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IMPLICATIONS OF THE LINKS BETWEEN DEMOGRAPHY AND ECOLOGY FOR THE ECONOMY OF THE REPUBLIC OF KARAKALPAKSTAN

ABSTRACT

This article analyzes the impact of demographic factor on territorial organization of production in rural areas of the Republic of Karakalpakstan and reveals the main trends in production development. The analysis of statistical data of rural areas is given and proposals to improve the negative situation are given. More than 1306.8 thousand people live in rural areas of the Republic of Karakalpakstan, where they are concentrated in 1187 settlements, 26 urban settlements, and 11 towns of district subordination. All this testifies to the presence of large undeveloped production reserves and huge human potential. However, due to reduction of Amudarya water level, rational use of resource potential as well as improvement of welfare of rural areas becomes very difficult from year to year. In recent years, there has been an intensive increase in negative trends affecting the health of the population under the influence of a set of environmental factors. Processes of aridization and deficit of fresh water have caused degradation of natural ecosystems of rural areas of Karakalpakstan, which was expressed in development of desertification. Our studies show that the economic efficiency of measures designed to improve the efficiency of agricultural industries should be determined by drawing up permissible criteria of impact on the natural environment on the basis of ecologization of production.

Key words: demography, process, fertility, population, settlement, rural area, production.

INTRODUCTION

In the study of the impact of demographic factors on the territorial organization of production in rural areas of the Republic of Karakalpakstan, Uzbekistan is a qualitatively new form of territorial and economic organization, characterized by deep economic and social ties, as well as the increased right of local authorities in the implementation of market reforms, which is an urgent demographic problem that requires solution in the relevant areas. In the implementation of these tasks particular importance is attached to the further development of the socio-economic sectors of the rural agro-industrial complex since more than 21.3% of irrigated land fund and 48.5% of pasture lands of the Republic of Uzbekistan are concentrated here.

More than 1306,8 thousand people live in rural areas of the Republic of Karakalpakstan, where they are concentrated in 1187 settlements, 26 urban settlements, and 11 cities of regional subordination. All this testifies to the availability of large undeveloped production reserves and huge human potential. However, due to reduction of Amudarya river water level, rational use of resource potential as well as improvement of the rural population's welfare becomes very difficult from year to year.

In recent years, an intensive increase of negative trends affecting the health of the population under the influence of a complex of environmental factors has been noted. Processes of aridization and deficit of fresh water have caused degradation of natural ecosystems of rural areas of Karakalpakstan, which was expressed in development of desertification. On the dried bed of the Aral Sea, due to weak development of landscape components, sand ridges are formed, confined to elevated forms of relief, which often causes dust-salt export. The main components of salt-dust are magnesium sulphate, calcium bicarbonate, sodium chloride, of which, the last two salts are considered to be extremely toxic.

As a result, all categories of drinking water are polluted, which affects human health. Thus, according to O.A. Ataniyazova and others 0.46 km³ of industrial wastewater, 0.37 km³ of municipal wastewater, about 35.0 km³ of collector-drainage water, 0.23 km³ of agricultural production water, and 2.3 km³ of thermal power plant water are formed in the river basin. Directly into the Amudarya river and its inflows 8,5 km³ of collector-drainage water, 90,0 million m³ of industrial and 195 million m³ of municipal wastewater and 125 million m³ of agricultural water is discharged.³ Also, annually 13-25 t/ha of salts per 1 ha of irrigated land. Moreover, all these anthropogenic components of substances in the Amudarya water are even more intensifying their impact by depositing here salt-containing dust (1.0-3.2 t/ha) from the dried bed of the Aral Sea [1]. All this naturally causes, first of all, salinization of soils. This is compounded by local economic activities that together lead not only to the degradation of natural systems but also to the deterioration of human health. In such a situation, the cumulative impact of natural and economic factors may be considered as an environmental crisis on a global scale. Impacts of such character are observed not only in vital activity of individual organisms, but also strongly change vital parameters of geo-ecosystems.

The purpose of the study is to study the territorial organization of production in rural areas of the Republic of Karakalpakstan, taking into account the demographic situation in the region, as well as to apply modern methods of research to study the socio-demographic situation in rural areas of the Republic of Karakalpakstan and identify ways to mitigate the negative factors affecting the socio-economic system so that this system can serve future generations, providing them with the essential products.

Materials and Methods

Data for this study come from the materials of statistical department of Republic Karakalpakstan for 1959-2019. These data were analyzed using comparative statistical analysis.

Results and Discussion

The Republic of Karakalpakstan occupies 166,600 square kilometers, i.e., more than 37% of the territory of Uzbekistan, and more than 10% of the total area of Central Asian republics. There are huge reserves of natural gas, oil, lignite, table salt, cement raw materials and other construction

materials. According to contemporary calculations, but not yet full data, Karakalpakstan accounts for 20% of irrigated land and 48% of pasture resources, as well as enormous reserves of bentonite and glauconite raw materials of Uzbekistan. It is also necessary to take into account that the explored reserves of lignite in the Aral Sea area make up 7.2 billion tons, and the preliminary reserves of iron ore in Tebinbulak region exceed 17 billion tons. Obviously, numerous discoveries of new, largest, including a number of unique, natural gas deposits in Ustyurt, the dried bottom of the Aral Sea and oil-gas-condensate raw materials in the northern Urga fully confirm this forecast.

The lower reaches of the Amu Darya River, as well as the basins of other major rivers of the world, was one of the oldest centers of irrigated agriculture and densely populated regions. However, due to natural and ecological circumstances, it has been severely affected by desertification, which has had a negative impact on the area's human population and settlement. According to statistical data as of the beginning of 2020, more than 1.9 million people lived here, an increase of almost fourfold compared to 1959.

Due to the one-sided specialization of the national economy of Karakalpakstan, the majority of the population, 957.3 thousand people, is rural. The main factor of population growth has always been its natural movement. However, as in other regions, there has been a decline in the overall fertility rate in recent years. The unfavorable socio-ecological situation has influenced the character of inter-district population exchange, which in recent years has developed clearly not in favor of Karakalpakstan. Here, the general parameters of both natural and mechanical movement of population are falling. This cannot but affect the course of socio-economic development of the district, the dynamics of population and its resettlement.

The population of the republic, in particular the rural population, is unevenly distributed by administrative districts and zones. It is connected with difference of natural conditions and peculiarities of settlement as well as development of its separate parts. The overwhelming part of the rural population is located in the oasis areas, i.e., in the Amu Darya delta, where there are favorable conditions for the development of agriculture, while most of the desert is not populated.

During the years of independent democratic development of Uzbekistan, there were significant changes in the distribution of the population employed in various sectors of the economic complex of rural Karakalpakstan. The employment in non-production sectors has increased. In 1959, about 10 % of people were employed in non-production spheres, while in 2010, 30.0% of people were employed in such spheres. In 2010, this figure exceeded 30.0%. At the same time, the employment in rural areas grew faster not only in relative, but also in absolute terms, creating conditions for the growth of settlements, central estates, farms of various production specialization.

The picture of rural population and settlements placement that has emerged as a result of a long process, reflects the influence of a variety of factors and on the formation of settlement, their former impact on the transformation of rural areas can be traced both on the settlement network and on the appearance of individual settlements of urban type. However, in the complex interweaving of factors

affecting the settlement in rural areas, the determinant in the end is the level of development and distribution of productive forces.

The development of productive forces and the process of social division of labor caused different forms of settlements in rural areas and their functioning and location. The role of the territorial division of labor is especially great in this respect. This can be illustrated by the influence of different branches of production on forms and scales of rural settlement at different stages of development of productive forces in the Republic of Karakalpakstan. One of the general tendencies of development of productive forces is the change of rural-urban population ratio, which increased between these years in absolute terms by 815.9 thousand people, i.e., 50.2% of the total population of the republic.

As productive forces of rural areas grow and economic maturity of regions increases, there will be a process of differentiation of economic conditions and formation of large settlements, first of all, in old-developed irrigated areas of southern zone of the republic, and in the future, northern areas of Karakalpakstan will be more and more actively included in this process. At the same time, for development of the still uninhabited northern areas of Karakalpakstan infrastructural problems need to be solved. In these areas, the nature of settlement and, above all, the dynamics of settlements has a noticeable impact on the socio-demographic situation. In this regard, significant features, such as sex and age structure of the population, correspondence of places of labor application and types of activities to the level of population development, etc. Under these conditions, labor reproduction dictates two main directions of settlement improvement: a) enlargement of rural and urban settlements by organizing comfortable living conditions; b) creation of interconnected group systems of settlement with inclusion of urban and rural settlements in the organizations of cultural and household services, etc.

The current state of the industrial and demographic situation in rural areas of the Republic of Karakalpakstan shows that today it has become more preferable to concentrate the sphere of services only in large cities. As a result, on average, there are only about 10 trade enterprises per 10-20 thousand people in Kungrad, Muynak and Takhtakupyr districts which occupy 80.7% of the territory of Karakalpakstan. Therefore, given all the problems that have developed in the service sector, the availability of a network of general education schools, medical and cultural and amenity facilities, commercial service enterprises and other elements of the service sector, as well as infrastructure facilities will be studied [2].

Depending on economic development, relatively better populated areas of the southern and central zone, where the population density is from 33 to 159 people per square kilometer, and in some small areas it reaches 160-240 people and more. The districts of the northern zone of Karakalpakstan have almost the same low population density (2-3 people per km²), only along irrigation systems and in Khojeli and Nukus districts can a higher population density can be found. The lowest population densities are in the Kungrad and Takhtakupyr regions (1-2 persons per km²), and in the littoral zone

(0.7 persons per 1 km²) [4]. This can be considered a result of negative activity of planned economy and monoculture cotton strategy of former years. That was the time when 1.3 million hectares of new lands, developed and put into operation from 1965 to 1990, were allocated to cotton. The domination of cotton sowing in the Amu Darya basin and other regions led to the high specific weight of cotton, and it reached 75% (in the world practice, cotton field's specific weight does not exceed 50%). All this has caused irreparable damage to the arable land itself, led to soil depletion, began to fall in yields not only of cotton, sharply changed the natural environment and hence the mass of environmental woes accumulated throughout the Aral Sea region [2]. The focus on cotton entailed the construction of new main canals and reservoirs. All these water arteries were laid in the ground or sandy soil, without waterproofing, as a result, the efficiency of irrigation networks fell by 0.52-0.60 [2].

Dynamics and territorial distribution of the population of the Republic Karakalpakstan

Name districts	Total population, in thousands of people			2019 in % 1959
	1959	1989	2019	
Southern region	166.0	428.8	749.9	334.0
Central District	187.4	529.8	703.6	375.4
Northern region	127.5	249.7	379.5	297.6
Aral district	29.8	27.4	31,3	105.3
Total	510.7	1213.8	1869.7	266.1

Due to the Aral Sea crisis, in the last decade, the Republic of Karakalpakstan has faced a complex set of environmental and social problems that have the most disastrous consequences. The desertification processes in this region acquire catastrophic character, they lead to destruction of equilibrium in natural-economic systems, degradation of all forms of organic life, and, consequently, to reduction of natural-economic potential of Karakalpakstan. Thus, now Karakalpakstan, having huge natural resources, on many indicators of production lags behind the average republican level. For instance, only 3.4-3.7% of gross agricultural output and 1.5-1.7% of industrial output of the republic are produced here annually.

At the same time, it should be noted that one of the reasons for low production efficiency in Karakalpakstan is its structural imbalance within the sectors: the predominance of industrial enterprises for processing agricultural raw materials in conditions of insufficient water resources and the lack of its powerful raw material base, as a result of which about half of the products imported

into the Republic are consumer goods. All this negatively affects not only the normal functioning of the processing industries but also the satisfaction of people's needs for basic necessities.

In recent years, the level of the Aral Sea has sharply decreased, and where recently the waves reigned, almost 3.5 million hectares have formed a dusty hot desert, dubbed "Aralkum". Billions of tons of toxic salts, pesticides, herbicides, including DDT, which got there within decades together with the water discharged into the rivers from the fields, have accumulated in the remnants of the sea, its dried-up bottom. Thus, the Aral Sea region land has been poisoned by toxic chemicals, which has also affected the humanity of the areas and the economic activities of the population. In Muynak and in a dozen of other settlements the number of inhabitants has significantly decreased, and some settlements (Urga, Akbetkei and others) have disappeared from the map of Karakalpakstan.

This nature of population settlement generates a mismatch between land and labor resources and negatively affects the involvement of production reserves into agricultural turnover. In this regard, it seems possible to move the main centers of territorial organization of production to the southern regions, where there are favorable conditions for the development of land and the creation of new infrastructure facilities. Significant growth in agricultural productivity, can be achieved only on the basis of a more rational placement and full use of labor resources. In the Republic of Karakalpakstan the working-age population is replenished at a fast rate. Of the total working-age population, students in schools, specialized secondary educational institutions, and higher education institutions account for 13-15%. Rural areas account for more than 2/3 of the workforce. If one takes into account the needs in the social sphere and construction in rural areas, more than half of them are left for agricultural production, while only 200-230 thousand people actually work permanently at agricultural enterprises. Thus, a significant part of the rural labor resources is not used. At present, the load of sown area per person in agriculture as a whole is 2.5 hectares, and in Turtkul, Beruni, Amudarya, and Khojeyli districts less than 1 hectare. Therefore, the statement that as if own labor resources for branches, in our opinion, is clearly not justified. Moreover, the rural able-bodied population will continue to be the source of full and sustainable supply of labor force for the development of agro-industrial production and all other sectors of the national economy. Another thing is that both now and in the future, it will be necessary to resettle the labor force inside the republic. In the southern, old-irrigated zone, for example, the reserves of arable land are almost not exhausted. The Kyrkkzyz, Zhambaskala and other massifs have long been developed here, and a new Ellikkala district has been organized. On the borders of Amudarya and Khojeli districts there are no vast free massifs. But in irrigation zone there are lands not occupied for crops, which can be developed in case of necessary reclamation works and improvement of planning of settlements. In the northern regions, in particular Muynak, the additional need for labor is of a different nature: there are huge vacant areas of land, development of which is carried out mainly for the cultivation of grain crops and other agricultural crops.

Thus, the availability of undeveloped land and labor reserves in the territorial relation do not coincide everywhere. For example, in the southern zone there is more than 50% of labor resources and only 26% of arable lands, and in the northern and central zone 47% of labor resources and 71% of arable lands are located. Therefore, for the development of the colossal lands of the northern areas it is necessary to take into account the influence of environmental-economic factors for the full use of internal reserves of farms, as well as the redistribution of population between natural-economic areas, will provide intensive development of production and create new labor reserves of developing sectors of chemical, gas, oil industry and construction industry.

At the present stage of socio-economic development of the Republic of Karakalpakstan, water resources are an important factor determining the territorial structure and specialization of the economy and, at the same time, limiting the development of some of them. Our calculations show that in the zone of influence of the Southern Aral Sea there are more than 2.9 million hectares of land suitable for irrigation, while the own water resources are enough to irrigate only one third of these lands. This indicates that in the coming decades, local water resources will be insufficient, and the level of the Aral Sea may fall even lower. A radical solution to the water problem in the Amu Darya basin, along with others, is also related to inter-basin water redistribution and protection of water resources through the application of more cost-effective water supply and irrigation technologies. Therefore, improving the territorial structure of the agro-industrial complex will have a significant impact on the further development of the region's productive forces [3].

Depletion of water resources creates considerable difficulties in development and allocation of agro-industrial complex branches in a number of natural-economic zones, organization of water-intensive production branches. The most difficult situation with water supply is in the northern part of the Republic of Karakalpakstan due to intensive development of irrigated agriculture on a large scale. In this connection, one of the most important tasks is all-round restriction of water-intensive crops sowing and termination of water discharge into drainless water bodies, rationalization of their industrial and agricultural use, saving under irrigation [6].

As it is known, development of production of Karakalpakstan during last years was going in agro-industrial sector, by way of arable lands expansion accompanied by intensive reclamation construction and pastures development. At the same time, in a number of labor-surplus regions of the country irrigated farming, processing industry of agricultural raw materials and construction materials industry were developed. In the areas of traditional pasture cattle breeding, the growth of sheep population was not always ensured by increasing the carrying capacity of pastures, and in rice-growing areas the growth of sown areas of agricultural crops did not correspond to the availability of water resources. This led to aggravation of ecological situation and reduction of economic efficiency of production. As a result of not integrated spatial strategy in relation to regional economy in the structure of agricultural sector the accents of monoculture direction prevailed: cotton cultivation, introduction of water-intensive crops such as rice in conditions of extreme shortage of water sources.

At the same time, horticulture and cattle breeding were developed irrationally without taking into account the ratios of crop rotation and development of fodder base, which led to increased tension in providing the population with food, and the processing industries with raw materials. The cultivation of vegetable and melon crops remained practically undeveloped in many farms. One of the reasons for the formed imbalances in the development of the agrarian sector is a predominantly sectoral approach to solving economic problems, underestimating the depth of market relations and internal specifics of the regional social factor. The analysis of the use of the production potential created in the republic shows that in a number of its elements extensive tendencies prevail, caused by the failure to take into account specific conditions in the development and placement of production and infrastructure facilities.

Conclusion

Formed on the territory of Republic Karakalpakstan structure and specialization of agricultural production, represented mainly by cotton growing under relatively small specific weight of alfalfa crop rotation, is, in our opinion, one of the main reasons of irrigated lands reclamation state reduction and agricultural production underproduction. Along with above-mentioned factors, one of the factors of low efficiency of social production is its structural imbalance within branches, with the predominance of branches of agricultural raw materials processing industry in conditions of lack of water sources for creation of powerful raw material base of processing industry. This creates imbalance in enterprises where economic mechanisms do not work, and this causes uncertainty and instability in the sphere of supply.

All this, as it seems to us, is one of the main reasons of underproduction, underutilization of capacities with high labor redundancy, a hotbed of aggravation of ecological tension in the Republic of Karakalpakstan. Therefore, the Aral problem is considered not only as a purely regional and national problem, but also has an international, global significance. It equally belongs to the acute problems affecting interests of all people living in this part of the world.

Our research shows that the economic efficiency of measures designed to improve the efficiency of agricultural sectors should be determined by drawing up permissible criteria for the impact on the natural environment on the basis of ecologization of production.

All this confirms the need to study the problems of socio-demographic development of rural areas and the development of priority methods for determining the structural composition of the population, the dynamics of its growth, population density of the territory in the context of rural areas and justify the improvement of socio-demographic situation in rural areas of the Republic of Karakalpakstan.

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