The Effect of Water Shortage on the Aral Sea on the Productivity of Agricultural Crops

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Abstract

According to statistical data, the water supply for the Republic of Karakalpakstan was 39-41% in 1999-2001, 50-55% in 2007-2010, and 54-58% in recent years, and no water came to the island at all. According to the analysis of world experts, by the 2050s, the water shortage will decrease by 5 times from its current state, and the water shortage situation may increase with many more years of drought. In this situation, in the Republic of Karakalpakstan, which is located on the coast of the island, solving the issues of agricultural specialization, replacing the water-intensive crops such as rice, sorghum, cotton and other crops that require a lot of water - planting of sesame, millet, sunflower, alfalfa, corn and other agricultural crops that do not require a lot of water, application and improvement of water-saving technologies, planning of development of agricultural land in the area that does not require a lot of water - animal husbandry are considered urgent issues.

As we all know, the Aral Sea rises in the old age and 16.5 million tons of dust-pollen-saline mixture per year falls on the lands of the Republic of Karakalpakstan, located in the Aral Bay, from 425-650 kilograms per hectare of salty and dusty soil and eventually reaches Antarctica, polluting the air, water, and land. is bringing.

Keywords: *Aral Sea, Karakalpakstan, water scarcity, saline soil, sesame, millet, sunflower, alfalfa, sorghum, green landscape, water economy.*

Introduction

The decision of the President of the Republic of Uzbekistan dated January 28, 2020 № PQ-4574 is tasked with ensuring the increase in the efficiency of the use of land and water resources in the sustainable development of agriculture, as well as environmental protection, the use of water-saving irrigation systems [1] .

Due to frequent water shortages in the area along the island, soil degradation is observed here, certain parts of agricultural land are degraded, out of active agricultural use and require recultivation.

Relevance of the topic

According to the analyzes of world experts [18,19,20], the water demand for the Republic of Karakalpakstan was 39-41% in 1999-2001, 50-55% in 2007-2010, and 54-58% in recent years. Water did not fall on the island at all. According to the estimates of world experts, the water shortage will increase by 15-17% in the future, the years of water shortage will repeat, and by 2050, the current water supply may be 5 times less. In this situation, solving the issues of agricultural specialization in the Republic of Karakalpakstan, located on the coast of the island, planting crops that require less water in agriculture instead of crops that require a lot of water, application and improvement of water-saving technologies, planning the development of agricultural land, a sector that does not require a lot of water - animal husbandry, are considered urgent issues.

As we all know, with the active efforts of the President of the Republic of Uzbekistan Sh.M. Mirziyoev, saxaul, keurek, kandym, cherkez and other halophyte plants were planted in a large area to create a green landscape on the shores of the Aral Sea, and now there are rows of green bushes. However, in the Republic of Karakalpakstan, where the central irrigation river is located at the end of the Amudarya, taking into account that the water problem will be severe in the near future, instead of crops that require a lot of water, crops that require 5-6 times less water than crops that require a lot of water should be planted, and the green landscape and agriculture in the region should be preserved. It is considered a sacred task for every inhabitant of the sphere. The reason is that 16.5 million tons of dusty-pollen-salty mixtures rise up from the Aral Sea annually, 425-650 kilograms of salty dust per hectare falls on the lands of the Republic of Karakalpakstan located in the Aral Forest, polluting the air and water of the land as far as Antarctica [2].

Content of the subject

Based on this situation, as indicated in the paragraph of the Action Strategy developed for the further development of the Republic of Uzbekistan in 2017-2021, "...modernization of agriculture and rapid development, consistent development of the production of agricultural products, further strengthening of food security, expansion of the production of ecologically clean products, significantly increasing the export potential of the agricultural sector..."1 important tasks that need to be worked on are defined [1,2].

In order to prevent negative processes on the island and along the island, and to preserve the meaning of active livelihood, our Presidents at the 48th session of the UN General Assembly on September 28, 1993, and at the 50th session of the UN General Assembly on October 24, 1995, and at the 72nd session of the UN General Assembly in 2017, representatives of the countries of the whole world and the Central Asian region called on the world

community to help save the island and the archipelago. As a result, in 1996, the International Fund for Saving the Island (FFSI) was established in Uzbekistan, Kazakhstan, Tajikistan, Kyrgyzstan and Turkmenistan, and many useful decisions were made [1].

The need for specialization in agriculture on the island is reflected in the following:

1. Supporting the region's fight against desertification by ensuring specialization in agriculture in the archipelago region;

2. Increasing the level of satisfaction of the population's demand for agricultural products by ensuring specialization in agriculture in the archipelago region;

3. Creation of new jobs for the population, while ensuring specialization in agriculture, etc. in Orolbayi region [1].

In the implementation of these tasks, the President of the Republic of Uzbekistan Sh.M. Mirziyoev‘s [3] № PF-5065 dated May 31, 2017 “Strengthening control over land protection and rational use, improvement of geodesy and cartography, on the measures to regulate the administration of state cadastres” Decree № PF-5199 of October 9, 2017 “Protecting the rights and legal interests of farmers, peasant farms and homestead land owners, fundamentally improving the system of effective use of agricultural arable land Decree on measures” decision № PQ-3318 of October 10, 2017 “On organizational measures for the further development of the activities of farmers, peasant farms and landowners” and other regulatory legal documents related to this activity are the basis for the implementation of tasks [1,2].

Results of the experiment

Due to water shortage observed in the Republic of Karakalpakstan in recent years, the planned harvest of agricultural crops is not obtained. For example, in 2000-2001, when the water supply was equal to 39-40%, one of the main crops was - the yield of cotton was equal to 12-13 tons/ha, and it did not even cover its own expenses. That’s why cotton cultivation areas were reduced to 30,000 hectares in Karakalpakstan at the initiative of the President, and 4 districts were specialized for cattle breeding and fodder base. Plants that require little water - millet, sesame, sunflower, alfalfa and sorghum, and plants that require moderate water - autumn and spring wheat, alfalfa, fruit and vegetable crops and watercress are included in the planting plan to a certain extent, and due to the fact that there is enough water for animal husbandry in the Republic the fields (green landscape) cover the May. The area of cotton was reduced in accordance with the water shortage, and the yield of cotton increased from 17.5 quintals to 22.3 quintals when water was somewhat sufficient[3].

In the agricultural conditions of the Republic of Karakalpakstan, in the conditions of water scarcity, the economic efficiency of planting crops on the farm - millet, sesame, sorghum, alfalfa and water-intensive crops - rice, wheat, cotton and horticultural crops - tomato) was revealed.

In the conditions of the Republic of Karakalpakstan [3], accounting books and estimates for the cultivation of cotton crops as of January 1, 2022, when the average yield was 22 t/ha, the total yield was 2.2 t/ha, and its average selling price was 6,200.0 soums/kg. and the expected income is equal to 13640.0 thousand soums, and the average annual

amount of water required for obtaining this crop is equal to 9.50 thousand cubic.

In the conditions of the Republic of Karakalpakstan, which is located on the shore of the island, when the productivity of wheat cultivation was on average 32 t/ha, the total yield was 3.20 t/ha, and the average selling price of wheat was equal to 2500.0 soums/kg, and the expected income was equal to 8000.0 thousand soums. , the average annual amount of water required for this crop was equal to 7.70 thousand cubic meters [4].

In Karakalpakstan, when the average yield of rice is 45 t/ha, the total yield is 4.50 tons, and the average selling price is 2,500.0 soums/kg, and the expected income is 11,250 thousand soums, but the average annual demand for this harvest is the amount of water used was equal to 24.6 thousand cubic meters per hectare [4].

Accounts and estimates for growing tomatoes from garden crops in Karakalpakstan as of January 1, 2022, when the average yield was 200.0 tons/ha, the total yield was 20 tons/ha, and the average selling price was 800.0 soums/kg, the expected income is equal to 16,000 soums/hectare, and the average annual water requirement for this crop is 12.5 thousand cubic meters per hectare [4].

Accounts and estimates for the cultivation of sorghum for grain in Karakalpakstan as of January 1, 2022, when the average yield was 35 t/ha, the total yield was 3.5 t/ha, and the average selling price of grain was 3,500 soums/kg, and the stalk yield was 180 t/ha. coincidentally, when 18 tons of stalks are harvested per hectare and sold at 600 soums, the expected income is 23,050,000 soums/hectare, and the average annual water requirement for this crop is 5,400 cubic meters per hectare.

In Karakalpakstan [4] alfalfa crops for hay, accounts and estimates as of January 1, 2022, when the average yield is 75 t/ha, the total yield is 7.5 t/ha, and the average selling price of grain is 2000 soums/kg. equal to 15,000.0 thousand soums/hectare, and the average annual amount of water required for obtaining this crop was equal to 5.6 thousand cubic meters per hectare.

Accounts and estimates for the cultivation of sesame in Karakalpakstan as of January 1, 2022, when the average yield is 15 tons/ha, the total harvest was 1.5 t/ha and the average selling price of grain is 9500 soums/kg, the expected income is 142500.0 thousand soums/hectare and the average annual amount of water required for this harvest is 4.2 thousand cubic meters per hectare it happened [3].

Accounts and estimates for the cultivation of millet in Karakalpakstan as of January 1, 2022, when the average yield was 15 t/ha, the total yield was 1.5 t/ha, and the average selling price of the grain was 6,500 soums/kg, the expected income is equal to 9750.0 thousand soums/hectare, and the average annual amount of water required for obtaining this crop is equal to 3.6 thousand cubic meters per hectare. So, it has been scientifically proven in our experiments that the water used to grow one hectare (1 hectare) of rice can be used to grow 6-7 hectares of millet, 5-6 hectares of sesame, 4-5 hectares of alfalfa or sorghum, 2 hectares of tomatoes and 3 hectares of cotton [4].

Conclusion

In the Republic of Karakalpakstan, the monoculture of cotton, which is being planted from the nose, has failed to find a productive field since the years of water shortage in the Republic. According to the analysis of economists and world experts, the income from grapes is 7 times more than the income from

cotton planted on 1 hectare of land. Currently, when there is a water shortage in Karakalpakstan, when we calculate the water standards needed for growing crops, 9.5 thousand cubic meters for cotton, 7.7 thousand cubic meters for wheat, 24,600 cubic meters are needed for rice and 12,500 cubic meters for tomatoes from sorghum crops, 5.4 thousand cubic meters for sorghum, 5.6 thousand cubic meters for alfalfa, 4.2 thousand cubic meters for sesame and 3,000 cubic meters for millet. It was determined during the research that 6,000 cubic meters will be used. In other words, it was calculated that 7 hectares of millet, 6 hectares of sesame, 4.4 hectares of alfalfa or 4.6 hectares of oats can be grown with the water used to grow 1 hectare of rice[3]. .

In cotton monoculture, when all agrotechnical measures were carried out in the appropriate order, the total income was 13,640,000 soums, while the income of 23,50,000 soums was obtained when growing sorghum, which requires little water, that is, compared to growing cotton, 9 million 400 thousand soums, 1 million 360 thousand soums in alfalfa growing, and 610 thousand soums in sesame growing have been scientifically proven.

If the total income from the planting of 4 different crops that require a lot of water - cotton, wheat, rice, and rice - is 32 million 890 thousand soums, and the irrigation water used for them is a total of 41.8 thousand cubic meters, including, if 6.9 thousand cubic meters of water were used for salt washing and 34.9 thousand cubic meters of water were used for irrigation during crop maintenance, 62 million 50 thousand soums were earned for growing 4 types of crops that require little water - sorghum, sesame, millet and alfalfa, and irrigation used for them, a total of 18.8 thousand cubic meters of water, including 4.6 thousand cubic meters of water used for salt washing and 14.2 thousand cubic meters of water used for crop maintenance irrigation as a result of mathematical and statistical calculations. So, compared to the cultivation of crops that require a lot of water, 23 thousand cubic meters of water are saved from crops that require less water, and 29 million 160 thousand soums more income is obtained from crops that require less water compared to the cultivation of crops that require a lot of water [5].

In the conditions of the Republic of Karakalpakstan, in improving specialization and shifting from cotton farming to cattle breeding, if the total income from water-intensive crops - cotton, wheat, rice, and sorghum crops - is 32 million 890 thousand sums, the net profit from animal husbandry is 124 million 325 thousand soums, compared to the specialization of crops that require a lot of water, it was proved through dissertation research that the profit is 91 million 435 thousand soums.

1. By analyzing the issues of specialization in the conditions of water scarcity in the Republic of Karakalpakstan, it is appropriate to increase the areas of corn, sesame, millet and alfalfa that require less water instead of water-loving plants - cotton, rice and other crops that require a lot of water.

2. The total income from cotton cultivation was 13 million 640 thousand soums, while 23 million 50 thousand soums were received from the cultivation of sorghum, i.e. 9 million 400 thousand soums compared to cotton cultivation, 1 million 360 thousand soums from alfalfa cultivation, and 1 million 360 thousand soums from sesame cultivation, 610 thousand soums more profit was received.

3. The total income from planting crops that require a lot of water - cotton, wheat, rice and sweet potato crops - is 32 million 890 thousand

sums, and the income from crops that require little water - sorghum, sesame, millet and alfalfa is 62 million 50 thousand sums. Compared to the cultivation of crops that require a lot of water, 29 million 160 thousand soums more income is obtained from crops that require less water.

4. Irrigation water used for crops that require a lot of water - cotton, rice, wheat and oleander crops - totaled 41.8 thousand cubic meters, while irrigation water used for growing crops that require little water - corn, wheat, sesame and alfalfa - totaled 18.8 23,000 cubic meters of water saved per thousand cubic meters was proved by the calculations of our scientific researches.

5. In the conditions of the Republic of Karakalpakstan, when the specialization is directed from cotton farming to livestock breeding, if the total income from crops that require a lot of water - cotton, wheat, rice, and rice - is 32 million 890 thousand sums, the net profit from livestock farming is 124 million 325 thousand soums, and compared to the specialization of crops that require a lot of water, it was proven through research that 91 million 435 thousand soums more profit will be obtained.

Recommendations

1. By analyzing the issues of specialization in the conditions of water scarcity in the Republic of Karakalpakstan, it is appropriate to increase the areas of corn, sesame, millet and alfalfa that require less water instead of water-loving plants - cotton, rice and other crops that require a lot of water.

2. 7 ha of millet, 6 ha of sesame, 4.4 ha of alfalfa or 4.6 ha of sorghum can be grown for one hectare (1 ha) of rice.

3. It is necessary to strengthen the material and technical base of agriculture and water management.

4. It is necessary to develop non-traditional areas of agriculture (beekeeping, fishing, etc.).

5. In order to effectively use land resources in conditions of water scarcity, specialization should be carried out depending on the water supply of the place.

6. Based on the analyzes of world experts, in the conditions where water supply is expected to decrease by 15-17% by 2050, it is advisable to strengthen agrocluster activities in the Republic of Karakalpakstan on the shore of the island, to plant food crops that require less water and to expand the size of livestock.

7. The total income from planting crops that require a lot of water - cotton, wheat, rice and sweet potato crops - is 32 million 890 thousand sums, and the income from crops that require little water - sorghum, sesame, millet and alfalfa is 62 million 50 thousand soums.

29 million 160 thousand soums more income was obtained from crops that require less water than from crops that require a lot of water.

8. The irrigation water used for crops that require a lot of water - cotton, rice, wheat and sorghum crops - totaled 41.8 thousand cubic meters, while the irrigation water used for growing crops that require less water - corn, wheat, sesame and alfalfa - totaled 18.8 thousand cubic meters. 23,000 cubic meters of water can be saved in our scientific studies.

9. In the research years in the Republic of Karakalpakstan, cotton, rice and other water-loving plants, which require a lot of water and have reduced areas, can grow 7 ha of millet, 6 ha of sesame, 4.4 ha of alfalfa or 4.6 ha of corn with 1 ha of water used to grow rice. we

propose to expand the areas of agricultural crops that require less water - corn, sesame, millet and alfalfa.

10. In the conditions of the Republic of Karakalpakstan, in the direction of specialization from cotton farming to cattle breeding, the total income from crops that require a lot of water - cotton, wheat, rice and field crops - is 32 million 890 thousand soums, while the net profit from cattle breeding is 124 million 325 thousand soums 91,435,000 soums more profit compared to specialization in demanding crops has been proven through research.

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