

IMPACT OF DESERTIFICATION ON SOME GEOSYSTEMS OF UZBEKISTAN

Anvar Rasulov,

Associate Professor of the Department of Geography of Tashkent State Pedagogical University, PhD.

Annotation. *This article discusses the impact of desertification on the geosystem of lower Zarafshan natural geographical okru, located in the extreme southwest of the Republic of Uzbekistan, the development of desertification, the analysis of the main natural and anthropogenic factors that cause desertification.*

Keywords: *geosystem, natural conditions, natural factors, desertification, natural, anthropogenic, County, landscape.*

The desertification processes currently occurring globally are also widely represented in the region of Central Asia with a sharply continental climate. The island's marine basin, which is particularly adjacent to the Qizilqum and Karakum deserts, has been declared an ecological disaster zone. Therefore, the processes of desertification given are studied by scientists of the Department of geography at the Institute of Seismology of the Academy of Sciences of Uzbekistan, the Institute of geography of the Academy of Sciences of Kazakhstan. Current geocological problems of such international importance are A.G. Boboev (1986, 1990, 2000), A.P. Petrov (1972), I.S. Zonn (1981, 1984), A.A. Rafikov (1988), V.M. Chupahin (1990), A.V. Chigarkin (1977), A.A. Abdulkosimov, S.B. Abbosov (1977, 2004), L.A. Alibekov (2000), C. Black, K.N. Scientific research by toderich (2000) and others: featured in monographs and scientific papers.

The lower Zarashan natural District is under the influence of two groups of factors, the processes of change, development and desertification of all Geosystems, as well as the acute geocological situations that have arisen. These are a group of natural and anthropogenic factors that, integrally, affect all geosisms.

Within the framework of Arid geochemical complexes, including the lower Zarafshan River, plant depletion causes in a word, are involved in the formation, development of desertification processes and a number of natural factors. These are factors such as: geological, climate, hydrogen, soil erosion, salinity and waterlogging of soils, zoogen.

Geological factors. One of the natural factors that give rise to the processes of reduction (desertification) of vegetation (degradation) is geological factors. These factors determine the specific geostructure, tectonics of each place, the lithological and mechanical composition of the beds, their characteristics, the reclamation status of geosisms. The composition, geotectonic and structural features of the mother genera, which served as the basis for the formation of geosisms, provide opportunities for desertification of all types with their ability to predispose to various natural geographical processes. For example, desert geosisms with sand beds deflate due to processes and turn into migratory sands and barks, dry-climate berk bottom geosisms under the influence of geochemical processes, various salts accumulate and form salt marshes, water erosion in the beds of loess and chalk is activated, forming ravines and disturbed lands. Thus, desertification processes in arid geosisms are formed and developed on a large scale.

In lower Zarafshan, the desertification process of geosisms is also closely related to geotectonic structures. Here, geotectonic structures are mainly made up of outcrops and dips. The absolute height of tectonic uplifts reaches 600-800 m, in some places it exceeds even 900 m. Such tectonic uplifts are the main space for erosion-denudation processes. The slopes of tectonic uplifts are degraded due to erosion and denudation processes, the soil cover is washed away, the amount of humus in it is reduced, the plant cover is thinned, etc. As a result, the productivity of arid climate mountain geotectonism decreases, and desertification processes increase as the productivity of desert pastures decreases.

Tectonic bottoms, on the other hand, are dominated by the second kind of natural geographical processes, namely salinity and waterlogging processes with the process of accumulation. For example, the Karakol delta of the Zarafshan River was formed due to the

process of accumulation in a tectonic trough. The accumulative deposits here are distributed in close connection with the tectonic structure. The thick sands of the Karakol delta of Zarafshan are concentrated precisely in tectonic bottoms. The large accumulation of salts also corresponds to this Delta zone. Therefore, the process of salinization in all Geosystems of the lower Zarafshan Delta and their soil cover, along with salinization in places where the ground waters lie close to the surface of the Earth, has prevailed. Such phenomena, developing year after year, activate desertification processes in lower Zarafshan County, creating a sharp geocological situation.

Climatic factors. In the process of desertification of arid geosystems, climatic factors play a leading role in the process of frequent droughts. The most recent droughts in our country, including in this district, occurred in 1999, 2000 and 2001, 2007, 2008. As a result, the aridity of the climate increased, the amount of annual precipitation decreased sharply, the water flow of rivers and streams during the growing season decreased to a minimum, and agricultural crops faced a water shortage. As a result, farms suffered significant material and economic losses.

The high total solar radiation (140-150 kcal/cm²), the annual radiation balance (2200-2400 MJ/m²), the high air temperature (46-48° C), the low atmospheric precipitation (80-100 mm), the extreme scarcity of moisture, the high amount of possible evaporation (1200-1500 mm) and other climatic elements create climatic conditions characteristic of arid regions. The combined expression of these in nature is manifested in the periodic occurrence of droughts.

The desertification process of the geocomplexes of the Lower Zarafshan district was also greatly influenced by changes in climatic conditions in previous geological periods. M.I. Budiko's (1974, 1977) paleoclimate, K.K. As a result of paleogeographic studies by Markov et al. (1965), it was found that in the Eocene, forest and forest-steppe geosystems dominated the entire territory of Central Asia and Lower Zarafshan. Desertification of these geosystems occurred in the Middle Oligocene as a result of a sharp cooling and continentalization of the climate. This process was especially intensified by the Pliocene. By the Quaternary period, the aridification of the climate intensified even more, and desert geosystems began to emerge. Thus, the desertification process intensified in the Lower Zarafshan district, and the area of desert geosystems expanded. N.S. Orlovsky (1981) noted that after the continental glaciation, a single climate change occurred. This was a period of climatic warming that lasted about 2 thousand years, 7-5 thousand years ago. At that time, the climatic conditions in the northwestern part of India and Pakistan and in the south of Central Asia were somewhat drier. This process coincides with the end of the Oligocene. Approximately 10,300 years ago, a humid phase began due to an increase in precipitation. However, 3,800 years ago, the dry period resumed and continues to this day with minor changes.

Hydrogenic factors. Another group of factors that trigger the natural (impoverishment) mechanism of desertification of arid (dry) geosystems are hydrogenic factors. Hydrogenic factors include the nature of surface runoff or runoff, the location of groundwater levels close to or deep in the earth's surface, and the process of their mineralization. The reasons for the extremely low atmospheric precipitation in arid regions are also very low quantitative indicators of surface runoff. In some areas of the Lower Zarafshan, especially in impermeable lowlands, the close proximity of mineralized groundwater to the surface leads to strong evaporation in the scorching summer heat, the accumulation of large amounts of salts in the soil, and the development of saline soils. Such hydrogenic factors activate desertification processes, leading to the proliferation and expansion of saline desert geosystems.

One of the factors determining the specific characteristics of soils in the alluvial-delta plains of the district is the softness, porosity, and fragility of their upper layer, which also has a significant impact on the development of desertification processes. This type of desertification processes is most clearly visible in the northwestern and southwestern parts of the district, namely in the delta of the Zarafshan River. This also allows the area of saline desert geosystems to increase from year to year.

Vegetation factor. In regions with arid geosystems, the development of desertification processes on a large scale and the destruction of geosystems are directly related to phytogenic factors. Desertification processes occur due to the sparseness of the vegetation cover characteristic of arid geosystems. Just as the geosystems of Lower Zarafshan are diverse, the thickness of the vegetation forming the landscape is also diverse. For example, the level of vegetation coverage of fortified hilly and sandy landscapes with dunes is 50-70%, and that of moderately fortified sandy landscapes is 30-50%. The level of vegetation coverage of the stony desert, saline desert and barren desert geosystems widespread in the region does not exceed 10-15%.

It is worth noting that the thicker the vegetation that forms the landscape in arid geosystems, the less the impact of wild and domestic animals on the vegetation cover, and vice versa, the rarer the vegetation that forms the landscape, the stronger the impact of animals. Thus, in the first case, the phytogenic degradation and desertification of arid geosystems are stronger.

Animal factor. The desert fauna has formed in the district, the main part of which is made up of burrowing species. Among them, rodents that lead an active life occupy a special place. Burrowing rodents, especially voles, loosen the soil, remove soft soil dug around their burrows, destroy the soil structure and, at the same time, accelerate erosion processes.

The occasional migration of locusts also contributes to the desertification process of the arid geosystems of Lower Zarafshan. The locust column cleans the biomass of the natural and anthropogenic complexes it encounters during its migration, turning them into bare land.

Anthropogenic factors. All types of human activities that affect desertification processes can be combined or divided into several groups. These are economic, social, military and legal factors.

Economic factors. The group that has the strongest impact on the desertification of the region among anthropogenic factors is economic factors. Inappropriate use of geosystems, failure to comply with agrotechnical rules in the development of deserts, and disregard for the integrity of geosystems and their inter-component relationships create conditions for the disruption of the ecological balance and the emergence of various geocological situations.

Desertification of geosystems as a result of livestock grazing. Lower Zarashon and neighboring Kyzylkum natural districts are among the most developed areas of livestock and pasture farming in our Republic. Here, continuous grazing of livestock, especially large numbers of Karakul sheep, throughout the year leads to the current state of desert geosystems, their productivity, and a gradual decrease in plant species. Therefore, excessive grazing of livestock in certain places within arid geosystems is one of the leading factors enhancing anthropogenic desertification processes.

According to geobotanists (Gael, 1951; Morozov, 1964), the effect of livestock on the vegetation cover of pastures and the productivity of their biomass can be both positive and negative. This means that in deserts with a continental climate, strong wind activity, and a low level of stability of sparse vegetation cover, excessive grazing of livestock leads to the degradation of desert pastures and an increase in the area of desertified geosystems [4].

The poor water supply of pastures and the very sparse network of wells further complicate the desertification process. In areas within a radius of 2-3 km from the wells, the native plants of the deserts are changing significantly due to excessive grazing of livestock and their constant movement from the surrounding areas to wetlands, and in areas within 0.5-0.7 km of the wells, the humus layer of the soil is completely lost. As a result, the number of plant species in phytocenoses has decreased by 2-4 times. Among them, there are also endangered and rare plant species [5]. The ongoing desertification processes are leading to a disruption of the balance of biological diversity in Lower Zarafshan and a sharp decrease in biomass in pastures.

Thus, currently, most researchers support the idea that as a result of uncontrolled grazing of livestock in the sandy and kumquat desert geosystems of Lower Zarafshan, sandy geosystems have been severely degraded, and shifting sands and dunes have formed in their place.

According to O.I. Morozova (1959), excessive grazing of livestock in sandy deserts leads to negative changes - the movement of consolidated sands, changes in relief forms, depletion of vegetation cover and its species, lowering of the groundwater level, and a sharp decrease in the amount of biomass.

As is known, the composition of desert plants is dominated by wormwood, sedge, sedge, and ephemerals adapted to arid climatic conditions. If desert pastures are used for their intended purpose, and livestock is grazed on them moderately, the density of plants will almost not be reduced, and shifting sands and dunes will not form.

A.M. Boboev (1989), analyzing the interaction and connection between oases and the desert areas surrounding them, recognized that several concentric circles of influence can form around each oasis. The width of the concentric circles depends on the size of the oases, the number of people living in them, the level of provision with production technology, and other factors. The influence zone of oases located among sandy desert geosystems is determined by the degree of sharp changes in geosystems. Examples of such changes include the degradation of geosystems of various taxonomic colors, the appearance of dunes, the rise in the groundwater level in some places, and the salinization of soils.[1].

V.A. Nikolaev (1972), based on the analysis of numerous sources, proposes to implement the following norms for the radius of grazing of livestock in pastures. Such indicators should not exceed 2.5 km in mountain pastures, 5 km in mountain zones, and 7 km in the Kyzylkum desert, Lower Zarafshan, and southwestern Turkmenistan [2].

Social factors. Social factors also play an important role in the intensification of desertification processes within the arid geozones of Lower Zarafshan. Especially in desert conditions, the lack of centralized fuel supply of the local population forces them to collect firewood from the surrounding desert areas and use it in everyday life. In the conditions of this district, firewood is mainly prepared from trees, shrubs, and semi-shrubs. That is why in large areas around populated areas and oases, tree-like and shrubby plants such as white and black saxauls, kandim, Circassian, and sand acacias have become very rare.

The ruthless cutting down of xerophytic trees, shrubs, and semi-shrubs, which in desert conditions protect the fragile soil cover and the stable development of consolidated sand massifs, and perform the functions of retaining natural moisture for a longer period during the growing season, creates favorable conditions for the dynamic development of deflation and further aridification of the climate of the regions. As a result, the number of valuable and medicinal plant species in the flora is decreasing, and biological diversity is gradually becoming poorer. As a result, the increasingly active desertification processes cause great damage to the diversity of desert vegetation and the sustainable development of geosystems, creating complex and acute regional geoecological situations.

The desertification process of arid geosystems is also greatly influenced by the unorganized and disorderly recreational activities of society. The removal of wildflowers that beautify the desert landscape during the spring holidays of urban and district residents in the deserts also has a negative impact on biological diversity and accelerates the desertification process.

The sharp decrease in species in the fauna and flora of Lower Zarafshan is even leading to the disappearance of some rare and valuable plant and animal species.

Military factors. Another factor influencing the anthropogenic desertification of geosystems in Lower Zarafshan district is military factors. Among the active forces of the Republic of Uzbekistan, the main place is occupied by the ground forces. They are armed with modern military equipment and conduct their military exercises in the desert zone. During military exercises, numerous tracked, heavy trucks and thousands of soldiers cover hundreds of kilometers across the sandy desert.

The combat actions of the ground forces during exercises and training, the digging of trenches stretching over long distances, and the occasional testing of various weapons contribute

to the development of technogenic, wind and water erosion of the weak, unstable soil and vegetation cover of geosystems. As a result, the cover of psammophytes and halophytes becomes sparse. The area of technogenic geosystems expands, the biological diversity of deserts decreases, and geocological situations become more acute.

Legal factors. One of the factors that fully cover the processes of anthropogenic desertification and call for a full understanding of its essence is legal or legal factors. The more the legal aspects of the use of nature in desert conditions are protected, thoroughly developed and strictly implemented in life, the more likely it is to prevent and slow down the desertification process [3]. Therefore, to achieve this, documents, decisions and laws on the rational use of land, water, subsoil resources, protection of flora and fauna, environmental protection and other geocological areas must be comprehensive and meet the requirements of any problems. At the same time, the flawless implementation of all adopted documents, decisions and legal laws in practice can undoubtedly lead to a slowdown in the process of anthropogenic desertification and a gradual reduction in the area of anthropogenic deserts. Otherwise, if the decisions made and the laws developed are ineffective and their implementation is not controlled, the process of anthropogenic desertification will develop more widely not only in Lower Zarafshan, but also in other regions of our Republic, creating acute geocological situations.

In the current era of scientific and technological development and the constant growth of the population of our country and the world, not only natural factors, but also anthropogenic factors have a great impact on the development of desertification processes in the Lower Zarafshan natural geographical district. Our geocological studies have revealed that the influence of anthropogenic factors is stronger than natural factors in the desertification process of arid geosystems in the Lower Zarafshan district, and the consequences of this are manifested in various forms.

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