

## Global and national food security issues in the context of land and water resources

Anatolij Nikolaevich Makarov\*<sup>1</sup>, Elena Vladimirovna Maksyutina<sup>1</sup>, Kaysyn Azretovich Hubiev<sup>2</sup>, Aydar Damirovich Gimadeev<sup>1</sup>

1. Department of the Economic Theory and Economic Policy, Kazan Federal University, Kazan, Russia

2. Department of Economics, Political Economy, Lomonosov Moscow State University, Moscow, Russia

\* Corresponding author's E-mail: makarovfksu@yandex.ru

### ABSTRACT

The article discusses the issues of ensuring food security, considering the national and global levels. The subject of the analysis is agriculture, which has always been strategically important in terms of ensuring food security. The relevance is due to the differences in the interpretation of food security by each individual subject of the world economy, as well as depending on the level of consideration. The article considers the problems of assessing the state of and threats to food security in the world and in Russia in the context of land and water resources, the reform of ownership of agricultural land, a constructive position on land reform is proposed, based on the experience of foreign countries, associated with the implementation of the reform reversal from privatization to organization of rational use of land on the basis of leasing state land in order to create effective entrepreneurship, which makes it possible to implement all cycles of the reproduction approach, and thereby turn Russia's resource advantages in relation to land and water resources into competitive advantages of the industry, ensuring the sustainability of the country's food security.

**Keywords:** Food security, Threats, Land ownership, Population, Eurasian Union, Water.

### INTRODUCTION

The concept of "food security" was formulated in 1974 in the documents of the UN General Assembly and subsequently concretized in 1996 in the Rome Declaration on World Food Security as an economic condition that guarantees physical and economic access to food. The significance and extreme importance of the indicator of the level of ensuring food security for every country in the world is obvious. However, interpretations of food security can be quite different for each individual actor, as well as depending on the level of consideration (global, regional or country). At the same time, the implementation of an appropriate set of measures to eliminate the threat of crossing the "point of no return" is inevitably associated with an increase in the efficiency of agriculture in general, as well as the use of land and water resources. As the COVID-19 pandemic advances, compromises have arisen between the need to contain the infection and to keep away from terrible financial and food security emergencies that hurt the world's poor and hungry most. Albeit no significant food deficiencies have arisen up 'til now, farming and food markets are confronting interruptions due to work deficiencies made by limitations on developments of individuals and movements in food request coming about because of terminations of eateries and schools just as from pay misfortunes (Laborde *et al.* 2020).

Global illness the board endeavors are additionally pointed toward ensuring homegrown food security, for instance when microbes of significant staples relocate across public fringes. Moreover, some significant harvests are generally created in tropical nations and burned-through around the world, remembering for industrialized nations; the sicknesses of these yields are of global interest, and they are to a great extent oversaw by the private area

(Nelson 2020). A novel portrayal of food supply that features the association of various food types in public food frameworks was created (Bentham *et al.* 2020). The article considers the issues of further growth in demand for grain due to the increase in the world's population, which will require the expansion of the area of arable land, which is very limited in the world. The erroneousness of reducing the problems of ensuring food security only to land resources is shown. The effectiveness of the use of land resources used for food production largely depends on the use of fresh water, the largest amount of which (70%) in the world is used in agriculture.

## MATERIALS AND METHODS

At the turn of XX-XXI centuries, following the requirements of the fleeting economic history, the priorities of the location of production factors are being adjusted, and information resources, Nano- and biotechnologies, and creative human potential come to the fore in scientific research (Maksutina *et al.* 2014; Makarov *et al.* 2018). At the same time, land, which continues to be the most important resource for agricultural production and an indispensable condition for the reproduction of life, often stays under the radar. While not only within a single country, but in the world in general, the relevance and value of this limited, unique, and irreplaceable resource of agriculture is increasing, especially considering the consequences of industrial and post-industrial development, urbanization processes, ensuring food security (McMichael & Schneider 2011, Lawrence & McMichael 2012). The importance of land resources, considered primarily as a base for the production of agricultural raw materials and food, increases with the growth of the world's population. According to the United Nations Population Fund, it took more than 200,000 years to reach the world's population in 1804 to 1 billion, about 100 years to double (2 billion in 1927), and about 50 years to subsequently double (4 billion 1974) (i.e., over the past 200 years, there has been a sevenfold increase in the number of inhabitants of the Earth). At the beginning of July 2020, the population of the Earth was approximately 7.8 billion people (during the current year, the population growth was 48.5 million) (Table 1). By the end of the century, the population growth will become more moderate: about 11 billion people will live on Earth.

**Table 1.** Forecast of the population and its growth from 2020 to 2050.

([https://countrymeters.info/ru/World#population\\_forecast](https://countrymeters.info/ru/World#population_forecast)).

Year	Population, people	Population growth, %
2020	7 797 322 395	0.44
2025	8 187 482 626	5.00
2030	8 553 090 972	4.47
2035	8 894 594 868	3.99
2040	9 212 224 932	3.57
2045	9 506 070 389	3.19
2050	9 773 651 653	2.81

At the same time, many countries, including the countries of Europe, the USA, Russia, China, Brazil, already show the lower birth rate, which leads to aging of the population. Specialists are sure that more than 20 countries by 2100 will have decrease in their population by more than two times (in particular, in Japan, Thailand, Spain, Italy, and PRC). ([https://life.ru/p/1334569?utm\\_source=yxnews&utm\\_medium=desktop&utm\\_referrer=https%3A%2F%2Fyandex.ru%2Fnews](https://life.ru/p/1334569?utm_source=yxnews&utm_medium=desktop&utm_referrer=https%3A%2F%2Fyandex.ru%2Fnews)). As for Russia, according to forecasts, natural population growth in the country in 2020 and thereafter until 2050 will be negative, which will hardly affect the dynamics of global population growth. The increase in the world's population will be accompanied by a further increase in the demand for cereals (on average over the past ten years, its annual growth is 2.3%) and the global demand for food will face limited supply. At the same time, an additional deficit is created by the fact that crop products will be used to a greater extent for the production of bioenergy and other industrial purposes. Considering all factors, by 2050 it may be necessary to double the volume of world food production ([https://countrymeters.info/ru/World#population\\_forecast](https://countrymeters.info/ru/World#population_forecast)). The growing demand for agricultural products primarily requires the expansion of the area of arable land, the resources of which are very limited in the world, and the specific area of arable land per inhabitant of the land is constantly decreasing (Fig. 1) (Kudeyarov 2015). However, if nature and technology do not restore a more favorable balance of supply and demand in food markets, the consequences could be devastating. At the same time, it should be noted that agro-industrial companies will benefit, i.e. as a result of these trends, investors today are creating favorable prerequisites for effective investment in the agricultural sector through the global index of agricultural companies.

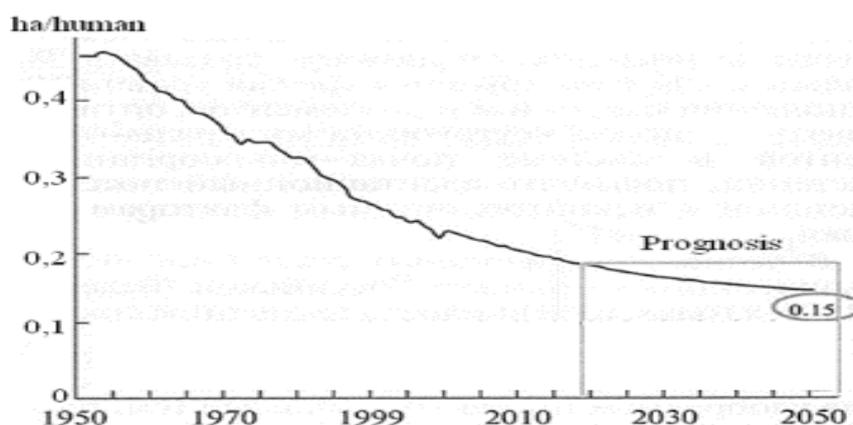


Fig. 1. Dynamics of arable land area per person in the world, hectares / person.

Experts believe the agrarian potential of the CIS countries to be of global importance. Only four countries (Belarus, Russia, Kazakhstan, and Ukraine) are capable of supplying the world market with food in quantities sufficient to feed half a billion inhabitants of the planet. Thus, agriculture, which has always been strategically important in terms of ensuring food security, becomes one of the main export industries for the countries of the region. Hence the need to revise the attitude towards the industry and adjust plans for its development and reform of land ownership. In this regard, Russia has unique agricultural opportunities and potential, as it is one of the world leaders in arable land, having almost 40% of the world's areas of chernozems - soils that are characterized by the highest natural fertility (a significant share of food entering the international market is produced in conditions similar to those in Russia), and, consequently, competitive advantages, the most important of which is the extensive nature of Russian agriculture, which makes it possible to produce environmentally friendly products in the vast expanses of the country, the volumes of which are limited throughout the world (Bagautdinova *et al.* 2013; Isaeva *et al.* 2013; Maksutina *et al.* 2014). Accordingly, Russia has a serious potential for land resources, which, subject to the ongoing rise in prices for agricultural products, gives it enormous advantages in world markets, and it would be able to position itself not only with domestic food supply, but also as an exporting country for a significant part of everything. The growing population of the planet.

## RESULTS AND DISCUSSION

There is no doubt that the effective implementation of land ownership determines the level of food security. However, it is impossible to reduce all the problems of ensuring food security only to land resources, to the sale of land ownership. The fact is that the efficiency of the land resources used for food production largely depends on the use of fresh water, moreover, in all countries of the world, the largest amount of fresh water (70%) is used in agriculture. The fact that in 2010 all UN member states recognized the right to access to water and sanitation as one of the basic humanitarian human rights is a confirmation of the special place of fresh water among the means of human existence. governments of all countries should provide their citizens with access to safe water sources (even in a disastrous situation: a person must have at least 15 liters of water for drinking and cooking; the distance from home to a water source should be no more than 500 meters (7- 10 minutes walk); the time in queue for water should not exceed 30 minutes (<http://inosmi.ru/world/20150612/228527377.htm>)). However, population growth, industrial development, and environmental pollution are still reducing people's access to usable freshwater sources. According to experts, in the coming decades, the problem will become even more aggravated, and conflict situations are predicted due to control over water sources. Water on the surface of the Earth circulates in a closed circle, changing its state of aggregation, while 85 million more people claim to get access to fresh water every year, despite the fact that the main sources of fresh water, rivers and lakes used for industrial effluents, are quickly polluted. "The amount of fresh water on Earth is now practically the same as in the time of Julius Caesar, who was at the head of the Roman Empire. However, over the past two thousand years, the Earth's population has increased from 200 million to 7.6 billion people, and the world economy has grown even faster (since 1960, GDP has grown by an average of 3.5% per year)" [10]. By 2026 over 4 billion people are predicted to lack fresh water, and by 2050 there will be only a few countries that will not experience a shortage of it. Hence, the contradictions between the countries related to the solution of the water problem are only growing every year. The course of events

confirmed the correctness of the scientists who predicted that "water for the 21<sup>st</sup> century would be the same as oil was for the 20<sup>th</sup> century," and the same thing that the much-desired black gold even led to military conflicts (as its reserves run out and belong not all), will happen to fresh water as soon as the demand exceeds its reproducibility (this phenomenon is called water stress) (<https://pravo33.wordpress.com/2008/10/26/>). Globally, the forecast for an increase in demand is indeed a serious concern: by 2050, the demand for drinking water will increase by 55%, and for electricity - by 70%. Desalination, which is often touted as almost a universal way to solve the problem of water scarcity, consumes the most energy, and thus is not affordable for many countries.

In this regard, Russia has the largest reservoir of natural fresh water due to the deepest (1642 m) Lake Baikal in the world, which contains 20% of the total supply of surface fresh water on the planet, and ranks first in the world in drinking water and second among all the lakes of the world in volume. The area of the entire water surface is 31,722 km<sup>2</sup>, which is approximately equal to the area of some European countries, for example, the Netherlands or Belgium. Scientists speculate that this lake is a nascent ocean. However, the results of human activity very often negatively affect the natural resources of our planet, cause enormous harm to the ecosystem of the wonderful reservoir of Lake Baikal, which, along with land resources, is the most important strategic factor in ensuring the country's food security (<https://ecoportal.info/ekologicheskie-problemy-bajkala/>).

Yet, the main issue of radical agrarian reforms proclaimed in the early 90s in Russia was the ownership of land, affecting the conflicting interests of different subjects, and, primarily, direct producers. Unfortunately, after the reforms of the 1990s-2000s, deformed and grey forms of economy of land ownership arose, which is due precisely to the process of cheap acquisition of land shares from the rural population and the organization of their further resale at higher market prices with the possibility of changing land categories. Instead of a massive stratum of strong owners in rural areas, there is a high level of poverty and unemployment. More than 70% of the population has disposable income below the subsistence level. At the same time, significant areas of agricultural land are not cultivated, the proportion of degraded soils has increased, and the area under crops has decreased by almost 40 million hectares (Kudeyarov 2015).

Land transformations that have been taking place since the early 1990s are based on the idea of forming new title owners - peasants endowed with ownership rights to land with the condition that land plots are assigned to them in kind. This poses a threat to the sustainable development of agricultural production and the provision of food security in the country (Khubiev & Makarov 2013), as this will lead to the fact that the peasants will lose their property rights, as has already happened as a result of "voucherisation". However, sustainable development and effective implementation of property rights can be ensured under state ownership. For entrepreneurs, property is not a key for effective management; it is enough to develop the institution of land lease, which allows for rational control of the production of products and the flow of funds. The priority in land transactions will be the rights of use and ownership, rather than title property rights. Acquisition of the right to lease requires less financial one-time funds than buying land, from here many agricultural producers will have free access to the main resource, which will contribute to their efficient land management. The next step in the reproductive support of an agricultural producer is to improve access to sources of motor power (fuel, lubricants, electricity, etc.). For this, a part of the exported raw materials should be closed to internal deep processing and their supply should be expanded on the domestic market. The expanded supply in the domestic market will lower the prices, which may be supported by the state. As a result, a reduction in agricultural producer's costs will turn Russia's resource advantages in relation to land and water resources into a competitive advantage for the industry.

## SUMMARY

The main idea in reforming land ownership should be that the main figure in the agrarian sector from an individual and social point of view is not the title owner of the land, but the entrepreneur, i.e. agricultural producer. The constructiveness of our proposed position is also confirmed by world experience, showing that effective agricultural production is impossible without the creation, with strong support from the state, of conditions for the economic realization of land ownership. One of the main tasks of the state land policy is the protection of land tenure rights.

## CONCLUSION

High capital intensity and low capital productivity exclude the successful competitiveness of the agricultural sector with other sectors of the economy. All this objectively requires government intervention in pricing, taxation,

lending, support, establishing price parity, etc. The functions of the state are determined by the need for rational use of agricultural land, water resources, primarily to ensure the country's food security and improve the socio-economic situation of villagers, stratification of society into very rich and poor, growth of social tension in society, crime, etc., creating parity in the level and quality of life of the rural and urban population.

## ACKNOWLEDGMENTS

The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

## CONFLICTS OF INTERESTS

There is no conflicts of interests.

## REFERENCES

- Bagautdinova, NG, Eshugova, SK, Saipullaev, U & Karasik, EA 2013, Methods of technology commercialization in projects of the agrofood system (AFS) development. *World Applied Sciences Journal*, 27(EMF), pp. 48-52.
- Bentham, J, Singh, GM, Danaei, G, Green, R, Lin, JK, Stevens, GA, Farzadfar, F, Bennett, JE, Di Cesare, M, Dangour, AD & Ezzati, M 2020. Multidimensional characterization of global food supply from 1961 to 2013. *Nature Food*, 1: 70-75.
- Danilov-Danilian VI, Global shortage of fresh water. - Access mode: <https://pravo33.wordpress.com/2008/10/26/>.
- Environmental problems of Lake Baikal. - Access mode: <https://ecoportal.info/ekologicheskie-problemy-bajkala/>.
- Global population. Access mode: [https://countrysmeters.info/ru/World#population\\_forecast](https://countrysmeters.info/ru/World#population_forecast)
- Isaeva, T, Safiullin, L, Bagautdinova, N & Shaidullin, R 2013, Aspects of a multi-level study of competitive performance of objects and subjects of economic management. SCOPUS18184952-2013-27-13-SID84891620976.
- Khubiev, KA, Makarov AN 2013, Reform of land ownership in the context of grey economy // Science, technology, and communications in modern society. Republican Scientific and Practical Conference with international participation. - Naberezhnye Chelny, pp. 42-47.
- Kudeyarov, VN 2015, Assessment of nutritional degradation of arable soils in Russia. *Vestnik Rossiiskoi akademii nauk*, 85(9), pp.771-5.
- Laborde, D, Martin, W, Swinnen, J & Vos, R 2020, COVID-19 risks to global food security. *Science*, 369(6503), pp. 500-502.
- Lawrence, G & McMichael, P 2012, The question of food security. *International Journal of Sociology of Agriculture and Food*, 19: 135-142.
- Makarov, AN, Maksutina, EV, Mustafina, LR & Zhunussov, BA 2018, August. Land ownership reform in context of neoclassical and political economy potential. In: International Conference " Economy in the Modern World" (ICEMW 2018), Atlantis Press.
- Maksutina, EV, Makarov, AN, Nazmeev, EF & Alpatova, ES 2014, Assessment of economic efficiency of investments into the human capital in modern conditions. *Life Science Journal*, 11: 376-379.
- McMichael, P & Schneider, M 2011, Food security politics and the Millennium Development Goals. *Third World Quarterly*, 32: 119-139.
- Nelson, R, 2020, International Plant Pathology: Past and Future Contributions to Global Food Security. *Phytopathology*, 110: 245-253.
- Ros E. Water reserves on earth are decreasing. - Access mode: <http://inosmi.ru/world/20150612/228527377.htm>
- Scientists told about the world's population by 2100. Access mode: [https://life.ru/p/1334569?utm\\_source=yxnews&utm\\_medium=desktop&utm\\_referrer=https%3A%2F%2Fyandex.ru%2Fnews](https://life.ru/p/1334569?utm_source=yxnews&utm_medium=desktop&utm_referrer=https%3A%2F%2Fyandex.ru%2Fnews).

## مسائل امنیت غذایی جهانی و ملی در زمینه منابع آب و زمین

آناتولیچ نیکولویچ ماکاروف<sup>۱\*</sup>، النا لادیمیرونا ماکسیتینا، کیسین آزر تویچ هوبیو<sup>۲</sup>، آیدار دمیرویچ

گیمادیو<sup>۱</sup>

۱- گروه تئوری اقتصادی و بخش سیاست‌های اقتصادی، دانشگاه فدرال کازان، کازان، روسیه

۲- گروه اقتصاد سیاسی، دانشگاه دولتی لومونوسف مسکو، روسیه

(تاریخ دریافت: ۹۹/۰۲/۲۲ تاریخ پذیرش: ۹۹/۰۸/۰۷)

### چکیده

در این مقاله، با توجه به سطح ملی و جهانی، موارد تأمین امنیت غذایی مورد بحث قرار می‌گیرد. موضوع تجزیه و تحلیل کشاورزی است که از نظر تأمین امنیت غذایی همیشه از نظر استراتژیک مهم بوده است. این ارتباط به دلیل تفاوت در تفسیر امنیت غذایی توسط هر موضوع فردی در اقتصاد جهان و همچنین بسته به سطح ملاحظه است. در این مقاله مشکلات ارزیابی وضعیت و تهدیدات امنیت غذایی در جهان و روسیه در زمینه منابع آب و زمین، اصلاح مالکیت زمین‌های کشاورزی، یک موقعیت سازنده در مورد اصلاحات ارضی، بر اساس تجربه کشورهای خارجی، مرتبط با اجرای تغییر جهت اصلاح از خصوصی‌سازی به سازمان استفاده منطقی از زمین بر اساس اجاره زمین دولتی به منظور ایجاد کارآفرینی موثر، که امکان اجرای تمام چرخه‌های روش تولید مثل را فراهم می‌کند، و بدین ترتیب مزایای منابع روسیه در رابطه با منابع آب و زمین به مزایای رقابتی صنعت تبدیل می‌شود و از پایداری امنیت غذایی کشور اطمینان می‌یابد.

\*مؤلف مسئول

---

### *Bibliographic information of this paper for citing:*

Nikolaevich Makarov, A, Vladimirovna Maksyutina, E, Azretovich Hubiev, K, Damirovich Gimadeev, A 2020, Global and national food security issues in the context of land and water resources, Caspian Journal of Environmental Sciences, 18: 467-472

Copyright © 2020