

A STUDY OF THE HISTORY OF LANDSCAPE RESEARCH IN THE LESSER CAUCASUS

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Abstract

The article characterizes the main scientific approaches and concepts in the history of landscape research in the Lesser Caucasus. For this purpose, using the research-analysis method, works of researchers who studied the nature of the area in different periods, compiled maps, and scientific literature materials were utilized. Since a landscape is an integrated system consisting of the unity of natural components, the article also provides brief information on the history of the study of the area's geology, geomorphology, climate, soil and vegetation cover, etc., alongside the history of landscape research. Analysis of the research shows that the geographical study of the Lesser Caucasus began partially in the 19th century. However, landscape studies in the area started later, around the middle of the last century. The research conducted in this field has covered topical issues of landscape science, carried theoretical, methodological, and practical significance, and has been aligned with the developmental directions of each period. Currently, landscape research is increasingly conducted based on remote sensing data and GIS technologies, which allow for a more detailed and precise study of landscapes.

1. Introduction

The history of science studies the origin and development of systematic knowledge [5]. It undertakes to understand both the historical development and the essence of scientific thought, as well as fundamental scientific concepts [4]. One of the goals of scientific heritage is to continue and develop historically formed scientific traditions, the differentiation that has occurred in science, and the activities of established scientific schools. As a branch of the history of science, the "History of Geographical Thought" also faces serious tasks, such as studying the scientific heritage of scholars in this field, deeply analyzing geographical ideas and research, and providing a scientific assessment. A critical analysis of diverse geographical research is also of great importance for refining a number of ideas and for revealing the utility of theoretical geographical thought and experience from past periods in accordance with modern requirements and goals.

Especially in our modern era, a time when global problems of nature and society are raging and there is a need for more detailed research into the developmental laws of nature and the changing

trends in nature-society relations, it is crucial to turn to the history of science, valuable past teachings, and the various stages of scientific traditions that can give impetus to modernization. At the same time, the history of geography serves to reflect an integrated line of thought - the important national and global geographical panorama of the history of geographical thought.

The aim of the research is to investigate the scientific heritage of landscape researchers in the Lesser Caucasus within the Republic of Azerbaijan. The research covers the period from the end of the 19th century to the present day.

2. Materials and methods

The writing of this article utilized works by scientists who conducted research in the area, scientific literature materials, and internet resources. The research was conducted based on the research-analysis method.

Since the landscape represents the manifestation of (visual) territorial uniformity, the article also briefly investigates the history of research into the area's geology, geomorphology, climate, soil and vegetation cover, etc., alongside the history of landscape research.

3. Analysis and discussion

The Lesser Caucasus meganticlinorium, as one of the internal elements of the Alpine fold belt, is distinguished by its complex geotectonic development features, and the diversity and specificity of its natural complexes. Due to its favorable geographical location, rich natural resources, and fascinating nature, the area has been of interest to people since ancient times and has become one of the world's oldest places of settlement. The first information about the Caucasus is found in the works of travelers who lived even before our era (Herodotus, 5th century BC; Strabo, 1st century BC; Ptolemy, 1st century AD, etc.). In particular, the 11th book of Strabo's 17-volume work, *Geography*, is entirely dedicated to Azerbaijan and contains a description of the Caucasus Mountains [13].

Later, some information about the nature, climate, economy, and ethnography of this region is found in the notes of Arab travelers. Historical information about the area is provided more extensively in the works of the prominent traveler H.Z. Shirvani (1780-1837/38). However, as this information was one-sided, it held only historical significance [12].

A.G. Isachenko noted that the origin of modern geography began from the last third of the 19th century. He wrote, "The foundation of modern geography was the idea of the geographical complex, which Russian geographers developed and prepared in specific forms such as the law of zonality, the study of landscapes, and the concept of the geographical envelope" [16].

The geographical study of the Lesser Caucasus also began partially in the 19th century. In the early part of that century, the French traveler Dubois de Montpéroux provided the first, albeit incomplete, data on the geological and geomorphological structure of the western part of the area [24]. Work on the geological, geomorphological, and orographic description of the area, its mapping, etc., was carried out by geologists. In the early 20th century, research in the Lesser Caucasus expanded further, connected to the discovery of many useful mineral deposits and an increased demand for mining raw materials. Therefore, at that time, the Ganja-Gadabay zone was one of the geologically best-studied areas.

More extensive information on the geological structure of the Lesser Caucasus is found in the works of the German scientist H.V. Abich. H.V. Abich laid the foundation for the study of paleontology and stratigraphy in the Caucasus, including Azerbaijan [1, 12, 21]. In his nearly 30

works related to the Caucasus, a significant amount of material concerning the Lesser Caucasus and the volcanic plateaus was compiled. Particularly, the topographical team led by I.I. Khodakov carried out considerable work in map compilation. Their written works provided some information on the geology and partially the geomorphology of the area. This information primarily pertained to the entire volcanic plateaus and partially covered a section of the Lesser Caucasus [24].

In the early 20th century, A.O. Gukasov was the first to provide a geomorphological scheme of the Transcaucasian Volcanic Plateau, as well as a part of the Lesser Caucasus territory [24]. Later, the works of F.D. Oswald, A.L. Reinhard, and others provided a significant amount of material on the geological-geomorphological structure of the Lesser Caucasus [15]. A.L. Reinhard described the river valleys of the high mountainous parts of Murovdag and Zangazur and was the first to indicate traces of ancient glaciation in these high-altitude areas. K.N. Paffenholz, in turn, was the first to study the Alpine glaciation system in the Lesser Caucasus, correlated river terraces with the Alpine glaciations, and published extensive data on the area's developmental history and neotectonics. He also developed the general stratigraphy for all volcanogenic deposits of geological age in the Lesser Caucasus [27]. In subsequent periods, the geological, geomorphological, and tectonic structure of the Lesser Caucasus was studied by V.E. Khain, Sh.A. Azizbekov, M.A. Gashgai, A.Sh. Shikhalibayli, A.I. Mammadov, M.A. Museyibov, Sh.B. Karimov, M.A. Abbasov, R.Y. Guliyev, N.Sh. Shirinov, H.A. Khalilov, Kh.K. Tanriverdiyev, and others [13, 14].

Until the 1920s-30s, there were virtually no specific works dedicated to the climate of the Lesser Caucasus, as well as Azerbaijan as a whole. The first fundamental data in this field was provided in the works of A.I. Voyeykov, and later in those of I.V. Figurovski. Due to the weakness of the meteorological network, the climate indicators in these works consisted of either approximate or unrefined data [8]. Later, the climate of the area was studied by A.A. Madatzade, A.J. Ayyubov, A.M. Shikhlynski, Sh.J. Mirzayev, G. Hajiyevev, and other researchers, who also compiled maps [12].

The study of the river network and lakes in the Lesser Caucasus began considerably late. The first scientific data on the surface waters of the area is provided in the materials of expeditions organized in 1881 under the leadership of A.P. Jilinski. The

expedition's report contained only partial information about the Ganja and Tartar rivers and Lake Goycha [24]. In later periods, S.H. Rustamov, B.S. Jafarov, M. Hasanov, Kh. Zamanov, R.M. Gashgay, and others made significant contributions to the detailed study of the area's rivers and lakes [2, 13]. In this field, the work "Landscape-hydrological characteristics of the Lesser Caucasus river basins and low-water discharge of the rivers" (2013) by Imanov F.A., Aliyeva I.S., and Guliyeva A.A. studied the influence of the landscape characteristics of the Lesser Caucasus river basins on river flow and performed a landscape-hydrological zoning of the area [15].

The Russian soil scientist V. Dokuchaev, who first came to the Caucasus in 1898, discovered the law of vertical soil zonality during his research in Transcaucasia. He provided a description of the soils in the foothills of the Lesser Caucasus and demonstrated how the soils change vertically [2, 13, 21].

M.E. Salayev made significant contributions to the detailed study of the soil cover of the Lesser Caucasus. The researcher studied the soil cover of the area's summer pastures, compiled a large-scale map of the area, and wrote a monograph on the subject [29]. H.A. Aliyev and Sh.I. Mirzayev conducted extensive research on the forest soils of the Hakari River basin, resulting in the publication of the monograph "The mountain-forest soils of the Hakari river basin and their efficient use" (1979).

The vegetation cover of the area was studied by A.A. Grossheim, L.I. Prilipko, Y. Isayev, V. Hajiyev, and others [2, 22, 13]. As early as the end of the 19th century, the report of the Russian Naturalists Society contained the first information about the copper mines near Goygol and the medicinal plants of Karabakh. The distribution of vegetation and the first botanical-geographical zoning of individual areas was provided in 1906 by I.I. Kuznetsov [24].

The mapping and physical-geographical zoning of the Caucasus began in the early part of the last century. In 1915-16, I.V. Figurovski was the first to divide the entire Caucasus into physical-geographical provinces and regions [8]. This division, which was schematic in nature, was based on climate, soil, and vegetation cover. Based on general geographical data collected between 1920-27, A.F. Leister and B. F. Chursin presented a new regionalization scheme in 1929, which, with some minor changes, replicated the division by I.V. Figurovski [24]. Later, B.F. Dobrynin pro-

vided a physical-geographical regionalization of the Caucasus [6]. He divided the Caucasus into 5 provinces, one of which was the Lesser Caucasus. None of these divisions are considered fully integrated/complex regionalizations.

The first physical-geographical zoning for the territory of Azerbaijan was carried out in 1949 by A.M. Shikhlynski. In this work, the Lesser Caucasus was taken as a separate area, while its foothill sloping plains were attributed to the Kura-Araz lowland [2, 24]. In his subsequent works, V.G. Zavriyev refined this scheme somewhat, treating the Lesser Caucasus as a separate province and distinguishing the following physical-geographical regions within its territory: Aghstafa-Gubadly, Mountainous Karabakh, Northern Kurdistan, Southern Kurdistan, and Khachinchay[30].

After the 1950s, issues of physical-geographical regionalization were addressed by A.E. Fedina, N.A. Gvozdetsky, G.K. Gul, M.A. Museyibov, H.K. Karimov, Sh.B. Karimov, I.S. Jafarov, B.A. Budagov, N.Sh. Shirinov, and others. All the regionalization schemes are very similar to one another, with some of them being scientifically debatable. N.A. Gvozdetsky considered the entire Lesser Caucasus and the volcanic plateaus as a single area [21]. Based on her research in the Caucasus, A.E. Fedina, using zonal, provincial, and genetic principles as a basis, distinguished 7 zones, 11 provinces, and 15 natural regions within the territory [7].

I.S. Safarov provided a regionalization scheme for Azerbaijan and, simultaneously, for the Lesser Caucasus, taking into account the distribution characteristics of agricultural crops [28].

In 1959, N.K. Karamov, taking into account all the features of the natural conditions in the territory of Azerbaijan, divided the area into 4 physical-geographical provinces, 21 natural regions, and 26 sub-regions [24].

In subsequent years, complex landscape studies were conducted for individual natural regions of the Lesser Caucasus, and Sh.B. Karimov performed a landscape regionalization of the Hakari River basin [18].

One of the works that comprehensively reflected the scientific results of studying the physical-geographical conditions of Azerbaijan and the Lesser Caucasus, published in 1963, is the "Atlas of the Azerbaijan SSR." In the atlas, the Lesser Caucasus is treated as an independent natural province, with physical-geographical regions distinguished within it [2].

The scientifically substantiated physical-geographical (landscape) regionalization map of Azerbaijan was compiled in 1975 by B.A. Budagov and M.A. Museyibov. This map served as the basis for refining the existing schemes of the republic's physical-geographical regionalization and for specifying the identified taxonomic-typological units [3].

It should be noted that the phase of systematic geographical research in Azerbaijan began in the middle of the last century. In 1945, among the academies of sciences of the union republics within the USSR Academy of Sciences, the third Institute of Geography after those in Moscow and Tbilisi was established within the Academy of Sciences of Azerbaijan. The Department of Physical Geography, one of the institute's first departments, created the conditions for the planned study of the republic's territory and the large-scale conduct of research work. That same year, the first major work resulting from the research in physical geography and landscape science by the department's staff (I.V. Figurovski, H.B. Aliyev, N.Sh. Shlepnyov, B.A. Antonov, N.M. Mamayev, B.N. Nazirova, etc.) was published: "Physical Geography of the Azerbaijan SSR" [9]. This work not only helped scientists gain significant experience in this field but also created a foundation for proposing many scientific and practically important theses in the field of physical geography. The work "Landscape Zones of the Southern Slopes of the Greater Caucasus Range" (1955) by N.K. Karamov, who made important contributions to the study of Azerbaijan's landscapes, is considered the first work in this field, as it was entirely dedicated to landscape problems [17].

A new stage in the development of landscape science in our republic began in 1967, when for the first time in the Soviet Union, a Department of Landscape Science was established at the Institute of Geography of the Academy of Sciences of Azerbaijan on the initiative and under the leadership of B.A. Budagov. After the creation of the department, the descriptive method of studying landscapes in the republic, which had been used until then, was abandoned. The focus shifted to the forefront the investigation of the primary factors involved in their formation, greater attention was paid to solving the theoretical problems of landscape science and its regional geography, and particular priority was given to research aimed at developing new investigation methods [25].

In 1977, a laboratory for the application of aerospace methods in geography was established at the Institute of Geography. On this basis, the morphostructures of the eastern part of the Greater Caucasus, the Azerbaijani part of the Lesser Caucasus, and adjacent territories were studied by many of our scientists, including N.Sh. Shirinov (1993), M.A. Museyibov (1981), A.A. Mikayilov (1998), E.K. Alizade (2006), B.A. Budagov, H.A. Khalilov (2018), and others [25].

One of the issues facing landscape scientists in the 1960s was the study of the influence of neotectonic movements on the formation and development of modern landscapes. At that time, this problem was one of the weakly researched areas in landscape science, both in foreign countries and in the former USSR. In Azerbaijan, B.A. Budagov was the first to lay the foundation for a new scientific direction in this field [25]. Later, based on the materials from the scientific research conducted by the scholar in the South-Eastern Caucasus, which forms part of the Alpine orogenic province, he co-authored a monograph with A.A. Mikayilov titled "The Development and Formation of the Landscapes of the South-Eastern Caucasus in Connection with Neotectonics" (1985). This work was distinguished by its originality and was the first research work in the territory of the former USSR dedicated to this specific problem.

During the 1960s-80s, under the leadership and with the participation of B.A. Budagov, landscape scientists compiled large-scale landscape maps of various regions of the Republic of Azerbaijan. Examples of these include maps at a scale of 1:200,000 for the south-eastern tip of the Lesser Caucasus, the area between the Shamkirchay and Khachinchay rivers, and the Karabakh Volcanic Plateau, as well as a map of the Azerbaijani part of the Lesser Caucasus at a scale of 1:100,000. In the listed maps, class, type, subtype, and species were adopted as the classification units of the landscapes [25].

The first map of the landscape belts of the Lesser Caucasus was provided by V.G. Zavriyev (1964) [30]. However, on this map, the altitudinal landscape belts actually corresponded more to vegetation belts, and it contained significant inaccuracies in the species composition and boundaries of the vegetation cover within these altitudinal zones [24].

The natural landscapes of various parts of the Lesser Caucasus have been studied in detail by a number of researchers.

Sh.B. Karimov and M.A. Suleymanov investigated the landscapes of the area between the Hakari and Okhchuchay rivers [19]. Sh.B. Karimov also performed a landscape zoning of the Hakari River basin and compiled a large-scale landscape map of the area [18].

G.A. Hajjiyeva, taking into account all physical-geographical factors in a complex manner for agricultural purposes, divided the north-eastern slope of the Lesser Caucasus into regions [10].

H.T. Hagverdiyev studied the general geographical patterns of landscape differentiation in the mountainous areas of the north-eastern slope of the Lesser Caucasus and revealed the patterns of distribution of natural territorial complexes by altitude [11].

M.H. Mirzayev conducted extensive landscape research on the Karabakh Volcanic Plateau and compiled a large-scale landscape map of the area. M.A. Suleymanov and A.A. Aliyev developed a 1:100,000 scale landscape map for the Karabakh range and the Hakari basin [24, 26].

Starting from the 1980s, research began on the development trends and modern dynamics of mountain landscapes, taking anthropogenic load into account, using the example of the south-eastern slope of the Lesser Caucasus [20]. E.Sh. Mammadbayov used aerospace materials to study the anthropogenic dynamics of the landscapes on the south-eastern slope of the Lesser Caucasus, investigated the developmental trends and differentiation features of natural landscapes resulting from anthropogenic influences, and consequently compiled large-scale (1:200,000) maps [23].

In recent years, various thematic maps of Azerbaijan have been compiled, in which the Lesser Caucasus, as a region of Azerbaijan, has been represented. These include maps such as: "Zoning of the territory of Azerbaijan according to the degree of ecological risk and hazard" (B.A. Budagov, R.M. Mammadov, E.K. Alizade, M.J. Ismayilov, 2011); "Medico-ecogeochemical landscape map" (B.A. Budagov, A.H. Ahmadov, G.I. Rustamov, 2014); "Ecogeochemical landscape map of Azerbaijan" (E.K. Alizade, G.I. Rustamov, E.S. Karimova, I.Y. Kuchinskaya, M.I. Yunusov, 2016); "Ecological risk map of Azerbaijan" (Mammadov R.M., Ismayilov M.J., 2020) and other thematic maps. The territory of the Lesser Caucasus is reflected in these maps according to the specific theme of each one.

In the current period, modern research methods are used more extensively alongside traditional methods in landscape studies. In particular, infor-

mation databases of regional landscapes are being created based on GIS technologies, and new types of digital landscape maps are being prepared. Among them, the digital "Landscape map of Azerbaijan" (Scale 1:250,000), developed in 2014 by the staff of the Institute of Geography (E.K. Alizade, A.A. Mikayilov, M.J. Ismayilov, S.Y. Guliyeva, I.Y. Kuchinskaya, E.J. Karimova, Z.A. Hamidova) based on the results of their long-term research and using remote sensing data interpreted within a GIS environment, is based on new scientific-theoretical principles.

The staff of the Institute of Geography continuously conduct multi-directional landscape research (landscape-ecological, landscape-geomorphological, landscape-anthropogenic, landscape transformation, landscape dynamics, etc.) in the Lesser Caucasus and write dissertations (e.g., F.V. Mammadova, T.V. Gasimova, etc.). Particularly in recent times, employees of the institute's "Landscape Science and Landscape Planning" department (M.J. Ismayilov, S.Y. Guliyeva, F.V. Mammadova, I.Y. Kuchinskaya, E.J. Karimova, etc.) have been investigating the environmental impacts of the war and the resulting ecological problems in the liberated Karabakh and Eastern Zangazur territories on the southern slope of the Lesser Caucasus.

The history of landscape studies in Azerbaijan has been divided into stages by many scientists. B.A. Budagov divided the development of physical geography and landscape science in Azerbaijan into two main stages - the pre-Soviet period and the Soviet period - and further subdivided the Soviet period into three sub-stages (1920-1937, 1937-1945, and post-1945) [3]. M.H. Mirzayev, who conducted extensive landscape research in the area, divides the research history of the Lesser Caucasus into two periods: up to 1920 and from that time until 1994 [24]. In our research, however, the study history of the area can be divided into four periods: up to 1920; 1920-1945; 1945-1990; and the period after 1990.

4. Conclusion

Research holds significant importance for studying the evolutionary dynamics and formative history of landscape science. The analysis of the research makes it clear that landscape studies in the Lesser Caucasus began in the middle of the last century. The landscape studies conducted in the area have covered current issues of landscape science (the structure, function, dynamics, classification, differentiation, transformation, etc., of landscapes), carrying theoretical, methodological, and practical significance, and have been

aligned with the developmental directions of each period. Based on the analyses, the history of general physical-geographical research in the area can be divided into four periods: up to 1920 - due to increased demand for mineral resources, the area was studied better from a geological-geomorphological perspective; 1920-1945 - this was a period of systematic research aimed at studying the physical-geographical components and natural resources of the area; 1945-1990 - comprehensive, multi-directional research (landscape-geomorphological, landscape-tectonics, landscape-anthropogenic, landscape transformation, landscape-ecological, etc.) was conducted throughout the area and in its individual parts; the period after 1990 - landscapes of the area have been studied more accurately and in detail, both quantitatively and qualitatively, through the widespread application of modern research methods (GIS technologies, remote sensing) alongside traditional ones.

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KIÇIK QAFQAZDA LANDŞAFT TƏDQIQATLARININ TARİXİNİN TƏDQIQI

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Xülasə: Məqalədə Kiçik Qafqaz landşaftlarının tədqiqat tarixinə əsas elmi yanaşma və konsepsiyalar səciyyələndirilir. Bu məqsədlə araşdırma-təhlil metodu əsasında müxtəlif dövrlərdə ərazinin təbiətini öyrənmiş tədqiqatçıların əsərlərindən, tərtib olunmuş xəritələrdən, elmi ədəbiyyat materiallarından istifadə edilmişdir. Landşaft təbii komponentlərin vəhdətindən ibarət bütöv sistem olduğundan məqalədə, landşaftın tədqiqat

tarixi ilə yanaşı, ərazinin geologiyasının, geomorfologiyasının, iqliminin, torpaq və bitki örtüyünün və s.-nin öyrənilmə tarixi haqda da qısa məlumat verilir. Tədqiqatın təhlilindən aydın olur ki, Kiçik Qafqazın coğrafi cəhətdən öyrənilməsinə qismən XIX əsrdən başlanılmışdır. Ərazidə landşaft tədqiqatları isə daha gec, keçən əsrin ortalarına təsadüf edir. Bu sahədə aparılan tədqiqatlar landşaftşünaslıq elminin aktual məsələlərini əhatə etmiş, nəzəri, metodiki və praktiki əhəmiyyət daşımaqla hər dövrün inkişaf istiqamətlərinə uyğun olmuşdur. Hazırkı dövrdə landşaft tədqiqatları daha çox landşaftın daha ətraflı və dəqiq öyrənilməsinə imkan verən məsafədən zondlama məlumatları və CİS texnologiyaları əsasında aparılır.

Açar sözlər: Kiçik Qafqaz, landşaft, tarix, metodika, xəritələşdirmə, rayonlaşdırma