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The Role of Physical-Geographic Factors in the Formation of the Forests of Lankaran Natural Region

Abstract

The role of physical - geographical elements in the forestation in the Lankaran essential region has been investigated. The special climate of the region, steamy and subtropic conditions, divergent relief forms and rich plant cover have created special nativeconditions for forest flora. The attendance of a dense hydrometry system and excessive annual precipitation and along with the biology variety of forests, form the essential for their distribution across the region. Also, the medium temperature in foothill and mountainous zones and changeable soil categories play the main role in the forest formation. The article converse about the formation of the Hirkan forest area in Lankaran region as a sum of the interconnection of geographical and physical components with each other, creating the essential special native landscape with both environmental and biologic value. As a sum of, the interactivity of physical geographical elements with each other has created surroundings for the formation of forest ecological systems with spesific and high ecological value in Lankaran zone.

Keywords: *physical, geographical, climate, biodiversity, landscape, forest, hydrographic*

Introduction

Lankaran natural region is considered one of the unique natural-geographic regions of Azerbaijan, differs from other natural regions in terms of its wide biological diversity and unique forest ecosystems. Many physical-geographical factors (climate, relief, soil, water network) play a special role in the formation of Lankaran's natural conditions and forest cover. The interaction of these physical-geographical factors has created the Hyrcania forest complex, which has an ancient history and is protected and preserved in the territory of Lankaran. Hyrcania forests are not only an ecological context, but also have significant aesthetic and scientific importance.

This article, in addition to scientifically analyzing the influence of physical and geographical factors on the formation of the unique forests of the Lankaran natural region, studies the important natural factors that influence the formation of this process and explains the impact of these factors on forest biodiversity. As a result, the main goal is to reveal the unique role of physical and geographical factors in the formation and protection of the forest landscape of the region.

Research

The Talysh Mountains and the Lankaran Lowland, located at the junction of the Talysh Mountains and the Caspian Sea, are well-known orographic units of the Lankaran natural physical-geographical region. The Lankaran Lowland, with a simple relief, narrows from north to south. The main forms of the unique relief in this area are the convex plains of the river confluences and smooth sea plains, as well as shallow depressions characteristic of some places. The mountainous part of Talysh is separated by three parallel ranges, the most important of which is the Talysh watershed range (Gomurkoy 2493 m, Gizyurd 2433 m, Shandangalasy 1816 m).

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The Talysh watershed range extends for 80 km from the Astarachay range in the south to the upper reaches of the Vilashchay in the northwest. The Diabar and Gosmalyan depressions of tectonic origin are located in the watershed zone of the Talysh Mountains. In the northwest of the watershed zone, the Peshtesar ridge parallel to it extends, which in many places, except for erosional valleys corresponding to the structure, merges with the Talysh Mountains and surrounding transverse ridges and is not so noticeable from an orographic point of view. These two ridges pass into the Bogrovdagh ridge in South Azerbaijan and extend to the Manjil gorge of the Giziluzan River. The third low mountainous ridge in the Talysh mountainous zone is the Burovar ridge with a length of 914 m (Burovar -914 m, Dizdoni 1056 m). The Burovar ridge intersects with the Vilashchay and Lankaranchay antecedent valleys. The Yardimli and Lerik depressions are located in the bosom of the Talysh Mountains. The wide eastern slopes are covered with numerous deep river valleys, while the western slopes facing the Ardabil depression of the Talysh range are short and slightly sloping, and are mainly dissected by erosional forms of temporary running waters. In the Lankaran natural province, the highland vegetation (flora) zonation begins with plain forests. In other mountainous provinces, this zonation begins with the desert-semi-desert and dry steppe vegetation zones of the plains and foothills. The development of vegetation cover mainly in the inner mountain depressions, in the Lankaran province, in accordance with the vegetation type of arid provinces in the highlands, is related to the interaction of the continental climate of the Iranian plateau.

Despite a number of valuable studies on vegetation, in the mid-40s of the XX century, the territory of Azerbaijan was still not covered by almost accurate geological and botanical studies. Until these years, punctual geobotanical mapping (scale 1: 25000, 1:100000) was carried out only in the south-east of Shirvan, in the central and south-western parts of the Mughan plain, in the Mil-Lankaran plain and in the Lankaranchay watershed. In more than 60% of the territory of Azerbaijan, the vegetation layer was studied only along the relevant routes. In this regard, in the 40s-50s and recently, a number of significant errors were discovered in the schematization of the vegetation of Azerbaijan by individual authors, as well as in the medium-small-scale vegetation maps. However, despite all these shortcomings, both during these years and in subsequent years, many useful research works on the flora of our Republic were produced.

The regional forests of Lankaran differ somewhat in plant species and forest forms compared to the forests of other mountainous zones of the Republic of Azerbaijan. These different features depend on the history of the formation and development of vegetation in the territory of Lankaran province, specifically on the fact that the region has more precipitation than other mountainous regions of our country, and on other factors. The territory of Lankaran is generally included in the ancient Hyrcanian province. Hyrcanian province itself, in comparison with the eastern part of the Caucasus and other regions, has preserved more relics of the 3rd period, creating the basis for the formation of semi-humid subtropical forests in the plains, foothills, and low-mountain areas.

According to the research of the Russian scientist L.I. Prilipko, one of the main characteristic features of the forests of the Lankaran natural region is the absence of other coniferous tree species here, except for yew (Taxus baccata) and juniper bushes. Another feature that distinguishes this type of forest from the humid and subtropical forests of Colchis is the weak development of evergreen shrubs, as well as their low species composition. The fact that 3 main types of evergreen shrubs (Hyrkan bizotu, Danaya, Hyrkan pırkali) grow in the Lankaran territory proves that the mountains and plains of Lankaran had a unique evergreen vegetation cover in the III period. Epiphytes in this area are relatively poorly developed (for example; bear's-foot trefoil), while lianas are well developed compared to epiphytes (maravca, gurma, dassarmaşığı), which is characteristic of low mountain and plain forests. The tree species that are widely distributed in the species composition of modern low mountain forests in the Lankaran region, which are classified as ancient tugai vegetation, include: Lankaran acacia, iron tree, Hyrkan fig, chestnut-leaved oak, velvet maple, heart-leaved alder, Hyrkan azat tree, Hyrkan boxwood, thick-leaved sedge, large-leaved sedge, and other tree and shrub species (Museyibov, 1998).

The highest points of the Talysh Mountains are the peaks of Gomurkoy (2493), Gizyurd (2433), Divanbil (981 m), Qala-Gırba (928 m), Vishnabad (848 m), and Ulyasi (828 m). The relief of the

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area, directed from west to east, noticeably descends, replacing both mountain slopes and foothills with slopes and lowlands. The reason for the formation of the Lankaran lowland is the rise of the Tertiary seabed, which at the same time leads to the widespread distribution of marine terrigenous and carbonate, volcanogenic, and volcano-sedimentary rocks. Denudation (destructive) formations are unique for the slopes in this area, and accumulative formations for the lowlands (Khishtova, 2021).

Since the moisture generated by the influence of the Caspian Sea is condensed through the Talysh Mountains, the amount of precipitation in the Lankaran lowland is high. In the areas covered by the reserve from 1000 m above the Caspian Sea to 20 m below sea level, the annual amount of precipitation varies around 900-1400 mm, which in turn covers the maximum amount of precipitation in the autumn months (712 mm, 51%), and the minimum amount in the summer months (166 mm, 11.8%). The evaporation process is 1.2-1.6 times less than the amount of precipitation of 750-850 mm, which means that the number of rainy days per year exceeds 90. When moving from north to south in the Lankaran natural physical-geographical region, an increase in the amount of precipitation falling on this area is observed. The amount of precipitation also depends on the increase or decrease in altitude. The amount of precipitation increases up to 500-600 meters above the Caspian Sea, and then decreases. This, in turn, leads to the gradual strengthening of the subtropical landscape as one moves south along the lowlands. In mountainous areas, the subtropical landscape is of great importance up to 800-900 meters, and boreal landscapes for higher areas. In the Lankaran-Astara region, the annual amount of precipitation varies regionally between 1200-1700 mm, which is the highest indicator for the territory of Azerbaijan and is one of the necessary factors in the development of forest vegetation (Yusifov, Hajiyev, 2004).

The small annual temperature range observed in subtropical climates leads to an extension of the vegetation period, which creates the basis for the intensive development of forest plants (Mammadov, 2004).

The snow cover in Lankaran depends on the altitude of the area and these indicators change every year. The snow density in the Talysh Mountains varies between 0.14-0.16. Yellow soils are characteristic of Lankaran region. On these types of soils, Hyrcanian forests rich in ironwood, oak, silk acacia and other tree species have formed and developed (Collection of scientific works of AzHveMEIB, 2019).

The high amount of precipitation in the Lankaran region is explained by the weakness of the evaporation process as a result of the high humidity of the air here. The high level of humidity of the air depends on the location of the area close to the Caspian Sea, and the fact that the cold air masses coming from the north and northeast are blocked by the mountain range surrounding the sea from the south. When analyzing the results of the existing materials of studies conducted on the durability and thickness of the snow cover in other regions, it was determined that the snow cover in most parts of the Lankaran region is unstable (Mahmudov, 2013).

The soils of the mountainous part of the Lankaran region have been studied for a number of purposes by V.R. Volobuyev, M.A. Salayev, G.Sh. Mammadov, M.P. Babayev, C.M. Jafarova, V.H. Hasanov, S.Z. Mammadova, C.A. Shabanov and other researchers. For this reason, a number of nuances are revealed in the works of V.J. Hajiyev, M.T. Jabbarov, B. Guliyev and other scientists related to the soils of the region. As noted in the map "Morphogenetic profile of Azerbaijani soils", "Modern classification of Azerbaijani soils" and "Ecological assessment of agricultural soils of the Lankaran-Astara natural, economic region", extensive information is provided on the soil types, subtypes, genera and species diversity, geographical distribution, genetic structure, color shades, and physicochemical aspects of the area. As a result of the conducted research, it was determined that the high mountainous part of the territory is formed by 3 types of soils, which are characteristic of vertical zonation: mountain-meadow, mountain-meadow-gozgyr, mountain-forest-brown, mountain-brown, and meadow-swamp (Aslanova, 2019).

M.T. Jabbarov (2000) notes that in the flora of Talysh, mountain-xerophyte vegetation is distributed at an altitude of 1400-1500 m above the Caspian Sea to 2500 m (in the summer pastures of Lerik and Yardimli regions). He also noted the widespread distribution of mountain-xerophytes

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at an altitude of 1700-2500 meters above sea level in the Zuvand and Diabar areas, as well as in the high mountain belt. In areas where the rocks of the Bozdag area consist mostly of sparse saline clays, specific phrygana groups resembling deserts occur, as well as in the arid forests (Gurbanov, 2024).

In the high mountainous areas of Talysh, relatively strong mountain-brown soils with a humus content of 6% to 10% are dominant. These types of areas are mainly alkaline, non-carbonate soils, and are of medium or heavy loamy, lumpy, granular, and lumpy-sandy in mechanical composition. On soils with soft upper layers, thyme, mixed lobular thyme, and various plant groups develop (Hajiyev, 2004).

A. Eyyubov (1968, 1975) emphasized that there are 6 agro-climatic regions within the borders of the Lankaran region, which differ from each other in terms of climatic environment:

1. Jalilabad-Gizilaghac;
2. Masalli
3. Lankaran-Astara;
4. Burovar-Siakar;
5. Lerik-Yardımlı;
6. Diman-Gizyurdu (Mammadova, 2003).

The characteristic features of the forests of these regions are rich in unique and endemic tree species. Specifically, these types of trees growing in the Talysh Mountains are known worldwide. Throughout history, the Lankaran lowland has been covered with Hyrcanian-type forests. However, as a result of human influence on nature, these types of forests have been destroyed and replaced by tea plantations, tangerine orchards and other agricultural areas. Along with several optimal fertility levels, part of the lands useful for agriculture in the Lankaran region have been subjected to erosion and salinization. As a factor that has a very striking effect on soil productivity, erosion can be compared only with sharp salinization. As a result of this effect, a number of soil properties and regimes have undergone sharp changes, negatively affecting the chemical, physical, and water-physical indicators of the soil (Aslanova, 2019). The greatest damage affects soil humus, which is an important integral element of productivity, as a result of which its quantity and reserves in the soil profile tend to decrease, and its composition deteriorates. At the same time, a decrease in other nutrients and a weakening of the biological activity of the soil are also observed. At very severe levels of erosion, the soil completes its natural-historical activity with the gradual washing away of the upper layer of the soil, usually with the emergence of lower horizontals consisting of parent rock to the upper layer. Scientists divide soils into four groups according to the degree of erosion: weak, medium, severe, very severe. As a result of research conducted in administrative districts (excluding Masalli district), it became clear that 15.4% of the lands of Lankaran useful for agriculture, or 43,261.3 hectares, have been subjected to erosion (Mammadov, 1997). As a result, the area of forest ecological systems has significantly decreased and their structure has been disrupted. Specific nature reserves such as the Hirkan National Park and the Gizilaghac Reserve have been created to protect forests. These areas are of great importance in protecting the rich nature of Lankaran (Aslanova, 2019).

Conclusion

The rich forest cover of the Lankaran natural region plays an important role in protecting the ecological balance, biological diversity of the region and ensuring soil fertility. Physical and geographical elements such as the diversity of landforms in terms of the totality of land forms, the subtropical nature of the humidity of the climate, the density of the hydrological network and the breadth of soil types have had a fundamental impact on the formation and spread of forests. However, despite all this, in recent decades, due to the expansion of agricultural areas, the increase of human impact and the large population, the decrease of forest areas, a change in their composition and the disruption of ecological systems have been observed. Such circumstances have led to increased vulnerability to soil erosion, degradation, desertification and climate change.

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In this case, scientific research of forest resources, assessment of physical-geographical nuances and preparation of a regional plan for intensive forest management are extremely relevant and important. The protection, restoration and sustainable use of forest cover in the Lankaran natural geographical region is of great importance in terms of ensuring both local ecological stability and national ecological security in general.

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