved biodiversity protection. Another step forward would be for Russia to create a cap and trade carbon system where abandoned land could serve as a major carbon sink in the Eurasian region.

Units

% – percentage
bln – billion

cap – per capita

CO_2 – carbon dioxide

CO_2e – greenhouse gas expressed in carbon dioxide equivalent in terms of their global warming potentials

GHG – greenhouse gas

Gt – gigatons

ha – hectare

kcal – kilocalories

kg – kilogram

kha – thousand hectares

km^2 – square kilometer

kt – thousand tons

Mha – million hectares

mln – million

Mt – million tons

t – ton

TLU –Tropical Livestock Unit is a standard unit of measurement equivalent to 250 kg, the weight of a standard cow

t/ha – ton per hectare, measured as the production divided by the planted area by crop by year

t/TLU, kg/TLU, t/head, kg/head- ton per TLU, kilogram per TLU, ton per head, kilogram per head, measured as the production per year divided by the total herd number per animal type per year, including both productive and non-productive animals

tln – trillion

USD – United States Dollar

References

Dyatlovskaya, E. (2019, March 20). The list of poultry meat exporters to China increased to 30 companies. *Agroinvestor.ru.* Retrieved from https://www.agroinvestor.ru/companies/news/31427-spisok-eksporterov-uvelichilsya-do-30/

FAO. (2012). *The Russian Federation forest sector outlook study to 2030.* Retrieved from http://www.fao.org/3/i3020e/i3020e00.pdf

FAOSTAT. (2019). *FAOSTAT database.* [Data set]. Retrieved from http://www.fao.org/faostat/en/#data

Government of Russia. (2016, November 30). *Passport of priority project "Exports of agricultural products."* Retrieved from http://government.ru/news/25591/

Intracen. (2019). International Trade Center. Retrieved June 6, 2019, from http://www.intracen.org/

Ministry of Agriculture. (2019). Ministry of Agriculture of the Russian Federation - The Russian Government. Retrieved July 12, 2019, from http://government.ru/en/department/59/events/

Ministry of Economy of Russia. (2018). *Projections of socio-economic development of Russian Federation for the period up to 2036.* [Data set]. Retrieved from http://economy.gov.ru/en/home/activity/sections/macro/index

Ministry of Health. (2016). *Proposal of the strategy of forming the healthy life of the nation.* Retrieved from Ministry of Health website: https://www.gnicpm.ru/UserFiles/PROEKT_STRATEGII_NIZ-210616.pdf

National greenhouse inventories. (2019). «НАЦИОНАЛЬНЫЙ КАДАСТР антропогенных выбросов из источников и абсорбции поглотителями парниковых газов, не регулируемых Монреальским протоколом » ФГБУ "Институт глобального климата и экологии имени академика Ю.А. Израэля„" Retrieved June 6, 2019, from http://www.igce.ru/page/news_23042019

Popov, I., Fadeeva, A., Palenova, E., Shamilishvily, G., Gorin, K., Burdo, A., ... Kirillova, Y. (2017). Effectiveness of "The IUCN red list of threatened species" application on a regional scale: current state of the "Red Data books" of Russia. *Biological Communications, 62*(1). https://doi.org/10.21638/11701/spbu03.2017.107

Rosreestr. (2019). Federal Service for State Registration, Cadastre and Cartography. Retrieved June 6, 2019, from https://rosreestr.ru/site/

Rosstat. (2019). *Federal Statistical Agency of Russia* [Data set]. Retrieved from http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/en/main/

Russian Health Ministry. (2019). *Share of Obese in Population | Data* [Data set]. Retrieved from https://www.rosminzdrav.ru/

World Bank. (2019). *Prevalence of undernourishment (% of population)* [Data set]. Retrieved from https://data.worldbank.org/indicator/SN.ITK.DEFC.ZS?