

SOME ASPECTS OF ECONOMIC AND SOCIAL GEOGRAPHICAL ASSESSMENT OF NATURAL LANDSCAPES (IN THE EXAMPLE OF FERGANA REGION).

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Annotation: Today, natural landscapes are losing their features as a result of anthropogenic impact. Scientific use of natural elements is the basis for achieving environmentally friendly and cost-effective results. The main objective of this work is to study the territorial aspects of natural landscape use. The data on the need to take into account natural, economic and socio-geographical factors when studying land resources are analyzed. Particular attention is paid to the efficient and environmentally friendly use of resources. The study used territorial, landscape extrapolation, comparative and cartographic methods. Natural landscapes are divided into regions according to altitudinal zones. Natural and geographical features of the territories of each region are studied and, based on them, types of agricultural use are recommended. Accordingly, the territory of the Fergana region is divided into four high-altitude regions. In particular, the territories of the first region, located at an altitude of 350-400 meters, have unique geoecological and landscape indicators. The second region, occupying the central part of the plateau, has a relief with an altitude of 400-600 meters above sea level. The scientific work provides recommendations on taking into account the territorial characteristics of each region in nature management. It is important to assess the current geoecological situation in the region and attach importance to geoecological approaches in agriculture.

[Mo'minov Doniyor G'ulomovich. **SOME ASPECTS OF ECONOMIC AND SOCIAL GEOGRAPHICAL ASSESSMENT OF NATURAL LANDSCAPES (IN THE EXAMPLE OF FERGANA REGION)**. *N Y Sci J* 2026;19(9):4-8]. ISSN 1554-0200 (print); ISSN 2375-723X (online). <http://www.sciencepub.net/newyork>. 02. Doi: [10.7537/marsnys190926.02](https://doi.org/10.7537/marsnys190926.02)

Key words: nature; ecology; natural resources; land resources; geoecology; geoecology; natural component; economy

INTRODUCTION

The geoecological and economic conditions of any geographical region are determined by its orographic position, the natural geographical environment formed in connection with it, and the extent of anthropogenic impacts. Therefore, in assessing the geoecological and economic status of a territory, special attention should be given to the dynamic interactions within the "nature–economy–population" system and the consequences arising from these interactions (Yu. Ahmadaliyev, 2007, p. 334).

In the case of the Fergana region, land and water resources constitute the primary natural assets influencing rural land use. Over the past 30 years, the total area of cultivated land in the region, including household plots, has declined from 304.4 thousand hectares in 1990 to 219.7 thousand hectares in 2024. An analysis of irrigated soil quality indicators shows that soil fertility remains low. Specifically, the bonitet score of irrigated lands, which stood at 66 in 1990 and 56 in 2010, has remained unchanged in 2024.

Although Fergana region is located in an upper zone with relatively favorable water availability, good natural drainage, and low water mineralization, both regional and local groundwater contamination have reached alarming

levels. In the “Tashlak,” “Bagdad,” and “Yarmazar” areas, the pollution and mineralization of groundwater sources significantly exceed acceptable limits.

Since independence, the population of the region has grown from 2,226 thousand in 1990 to 4,123 thousand as of October 1, 2024. During this period, the rural population increased from 1,531 thousand to 2,321 thousand. As a result, the average population density in rural areas has surpassed 400 people per square kilometer. These imbalances within the “nature–population–economy” geosystem have also exerted considerable influence on the ecological and economic conditions of rural areas in the region.

THE NECESSITY OF A LANDSCAPE APPROACH IN ADDRESSING ECOLOGICAL–ECONOMIC PROBLEMS

The necessity of applying a landscape-based approach in solving ecological and economic problems arising during the use of natural resources has become increasingly evident today (Mikhaylov, 2007). From this perspective, the study of the geoecological and economic conditions of rural areas in the Fergana region requires the classification of the territory into landscape types, as well as the development of recommendations based on the geomorphological and hydrogeological characteristics of the area.

Within the scope of this objective, the following tasks were identified as appropriate for the selected study area:

- identifying and delineating landscape types;
- determining the resilience of natural landscape components to anthropogenic impacts;
- developing methods for the integrated assessment of the region’s natural agrarian potential;
- identifying factors that complicate the ecological situation;
- preparing recommendations for the rational use of landscapes based on their specific characteristics.

LITERATURE REVIEW AND METHODOLOGY

In accordance with changes in hydrogeological and hypsometric conditions across different altitudinal zones, and based on economic-geographical and ecological considerations, four altitudinal zones were identified in the Fergana region.

According to Alibekov (1992), the classification of landscape types within each altitudinal zone can be carried out by describing their specific characteristics.

In Fergana region, landscape types vary from north to south in line with altitudinal zonation. Furthermore, using additional natural geographical indicators—such as relief, soil type, and geoecological conditions—the territory was subdivided into ten distinct landscape types. These natural regional complexes play a decisive role in shaping the current geoecological situation (Mo‘minov, 2012, 2024).

However, direct use of these natural regional units in geoecological or economic–geographical research is not feasible, because none of the administrative districts or economic units fully coincide with the natural boundaries of these zones. Therefore, it is advisable to delineate altitudinal zones whose lower boundaries correspond more closely to administrative–economic units (Djumayev, 2004).

RESULTS AND DISCUSSION

In the geographical–ecological classification of any territory by altitudinal zones, natural geographical components serve as the main basis. This can also be observed in the case of the Fergana region.

I-Altitudinal Zone. This zone includes the peripheral parts of the Quvasay, Margilan–Isfayramsay, Altariq, Isfara, and Sox alluvial–proluvial fans, as well as the depressions between the Kuva, Sox–Isfayram, and Sox–Isfara cones and their weakly terraced floodplains. These areas are characterized by specific geographical and ecological features at elevations of 350–400 meters (Figure 1).

The main factor negatively affecting soil conditions and land use in this zone is the hydrogeological situation. Groundwater flows into this zone from higher elevations and becomes increasingly mineralized. As a result, three types of saline soils are widespread: meadow solonchaks, marshy solonchaks, and typical solonchaks.

Anthropogenic activities have caused gradual thinning of agro-irrigation sediments in some areas, while in newly reclaimed territories such sediments have not yet formed.

This zone is considered geoecologically vulnerable and highly susceptible to human-induced changes. In particular, the expansion of irrigated lands and the development of desert areas have contributed to a rising groundwater table, leading to the degradation of irrigated soils. Additionally, sand movement, groundwater pollution, and the loss of vegetation, wildlife, and unique landscape formations pose further threats.

In this zone, the low hydrogeological and soil indicators result in a reduced natural agrarian potential, which in turn lowers the area’s resilience to external anthropogenic influences. According to Yu.Ahmadaliyev (2007), the

agro-ecological scores for Yazyavan district—one of the areas within this zone—are the lowest in the entire region: the hydrogeological score is 0.4, the geomorphological score is 7.0, the agro-climatic score is 19.8, the soil score is 9.9, and the total combined score is 37.1.

From an economic-geographical perspective, this zone has considerable development potential. Low population density and a relatively high amount of irrigated land per capita (higher than the regional average) indicate that land reclamation and agricultural development are likely to continue in the future.

II-Altitudinal Zone. This zone occupies the central parts of alluvial-proluvial fans. It includes gently sloping plains situated at elevations of 400–600 meters above sea level. Climatic indicators in this zone are similar to those of the first zone; however, annual heat resources are slightly lower, while precipitation and moisture coefficients are comparatively higher.

Groundwater plays a significant role in shaping both natural processes and human economic activities in this zone. The groundwater table lies near the surface, and slight mineralization is observed. Due to the widespread distribution of highly fertile meadow-marsh soils, almost the entire zone has been intensively developed for agriculture. As a result, natural meadow soils have been transformed into meadow-oasis soils due to continuous irrigation. Based on humus content, these soils are classified into two types: light-colored and dark-colored. In lower-lying areas, where groundwater rises close to the surface during certain periods, marsh soils are formed. From a geographic-ecological viewpoint, this zone is the most extensively transformed. Natural landscapes have been almost completely replaced by anthropogenic ones. Soil, water, and atmospheric resources in this area show the highest levels of pollution. Flora and fauna have been almost entirely modified by human activities (O.Kuzibaeva, et.c. 2025).

High population density further intensifies anthropogenic pressure on the environment. This zone is affected by not only agricultural activities but also by industrial, transport, and technogenic impacts. The presence of major cities such as Margilan and Kokand, as well as economically developed districts like Uchkuprik, Besharik, and Altirik, clearly demonstrates this.

Despite these pressures, the natural agrarian potential and resilience to external anthropogenic factors are the highest in the region. In Bagdad district, the average soil score is 20.4, while in Uchkuprik district it reaches 24—reflecting favorable geomorphological and hydrogeological conditions. According to natural agrarian capability indicators, this zone ranks as the strongest within the entire region.

III - highland region: Occupies the upper part of the outer conical plateaus (3.1), the adriatic rocky plains (3.2), the region of the Sokh, Rishton, Altirik, Chimyan, Arsif hills (3.3), the inter-hill and adriatic (3.4) plains (Chimyan, Akbilal, Arsif). It consists of plains with an altitude of 700 meters and a wavy relief. Most of this highland region, broken by natural ravines, is rocky and gravelly.

The average annual air temperature in this altitude region is 0.5-0.8 ° higher than in Fergana and is 13.4 °. The amount of precipitation increases from west to east. Due to constant winds, the amount of precipitation in the Sokh plain is less than in other agro-climatic regions, for example, the annual rainfall in Kokand is 98 mm, while in Shorsuv it is only 53 mm. This situation may be the reason for the greater development of irrigated agriculture in western Fergana than in other parts of the valley.

Thermal resources and natural humidity coefficient in this altitude region are different from other altitude regions; annual amount of heat resources is 4280-4450, humidity coefficient is 0.14-0.16.

Rivers flow from mountain and hill gorges to the plains and are distributed into a system of large irrigation canals. In the upper part of the Sokh spread, there is the Sarigurgan hydro-unit, and in the lower part there is the Kokand hydro-unit. Altiriksoy, Faziobodsoy, Margilonsoy, and Beshalish canals flow from Shahimardon hydroelectric station.

Hydrogeologically, this elevation is characterized by a deep groundwater table (50-100 m) and a well-developed drainage system. Although the gravel layer occupies large areas, light gray soils are common in some places. The widespread distribution of gravel cover eliminates the risk of deep groundwater, soil salinization, and waterlogging. However, the use of gravel areas requires a lot of labor and money. Therefore, these areas are less commonly used for agriculture. This elevation also includes the inter-hill depressions, which begin in the village of Chimyan in the Fergana district and continue to the Karkidon reservoir in the Kuva district. The plains, the relief of which decreases to the north, consisting of proluvial and dilluvial deposits, have been cultivated since ancient times. Irrigated light gray and pasture oasis soils are widespread.

Geoecologically, this highland region is considered a relatively favorable area. However, in recent years, as a result of the development of the foothills and inter-hill depressions, groundwater levels have risen, soil salinization and waterlogging have been observed. As a result, the calculated score of hydrogeological indicators determining natural and agricultural potential is decreasing. In addition, negative phenomena such as changes in the relief and a

decrease in the flora and fauna of the steppe regions are observed. The overall natural and agricultural potential of the region's landscapes is distinguished by its high level in the Altairik and Kushtepa districts.

The lack of land for economic development, the underdevelopment of industry and construction, and the market infrastructure are creating employment problems in the region. High labor migration of the rural population is characteristic, and unskilled labor resources are concentrated in large villages.

IV-altitude zone : It includes the Kampirkak, Burgandy, and Katrangtog ranges (4.1), which are islands in the Alay and Turkestan mountain systems within the regional territory. Here, steep rocky relief forms alternate with deep valleys (4.2), (Sukh, Yordon, Shakhimardon). Agricultural land use is mainly characteristic of these valleys, while other areas are used for animal husbandry and mountain gardening.

The air temperature and amount of precipitation differ sharply from the plains in the short summer months and the abundance of precipitation. In the mountain valleys (Sukh, Shakhimardon, Yordon) 1500 merpat an altitude of 1300 m, the amount of precipitation is 350 mm 400 mm, which allows the development of arable farming. Potatoes, winter wheat, and rice are grown here in the river valleys. Mountain pastures provide great opportunities for the development of livestock farming.

This highland region is home to the Isfara, Sokh, Shakhimardonsay, and Isfairsamsay rivers, which are considered important water sources for the valley. The Sokh River originates around the Matchah Pass, where the Alai-Turkestan and Zarafshan ranges meet. This area, which is up to 3,850 meters high, is home to many glaciers, which flood in July and August, when the demand for water is greatest. Hydrogeologically, the good groundwater flow here ensures the drainage of dissolved salts (chloride, sulfate, hydrocarbonate). At the highest elevations, brownish mountain soils are common, 1400 merpat an altitude of 800 meters, dark gray, and from 400-500 meters to 600-800 meters, typical gray and light gray soils are common.

Geocologically, it is a region that performs the function of a unique reserve, maintaining the balance of the entire valley and providing water resources. The gravelly mechanical composition of these soils allows water to penetrate underground, preventing waterlogging and salinization.

The relative decrease in natural and agrarian potential indicators in this region is caused by geomorphological and agro-climatic conditions. Agro-climatic indicators in Sokh and Fergana districts, and geomorphological conditions in Kuva, Uzbekistan and Fergana districts, cause a decrease in the overall natural agrarian opportunity score. The proximity to the foothills district also caused a decrease in the level of resistance of this region to external anthropogenic influences.

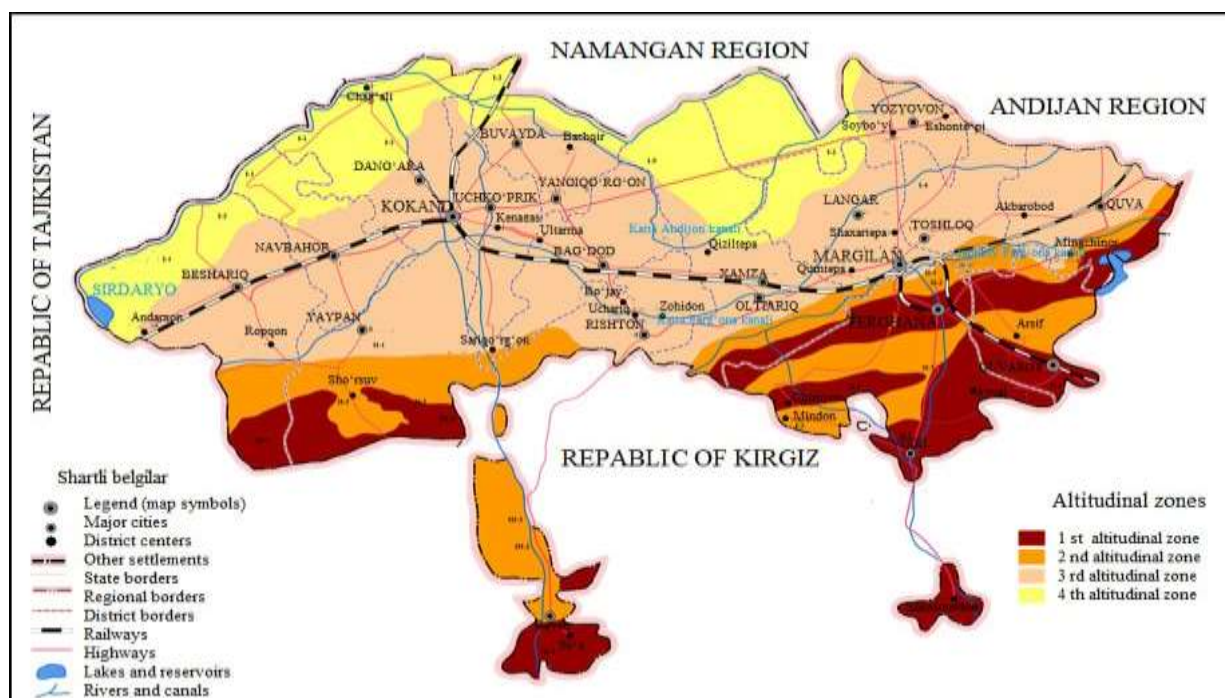


Figure 1. Altitudinal zones of Fergana region based on landscape classification

It is an economically underdeveloped region that has immense potential for the development of recreation and tourism in the future (O.Tobirov, e.tc.).

Altitude zones and landscape types distinguished by landscape indicators serve as the basis for the initial stage of research conducted to assess the geoeological and economic situation. Since these indicators determine the level of resistance of the region to external anthropogenic influences. To study the amount of external anthropogenic influence indicators, their dynamics, and use statistical data, rural districts corresponding to altitude zones are distinguished, the majority of the territory of which is located within a certain region.

From a socio-economic geographical standpoint, this is the most developed rural zone of Fergana region. However, issues such as land scarcity and rural employment challenges are also observed.

CONCLUSIONS

The landscape types of a territory and the altitudinal zones delineated on the basis of landscape indicators serve as a fundamental basis for research aimed at assessing its geographic–ecological and ecological–economic conditions, as well as for organizing the use of natural resources on a scientific basis. This is because these indicators represent the key factors that determine the territory’s resilience to external anthropogenic impacts.

Identifying rural districts whose areas largely correspond to specific altitudinal zones is advisable, as this allows for the use of appropriate statistical data when assessing external anthropogenic pressures on the territory.

Improving the system of economic land use in accordance with landscape requirements, assessing the existing geoeological and economic conditions, and identifying and mitigating potential environmental problems constitute essential tasks in the modern context.

UDK: 911.3:63

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