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ASSESSMENT OF CLIMATE MODIFICATION TRENDS IN JIZAKH REGION BASED ON KEY LANDSCAPE INDICATORS

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Today, global climate change is having a significant impact on all regions of the world. It is causing an increase in air temperature, changes in the territorial and seasonal distribution of precipitation, the recurrence of drought events, and extreme weather events. Such global climate change is especially evident in areas of arid regions. Jizzakh region is also suitable as such an area.

Jizzakh region, located in the central part of Uzbekistan, is distinguished by its complex natural and geographical conditions, the combination of plains and foothills, arid continental climate, and the diversity of natural resources. In recent years, climate changes observed in the region have led to certain modifications in the state of soil cover, vegetation, water resources and other landscape components. In recent years, climate changes observed in the region have led to certain modifications in the state of soil cover, vegetation, water resources and other landscape components. Timely identification and assessment of such processes is of great importance in ensuring the ecological stability of the region, rational use of natural resources and development of effective measures for environmental protection. Landscapes are complex geosystems of the natural environment, the state and development characteristics of which are assessed using various indicators. In particular, vegetation cover, soil moisture, the state of surface and groundwater, bioproductivity, the degree of anthropogenic change in landscapes, and meteorological indicators serve as important indicators in determining climate change. These indicators make it possible to assess climatic modifications in the region, identify their dynamics and regional differences.

Climate change is not uniform globally, especially in the arid region under study, the impact of climate change on the Jizzakh region over the past 40 years was analyzed using the following tables and figures. The sources are the Jizzakh regional hydrometeorological department, meteoblue.com ERA5, ECMWF fifth-generation atmospheric reanalysis of global climate, covering a spatial interval of 30 km from 1979 to 2023 (Table 1, Figures 1, 2, 3).

Based on the indicators in the table (1) above, the impact of winter and summer temperatures and precipitation on the landscapes of the Jizzakh region within the influence of the inland waters of the region in the period from 1979 to 2023 was analyzed and presented as follows. The dotted blue line indicates the linear trend of climate change, blue indicates cold temperatures, and red indicates hot temperatures. The graph below shows the impact of climate change on the average annual air temperature for the Jizzakh region (Figure 1).

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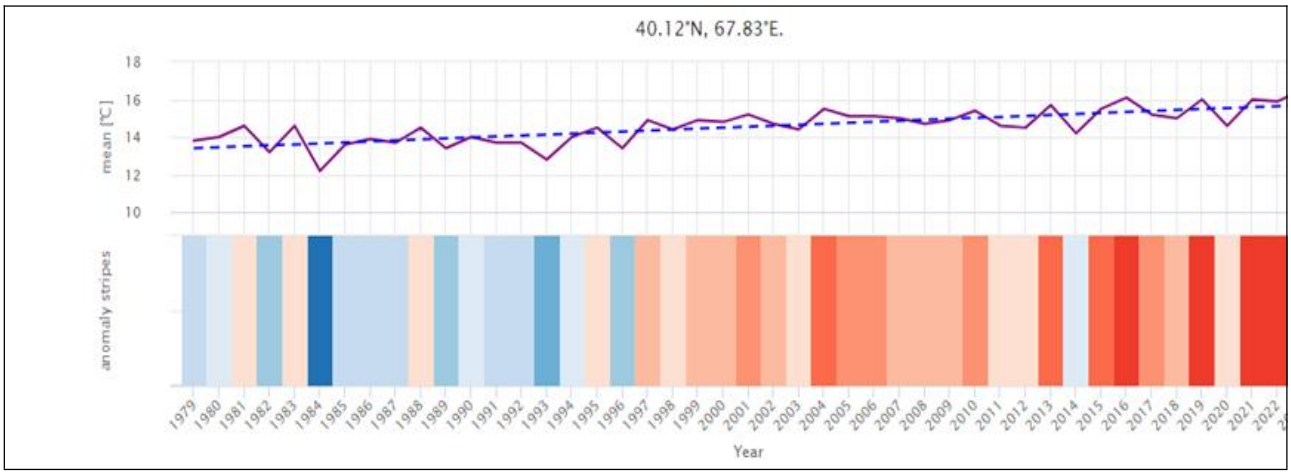


Figure 1. Temperature changes in Jizzakh region from 1979 to 2023

The amount of precipitation in the region has also decreased in line with temperature. The dotted blue line is the linear trend of climate change, blue is cold, red is hot (Figure 2).

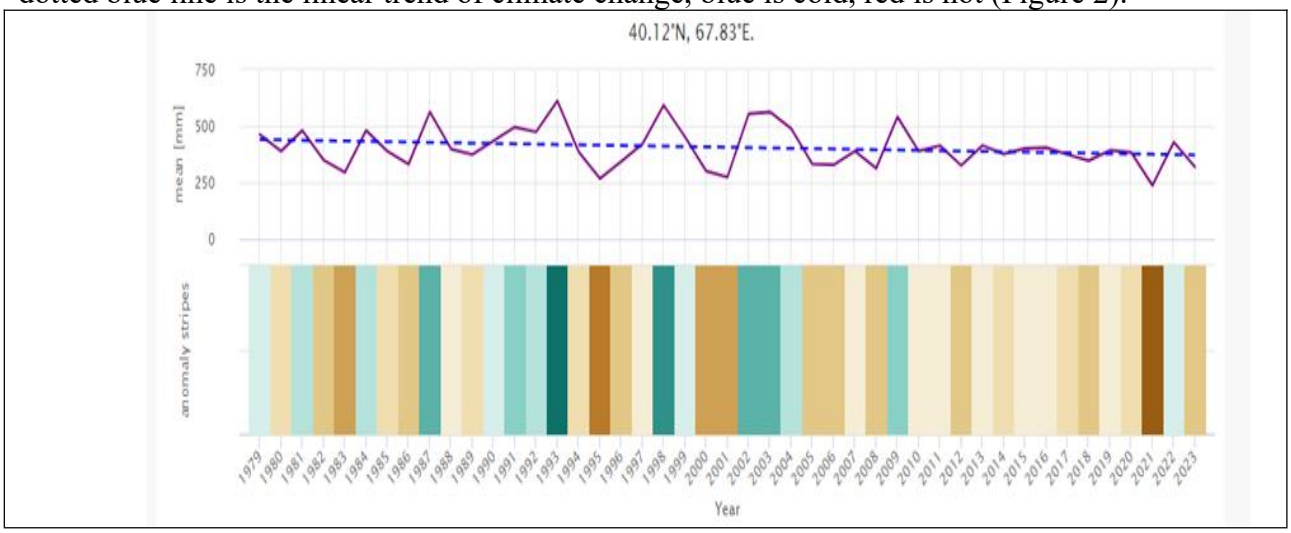


Figure 2. Changes in precipitation in Jizzakh region from 1979 to 2023

This graph shows the average total precipitation for Jizzakh region. If the linear trend line of climate change rises from left to right, the precipitation trend is positive and the humidity increases, if the line is horizontal, then there is no clear trend, and if it falls down, it becomes drier over time. Based on the analysis, it is observed that the air temperature of the region decreased from 1979 to 2023, both in terms of temperature and precipitation, which in turn led to changes in natural water bodies and a decrease in the productivity of landscapes.

The conducted studies show that the climate change taking place in the world has also had an impact on the Jizzakh region. Especially since the region is located in an arid region, the desertification process is accelerating. If we observe it through the inland waters of the region and the landscapes within their sphere of influence, a decrease in water and an increase in salinity are observed in the Aydar-Arnasay Lake System (AAKS) in the region. As a result, the biodiversity of the lake and its surroundings is decreasing. The number of morphological units of the landscapes during the period of increased water in the lake is significantly different from the current one. This can be seen in particular in the fact that landscape dynamics have become much closer to the water, flora and fauna have decreased, and in the AAKT, salinity has increased from 5.0 g/l to 8.1 g/l between 1985 and 2023, and the temperature on the lake surface has increased from 13.4oC to 15.8oC (Figure 3).

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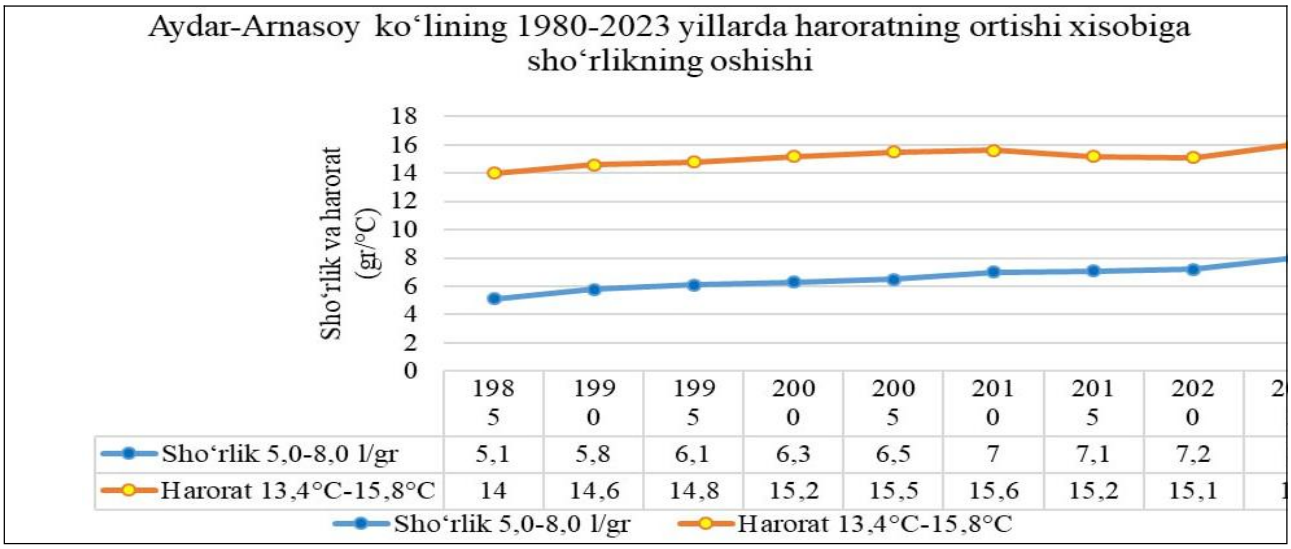


Figure 3. Temperature rise and salinity increase in the AAC from 1980 to 2023.

In addition, the influence of the Kyzylkum desert in the northern part of the lake is increasing, saxaul forests are being replaced by shrubs, and shrubs are being replaced by herbaceous ephemeral and ephemeroid bottom simple plants. This influence is also occurring in other hydrographic objects of the region. In particular, in the middle and lower reaches of the Sangzor River, i.e. the banks after it is named Qli, in the lower reaches of the Zaminsuv River, in the northern part of the Jizzakh and Qarovultep reservoirs, and in the lower reaches of the South Mirzachul Canal, it can be seen that the influence of anthropogenic factors, along with the impoverishment of landscapes, is having a stronger impact. Such climate change conditions lead to a decrease in water resources in the region, which further accelerates desertification and drought. When we observed the last forty years of natural and hydraulic water bodies in the region, we witnessed a decrease in them in line with climate change. By comparing the trends in the main indicators of global climate change - air temperature, evaporation and atmospheric precipitation - in the landscapes of the Jizzakh region, the dynamics (paradigms) of landscape changes were identified (Figure 8).

As a result, it can be observed that the following landscape changes have occurred in the territory of the Jizzakh region between 1979 and 2000 and 2023 (Figure 2). It was observed that these changes, along with their impact on the surrounding natural landscapes, had a negative impact on the depletion of the soil, flora and fauna of the region. These conditions are especially evident in the Sangzor River, the AAC. The northern part of the region is surrounded by plains, Kyzylkum and Mirzachul, hot and dry landscapes. The scale of these natural geographical areas has recently changed, affecting mountainous areas and water landscapes. In particular, the salinity of the AAC, the number and species of fish are decreasing, and the facies changes in the landscape were clearly visible ten years ago, but now this change has become more pronounced.

Based on the above results, the dynamics of landscape changes in the Jizzakh region from 1985 to 2020 were developed. In particular, the study shows that the change in hydrographic objects (AAKT, reservoirs), in particular the 3-2-1 terraces of rivers, is becoming poorer towards water, which is further accelerated by the impact of the above-mentioned 44-year climate change and anthropogenic load (Figure 6).

The following assessment criteria have been developed from the perspective of assessing the landscape and ecological conditions of the Jizzakh region. In particular:

Unfavorable level - areas that are geoecologically, unfavorable for development for agriculture and recreation (high mountains and medium-high mountains, rocky and gently sloping watersheds), have almost no agricultural and recreational resources. Therefore, their use for other economic purposes is also very limited.

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Less favorable level – geoecologically, although somewhat limited for development for agricultural and recreational purposes: construction of guest houses, use for hunting and fishing on the slopes and in the valleys of the Sangzor River; development of water tourism, fishing in the vicinity of the Korovultepa reservoir, Tuyatartar canal; there are opportunities for the construction of health resorts in places with sources of mineral and healing groundwater.

More favorable level – consists of moderately favorable landscapes for development for agricultural and recreational activities, mainly in the upper parts of small stream valleys on the slopes of mountain ranges and in the valleys of the intermountain basins crossed by small streams.

Favorable level – includes landscapes covered with forest massifs, located far from water sources, on the banks of small streams on the slopes of mountain ranges, which are favorable for development for agricultural and recreational purposes. In these regions, there are fewer conditions for developing several types of economy and recreation in one place. The area unit in relation to the number of agriculture and recreation is also lower than in regions of a very favorable level.

A very favorable level includes the most favorable landscapes in the region for development for geoecological, agricultural and recreational purposes. This includes the coastal areas of larger streams, the adjacent parts of the mountain slopes. The abundance of forests, meadows, rivers and streams in these regions creates convenience for the placement of all types of health resorts and recreation facilities.

It should be noted that the issue of preserving and protecting natural-anthropogenic landscapes and the interrelationships between their elements, not only in the valleys, but also in all regions of the region, is associated with limited extensive use. No matter how much the landscapes of the region are changed by man, they develop according to natural-anthropogenic laws. Therefore, their use requires the development and application of measures to comply with and improve natural geographical laws.

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