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THE PROBLEM OF DROUGHT IN THE TERRITORY OF AZERBAIJAN AND COMBAT MEASURES

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ПРОБЛЕМА ЗАСУХИ НА ТЕРРИТОРИИ АЗЕРБАЙДЖАНА И МЕРЫ БОРЬБЫ

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Abstract. The article considers global and local climate change, and the problems associated with these changes. The increase in drought in the world and in Azerbaijan. The influence of various types of anthropogenic impact on the environment is studied. Measures to reduce their negative consequences are proposed. 52.4% of the total land fund of Azerbaijan is suitable for agriculture. The bulk of the soil is in arid areas (Kura-Araz lowland, including the Salyan, Mil, Mugan, Shirvan and Karabakh plains). Drought is also observed in the foothills of the Lesser Caucasus. Growing crops without irrigation is impossible. Problems arise in irrigating crop areas in dry years. The presence of drought in the summer months and a decrease in water resources negatively affect agriculture. The total water deficit in Azerbaijan in 2020 amounted to more than 0.2 km^3. The water deficit may increase to 1.3 km^3 in 2030 but may amount to 4-5 km^3 in 2050. It is proposed to use current technologies in the country's natural resource management system.

Аннотация. Рассмотрены глобальные и локальные изменения климата и проблемы, связанные с этими изменениями. Рост засухи в мире и на территории Азербайджана. Исследуется влияние различных видов антропогенного воздействия на окружающую среду. Предлагаются меры по снижению их негативных последствий. 52,4% всего земельного фонда Азербайджана пригодны для земледелия. Основная часть почв приходится на долю засушливых территорий (Кура-Араксинская низменность, включая Сальянскую, Мильскую, Муганскую, Ширванскую и Карабахскую равнины). Засуха наблюдается и в предгорных частях Малого Кавказа. Выращивание сельскохозяйственных культур без орошения невозможно. Создаются проблемы в орошении посевных площадей в засушливые годы. Наличие засухи в летние месяцы и уменьшение водных ресурсов негативно сказываются на сельском хозяйстве. Общий дефицит воды в Азербайджане в 2020 году составил более 0,2 $км^3$. Величина дефицита воды может увеличиться до 1,3 км3 в 2030 году, но может составить 4–5 $км^3$ в 2050 году. Предлагается использование актуальных технологий в системе природопользования страны.

Keywords: drought, global climatic changes, water deficiency.

Ключевые слова: засуха, климатические изменения, дефицит воды.

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Drought, water erosion, deflation, acidity, more moisture, alkalinity, stony, man-made destruction, structure loss, humus decrease, strong insufficient of phosphorus are factors which restrict plant productivity.

The name is a long period of low precipitation, relative air humidity below 30%, and daily temperature 4-5 degrees above normal (from some month to some years). As a result of drought, the necessary water insufficient is formed for the human's life and economic activity, the inconvenient condition is created for plant development, the drinkable water sources are drying up. Drought occupies large zones. Drought is an incentive force of desertification. A main reason of droughts creation is climate factors, especially increase of temperature.

In the last account of the Group of Non-Governmental Experts on climate changes it is shown that the average annual temperature reaches 0.8^0C on the earth for last 100 years. Water insufficient, desertification, drought problems, an analysis of its creation reasons, decrease of negative effects and prevention issues have great importance, because approximately 50 % of the zone are located in the arid zone which is characterized with the type of desert and dry field.

Approximately 80% of the tillage areas of the world exposed to drought, decrease of vegetation, soil salinization degradation. Only soil erosion affects one fifth of the agricultural soils in the whole world. The soil degradation negatively affects 40% of the world population. According to the prognosis, the soil degradation will decrease global food productivity12% and it will be a reason for increase of 30% food price till 2040 (UNEP, 2023) [4].

Modern state of the problem

Unusual warm winter seasons in Azerbaijan, risk of re-drying of rivers and water reservoirs in summer, decrease of water electrical energy production, increase of air temperature mean that droughts will become more frequent. In the last 30 years an average annual temperature of the air increased approximately 0.6-1.2 degrees compared to the long-term climate norm and a quantity of rains decreased 10-20 mm. As a result, drought strengthens, but the soils degradation accelerates. Increase of temperature and decrease of precipitation create great problems in different areas of agriculture. The assessment of carried out by means of global climate models indicate that the climate changes will mostly condition lack of water in Azerbaijan. It can be continuous character in drought repetition as observed from 2011 till now. A need of economy to water in drought years can be reached the crisis threshold [2, 3].

4780.6 thousand hectares from 8660.0 thousand hectares, i.e. 52.4% of the total soil fund of Azerbaijan soils are suitable for agriculture. A main part of these soils falls on the share of arid areas (Kur-Araz lowland, including Salyan, Mil, Mughan, Shirvan and Garabagh plains). The definite drought is observed in the foothill parts of the Little Caucasus. It is clear that it is impossible to grow agricultural crops without irrigation. The surface water resources decrease, water reduces or fully dries, and this leads to water lack and creates problems in irrigation of the sowing areas in the drought years. Taking into account these, an issue of rational use of the available soil and water resources is always relevant.

The driest zones of Azerbaijan — Beylagan, Imishli, Saatli, Sabirabad, Salyan, Neftchala, Ujar, Bilasuvar and others are main agricultural regions of our country. We consume more than our existing water sources provide them, more part is used for irrigation. The additional irrigation is required in the hot times of summer because more parts of the sowing areas are located in the arid zones. The presence of drought in the summer months, when the plants grow faster and decrease of water resources negatively affect agriculture.

Desertification process is characteristic for Azerbaijan and it is one of the terrible processes. Today, this process is very intensive in Azerbaijan and it occurs with its special characters. One of

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the main reasons is that up to 60% of the country's territory belongs to arid climatic conditions. The drought coefficient in 40% of the zone has a similar character in deserts. Predominance of drought throughout the year causes degradation and desertification of soils in the arid zone where about 4.5 million people live.

Every year desertification rises in our country and this is a great concern among scientists. Azerbaijan is currently on the 20th place in the list of countries that may face water shortages in 2040. Though Azerbaijan is the "poorest" country of South Caucasus according to the bulk of drinkable water resources and limitation of water resources in the country, Azerbaijan is ahead of many countries in the world in terms of the amount of water per capita.

The agricultural areas in the drought condition and less fertile soils are studied, the works are performed in the direction of cultivation and development of the new sorts of the agricultural crops, enlargement of the researches on cultivation of the drought-resistant plants are planned in the scientific-research institutions. It is necessary to enlarge directions of the agriculture which require less water. When very serious problems exist in connection with surface water resources because of shortage of water sources, the pure and fully usable underground sources can be used in the future.

Besides, fight against drought, the measures about reforestation has many advantages in order to restore and increase the soil fertility. The forest keeps crops moist, reduces evaporation. Presence of great green zones decreases air temperature, and this creates condition for water circulation.

An area of the forests in Azerbaijan diminished 3 times in the last 100 years. This decreases 20 percents of the local water resource in the country. Beginning from 1930 years the forests were cut with different purposes, the industrial and construction needs were provided. Deforestation affects bulk of the waters running from the mountains of the Great and Little Caucasus to the Kur and a water level of the river decreased. And this is a reason for drought in the Tugay forests of the Kur valley.

Last years, as a result of long drought in Azerbaijan flow of the Kur and Araz rivers strongly decreases. Some rivers fully dried in the country. It is difficult to provide the agricultural plants with irrigation water as their water demand reaches the maximum limit in the hot months of the year (July, August). It is expedient to grow drought-resistant plants gradually, as a result of rainfalls reduction.

This process continues as a result of unplanned human economic activity and covers up to 15 % of soil area. Every year 50 000 km^2 zone is deserted under the anthropogenic influences. Deforestation, cutting of bushes, irregular grazing of the cattle and other reasons causes destruction of sod layer, formation of the shell layer on the surface. Sand hardening, construction of the protective forest stripes, application of the phytomeliorative measures, fulfillment of the crop rotation and other measures are available in order to prevent this process [1].

Taking into account the climatic changes, mainly drought-resistance, the specialized crop rotation system should be determined, cultivation technology possessing high adaption ability should be applied for each region of our country. Adequate amount of organic and mineral fertilizers should be applied, the soil must be correctly cultivated and necessary ameliorative measures must be fulfilled. There is a water deficit in the water balance of Azerbaijan, the average annual water discharge coefficient fluctuates within the range of 0.07-0.44. The highest runoff coefficients (0.55-0.62) are observed in the western part of the southern slope of the Greater Caucasus, in the Ganykh River basin, and the lowest (0.07-0.15) are in Gobustan, the Ajinohur Plain, Jeyranchol and the South Caucasus [5]

Since 2000, statistics show an increase in air temperature of 0.8^{0}C and little periodic precipitation. The area of mountain glaciers on the peaks of Bazardüzü, Shahdag, Bazaryurd, Tufandag and Kapicik has decreased sharply. The flow of rivers has decreased accordingly.

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In 2021 alone, the consumption of water from Kur, the main water artery of Azerbaijan, decreased from the long-term norm of 575 m^3/sec to 245 m^3/sec.

Table

SOME INFORMATION ON WATER USE IN AZERBAIJAN [5]

Показатели	*1990*	*2015*	*2021*
Water taken from natural sources	16176	12285	13743
Water per capita m^3/person	2293	1289	1372
Water consumption, (total) bln. m^3	12.477	8,567	10,526
Area of irrigated land, mln. yes	1,4228	1,4345	1,4849
Water consumption, m3/ha	6063	4222	5101

Melting of mountainous glaciers is very dangerous for Azerbaijan like all the countries of the world, the main rivers of the region are nourished with them. In the last 50-60 years, an area of the glaciers decreased approximately 30%. According to the prognosis, the glaciers can lose 50% of their bulk because of increase of 2^0C average annual temperature, but 78% of the bulk because of 4^0C heat increase. Such melting of the glaciers can be a reason for shortage, deficiency of the pure water. According to the assessments, decrease of flow in the Kur and Araz rivers from 5% to 15% is expected. A total water lack in Azerbaijan was more than 0.2 km^3 in 2020. A quantity of water insufficiency can be increased till 1.3 km^3 in 2030, but it can be 4-5 km^3 in 2050.

Due to lack of water, the situation is dire because Azerbaijan's water resource depends on neighbor countries. Therefore, Azerbaijan conducts water management relations with neighboring countries both at the multilateral and bilateral level — in the form of bilateral commissions and working groups on issues of joint use of water.

Last years, unusable condition of the farm and intra-farm irrigation network leads to deterioration of the irrigated soils state during periods of low water, which are often observed and as a result it causes them to leave the agricultural cycle. Beginning from 1990, the irrigated soils more than 5000 hectares in the country left the agricultural cycle. Besides, increase of drought in a situation of climatic change and continuation of ineffective irrigation methods application can be deteriorated taking into account the dependence of agriculture on irrigation.

An application of the new technologies based on drop method in irrigation is an important stipulation. This method is applied in Azerbaijan, but today a main irrigation method is still a non-mechanized surface irrigation method, which results in huge water loss. Our scientists see the way out of this situation in the economical use of our water resources. When the snow melts in spring, the melted waters collect in the water reservoirs and then can be used. Desalinated water of the Caspian Sea, unconventional waters, including waters of the collector-drainage network, purified sewage waters, waste waters of the industries and farms, the underground waters located in the deep layers can be used in irrigation and technical areas.

Scientific-research works are performed in the direction of use of sea and collector waters in irrigation, long use of the unconventional irrigation methods in connection with drought and water insufficiency in the "Water and Amelioration research Institute", as a result, important, rich scientific and practical materials, scientifically grounded measures are worked out.

Since the first years of the new century, an interest in rational use and protection of waters increased and this tendency has become stronger last years. Process of the integrated management of water resources, continuous restoration, distribution and use monitoring of water resources should be provided considering the social, economical and ecological problems.

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Regular control to the technical state of the water farm objects is fulfilled, monitoring of the water supply systems, hydro-technical devices, objects of the water and water farm, surface and subsoil water resources is performed by the state.

The new technologies should be used to prevent the water loss, rational use of drinkable water and irrigation. The irrigative water should be economized, the irrigative canals must be renewed. The concrete canals should be preferred. Modern irrigation methods should be used so that water is lost less. The exact norms in irrigation must be followed. Consistent supply of water for irrigation should be ensured.

Last times, constant measures, meetings in connection with the 29th session of the (COP 29) Conference of the Parties to the Framework Convention on Climatic Change of UN is being held in Baku. Our main priority is to perform basic, flexible and sustainable activities in the direction of emissions decrease, in order to keep temperature increase lower than 1.5^{0}C and global warming in control, to bring all parties together under this initiative. Therefore, the countries of the world should take joint steps, cooperate and mobilize all their forces to solve the problem.

Azerbaijan is determined to become one of the leading countries in the field of renewable energy and uses its rich wind and solar potential for this purpose. This is an important component part of 40% decrease plan of the greenhouse gas emission The country diversifies an available energy system in order to be a leader in the 30% till 2030. Azerbaijan is an exemplary country in this area, it will renew its national targets within the contributions document determined in the next National Standard according to 1.5^{0}C target.

References:

1. Babaev, A. Kh. (2011). Monitoring i ekologicheskii kontrol' kachestva pochvy. Baku, (in Russian).

2. Gashimov, A. S., Osmanov, T. A., & Mamedov, I. M. (2004). Integrirovannoe upravlenie vodnymi resursami. In Printsipy netraditsionnogo ispol'zovaniya vod v oroshenii, Baku. (in Russian).

3. Gashimov, A. S., & Khasaev, G. A. (2022). Natsional'nyi plan razvitiya vodnogo khozyaistva v Azerbaidzhanskoi Respublike. In Sbornik nauchnykh trudov, Baku, 6-31. (in Russian).

4. Tamrazov, T. Kh. (2023). Diversifikatsiya rastenii – effektivnaya strategiya zashchity kachestva posevnoi pochvy. In *Vsemirnyi den' pochv: pochvennyi faktor v ustoichivom sel'skom khozyaistve: Materialy Respublikanskoi nauchno-prakticheskoi konferentsii, Gyandzha*, 141-147. (in Russian).

5. Rzaev, M. A. (2024). Mery po ratsional'nomu ispol'zovaniyu vodnykh resursov v zonakh orosheniya Azerbaidzhana v usloviyakh izmeneniya klimata. *Melioratsiya*, (4), 68-72. (in Russian).

Список литературы:

1. Бабаев А. Х. Мониторинг и экологический контроль качества почвы. Баку, 2011. 263 с.

2. Гашимов А. С., Османов Т. А., Мамедов И. М. Интегрированное управление водными ресурсами // Принципы нетрадиционного использования вод в орошении. Баку, 2004.

3. Гашимов А. С., Хасаев Г. А. Национальный план развития водного хозяйства в Азербайджанской Республике // Сборник научных трудов. Баку, 2022. С. 6-31.

4. Тамразов Т. Х. Диверсификация растений – эффективная стратегия защиты качества посевной почвы // Всемирный день почв: почвенный фактор в устойчивом сельском

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хозяйстве: Материалы Республиканской научно-практической конференции. Гянджа, 2023. С. 141-147.

5. Рзаев М. А. Меры по рациональному использованию водных ресурсов в зонах орошения Азербайджана в условиях изменения климата // Мелиорация. 2024. №4. С. 68-72.

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