



Chapter II. HISTORICAL AND PHILOSOPHICAL ASPECTS OF PEDAGOGICAL RESEARCH

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EDUCATIONAL ASPECTS OF RESEARCHING THE TRANSFORMATION OF MOUNTAIN LANDSCAPES IN THE CONTEXT OF GLOBAL ECONOMIC DEVELOPMENT

Abstract. The relevance of studying the transformation of mountain landscapes is determined by the complex interaction of natural-geographical, social, and economic processes, which requires an integrated educational approach to develop students' comprehensive competencies. The characteristics of the mountain environment, in particular geographical isolation



and demographic decline in small schools, create unique challenges for organizing the educational process. This emphasizes the need for methodological developments that take into account the specificity of mountain territories and ensure the development of ecological, spatial, and geo-economic competencies among students.

The aim of the study is to develop methodological principles for integrating the topics of the world economy and the transformation of mountain landscapes into the geography curriculum. This contributes to the effective formation of ecological, spatial, and geo-economic competencies, which are key for monitoring and rational natural resource management by local residents in mountainous areas. The study was conducted using the analysis of scientific publications, project-based activities, and a local studies approach. The local studies approach allows a deeper understanding of the local characteristics of interactions between natural and socio-economic processes, particularly in the Carpathian region, and enhances students' motivation.

Among the methodological techniques, the use of maps, remote sensing (RS), geographic information systems (GIS), and case studies was highlighted. Such a comprehensive approach ensures the integration of theoretical knowledge and practical skills. The results of the study confirmed that interdisciplinary integration of knowledge in geographical education contributes to increased learning motivation and improved research quality. Studying the educational aspects of mountain landscape transformation in the context of world economy development promotes the formation of systemic thinking and the development of integrated competencies: ecological (ability to make responsible decisions), spatial (ability to use GIS and cartographic materials), and geo-economic (understanding the impact of global processes). This format of organizing learning fosters ecological awareness and prepares students to make informed decisions in the field of sustainable development of mountain territories. The combination of world economy topics and mountain landscape transformation should become an integral part of modern geographical education.

Keywords: mountain landscape transformation, world economy, ecological competence, educational process, spatial competence, geo-economic competence, interdisciplinary projects, education for sustainable development.

ОСВІТНІ АСПЕКТИ ДОСЛІДЖЕННЯ ТРАНСФОРМАЦІЇ ГІРСЬКИХ ЛАНДШАФТІВ У КОНТЕКСТІ РОЗВИТКУ СВІТОВОГО ГОСПОДАРСТВА

Анотація. Актуальність дослідження трансформації гірських ландшафтів обумовлена складною взаємодією природничо-географічних, соціальних та економічних процесів, що потребує інтегрованого освітнього підходу для формування комплексних компетентностей здобувачів освіти. Особливості гірського середовища, зокрема географічна ізоляваність та демографічний спад у малочисельних школах, створюють унікальні виклики для організації освітнього процесу. Це посилює потребу в методичних розробках, які б враховували специфіку гірських територій та забезпечували розвиток екологічної, просторової та гео економічної компетентностей здобувачів освіти.

Метою дослідження є розробка методичних засад інтеграції тематики світового господарства та трансформації гірських ландшафтів у навчальну програму з географії. Зазначене сприяє ефективному формуванню екологічної, просторової та гео економічної компетентностей, які є ключовими для моніторингу та раціонального природокористування гірських територій місцевими жителями. Дослідження проводилось із застосуванням аналізу наукових публікацій, проектної діяльності та краєзнавчого підходу. Краєзнавчий підхід дозволяє глибше зрозуміти локальні особливості взаємодії природних і соціально-економічних процесів, зокрема в умовах регіону Карпат та посилює мотивацію здобувачів освіти. Серед методичних прийомів також виділено використання карт, дистанційного зондування Землі (ДЗЗ), геоінформаційних систем (ГІС) та кейс-методів. Такий комплексний підхід забезпечує інтеграцію теоретичних знань і практичних навичок. Результати дослідження підтвердили, що міждисциплінарна інтеграція знань з географічної освіти сприяє посиленню навчальної мотивації та підвищенню якості дослідницької діяльності. Вивчення освітніх аспектів дослідження трансформації гірських ландшафтів у контексті розвитку світового господарства сприяє формуванню системного мислення й розвитку інтегральних компетентностей: екологічну (здатність приймати відповідальні рішення), просторову (уміння використовувати ГІС та картографічні матеріали) та гео економічну (розуміння впливу глобальних процесів). Такий формат організації навчання розвиває екологічну свідомість і формує готовність до прийняття обґрунтованих рішень у сфері сталого розвитку гірських територій. Поєднання тематики світового господарства та трансформації гірських ландшафтів має стати складовою сучасної географічної освіти.

Ключові слова: трансформація гірських ландшафтів, світове господарство, екологічна компетентність, освітній процес, просторова компетентність, гео економічна компетентність, міждисциплінарні проекти, освіта для сталого розвитку.

INTRODUCTION

The Problem Formulation. The transformation of mountain landscapes in the context of the development of the global economy is a multidimensional process that combines natural-geographical, ecological, social, and economic factors. The specificity of mountain territories creates particular challenges for the educational process, especially in small rural schools, which are affected by demographic decline, the mono-functionality of the economy, and geographical isolation. The lack of interdisciplinary integration of knowledge limits the development of competencies necessary for the sustainable development of mountain regions. These factors highlight the need for methodological materials that take into account the specificity of mountain territories, promote the development of research and project skills, and improve the digital literacy of students and teachers. Low motivation to study complex interdisciplinary topics also reduces students' access to modern knowledge and technologies.

Research on the transformation of mountain landscapes in the context of global economic development opens new perspectives for integrating knowledge in natural sciences, economics, and education, enabling the training of competent specialists capable of adequately responding to modern ecological and socio-economic challenges.



Existing studies provide a solid knowledge base regarding the processes occurring in mountain landscapes and the methods to monitor these transformations.

Аналіз останніх досліджень і публікацій. Theoretical, methodological, and educational aspects of mountain landscape research have been addressed by Ukrainian scholars such as V. Armand, O. Beydyk, P. Maslyak, I. Pistun, V. Petlin, S. Pichura, M. Fashchevskyi, and others. Issues of anthropogenic transformation of mountain geosystems in the context of sustainable development have been explored by O. Molchak, M. Kovalenko, T. Lavruk, I. Kovalchuk, L. Shevchuk, and others. Educational and methodological approaches to studying mountain territories and developing geo-ecological thinking in students have been proposed by N. Herasymenko, V. Plakhotnik, I. Samoylenko and M. Stadnytskyi.

Overall, modern research in the field of geographical education is gradually shifting from purely natural science approaches toward interdisciplinary ones, encompassing educational, ecological, and economic aspects of mountain landscape transformation in a globalized world.

AIM OF THE RESEARCH

The aim of this study is to develop methodological foundations for integrating the topics of the global economy and mountain landscape transformation into the curriculum for the effective development of ecological, spatial, and geo-economic competencies.

RESEARCH METHODS

In the study of mountain landscape transformation in the context of global economic development, a comprehensive methodological approach was applied, combining the analysis of current scientific publications with a range of practice-oriented tools.

РЕЗУЛЬТАТИ ДОСЛІДЖЕННЯ

Global economic processes significantly influence the transformation of mountain landscapes through changes in socio-economic structures and the intensity of natural resource use. Mountain territories remain socially, economically, and ecologically vulnerable areas, where landscape changes are unique due to specific climatic conditions and topography. Economic factors determine not only the use of natural resources but also the socio-cultural development of local communities, requiring balanced approaches to preserve the sustainability of mountain ecosystems and landscapes. Thus, the interaction of global economic processes and changes in mountain landscapes represents an interplay of economics, ecology, and social spheres, shaping current trends in the development and transformation of these unique natural complexes.

The study of mountain landscapes allows the identification of patterns in their formation, structure, functioning, and changes under the influence of economic activity, providing a basis for developing theoretical models and practical recommendations for rational resource use and environmental protection. The educational aspect involves integrating this knowledge into curricula to prepare specialists with a systemic understanding of modern ecological and socio-economic challenges in mountain territories. Such education is essential for developing skills in landscape monitoring, the use of geographic information systems (GIS), and the implementation of sustainable approaches to natural resource management, making mountain landscapes an important topic in contemporary geographical and landscape education (Nadtoka O., 2018).

At this stage, it is crucial to study the educational aspects of mountain landscape transformation research, considering the impact of global economic development. Focus should be placed on revealing patterns of landscape changes under global economic processes and developing a systematic approach to their monitoring and management in the educational process. In this study, we focus on:

- Analysis of the impact of global economic trends on the transformation of mountain natural complexes;
- Formulation of recommendations for implementing educational approaches and methods for studying mountain landscapes in curricula;
- Identification of key aspects of developing students' competencies in monitoring and rational use of mountain territories.

The transformation of mountain landscapes is a process of changing their natural structure and functioning under the influence of anthropogenic and natural factors. In mountain regions, these processes are unique due to specific climatic, topographical, and ecosystem characteristics, which determine their increased vulnerability and the importance of controlling changes for rational resource use and environmental preservation (Telish P., 2014).

Mountain landscapes are unique natural-territorial complexes with vertical differentiation of environmental conditions and high sensitivity to economic activity. Global economic integration, intensive exploitation of natural resources, and the development of infrastructure, tourism, and agriculture cause profound transformations in these landscapes, altering their ecological status, structure, and functional properties (Plaskalnyi V. 2016).

The influence of the global economy on the spatial-temporal dynamics of mountain landscapes is manifested through several key types of economic activities that drive significant transformations urbanization in mountain areas, tourism, agriculture, forestry, and energy. These processes occur under globalization and the increasing integration of the global economy, forming new spatial and temporal vectors of mountain landscape dynamics. The educational aspect of these changes lies in the necessity to study these processes for effective monitoring, forecasting, and rational management of natural resources and territorial development in mountain regions within a global context (Zvorych I., & Zvorych O., 2022).



Methods for assessing the socio-economic vulnerability of mountain territories include a comprehensive approach that combines quantitative and qualitative analysis: statistical analysis of socio-economic indicators, spatial analysis using GIS and digital elevation models (DEM), social vulnerability indices, expert assessments and sociological surveys, systems analysis methods, and scenario modeling of socio-economic development. These methods are applied comprehensively and adapted depending on the research goals and the specifics of mountain territories, ensuring a thorough assessment of vulnerability for sustainable development planning and risk management (Monynets V., 2022). The impact of the global economy on natural resource use in mountain areas is significant and multifaceted. Mountain regions cover over one-fifth of the Earth's surface and are home to a large portion of the population, while also possessing unique biodiversity and important natural resources. The global economy affects mountain regions through:

Intensification of the use of natural resources – water, forest, and mineral resources which often leads to ecosystem degradation, loss of biodiversity, soil erosion, landslides, and floods.

Development of tourism, which provides economic benefits but exerts pressure on natural systems through infrastructure load and landscape alteration.

Globalization and market changes, leading to the transformation of local types of economic activity, including the decline of traditional, intensive, or unsustainable agriculture.

Climate change, amplified by global economic processes, affects the water balance and natural cycles in the mountains, with long-term consequences for resource management.

International policies and agreements aimed at preserving mountain ecosystems and promoting sustainable development, whose effectiveness depends on integration into local resource management.

Thus, the global economy defines both opportunities and challenges for mountain regions, requiring balanced approaches to resource use that consider ecological, social, and economic aspects to ensure the sustainable development of mountain territories (Relevance of the Development of Mountain Regions, 2025).

This topic allows the integration of knowledge from physical geography, ecology, socio-economic geography, and landscape studies, contributing to the preparation of competent specialists capable of effectively assessing environmental risks and developing strategies for the sustainable development of mountain regions. The educational process based on this topic is enriched with practical examples of the interconnection between global economic processes and regional natural transformations, addressing contemporary challenges of the global economy and ecological safety, while fostering the development of relevant competencies (Table 1).

In school education, this topic is integrated into sections covering physical geography, ecology, and global economy, helping students develop a systemic understanding of the interaction between humans and nature, current global challenges, and the specific features of mountain region development. It promotes the development of ecological awareness, spatial thinking skills, and understanding of the impact of global economic processes on the natural environment.

Table 1***Competencies Developed During the Study of Mountain Landscape Transformation***

Competence	Components	Expected Results
Ecological	Analysis of environmental problems; responsible resource use	Understanding threats and making ecologically justified decisions
Spatial	Cartography, GIS, remote sensing (RS), spatial data analysis	Ability to work with maps; perform basic geo-analysis
Geo-economic	Understanding global economic processes	Awareness of the impact of the global economy on regional development
Research	Project-based approach; case study methods	Development of skills in analysis, synthesis, and information evaluation

The integration of knowledge from socio-economic and physical geography, ecology, and landscape studies is a necessary condition for a comprehensive understanding of mountain landscape transformation and sustainable resource management.

An integrated approach ensures a thorough analysis of mountain landscapes, the development of sustainable resource use models, territorial development forecasting, and effective decision-making. An educational process based on such integration fosters systems thinking and skills in students and specialists for work in sustainable development, ecological monitoring, and mountain territory planning (Shevchuk L. & Herasymchuk O. 2024).

Table 2 presents methodological techniques that can be used in the study of mountain landscape transformation. The study of mountain landscape transformation in the context of global economic development can be addressed through topics such as "Introduction to Mountain Landscapes: Natural Features and Human Impact", "Global Economic Processes and Their Impact on Mountain Ecosystems", "Use of Remote Sensing and GIS in Mountain Landscape Monitoring", and case studies like "Environmental Challenges in Mountain Regions and Ways to Overcome Them". These topics combine



theoretical knowledge with practical skills, contributing to the development of students' ecological, spatial, and geo-economic competencies, which aligns with contemporary educational standards.

Table 2

Methodological Approaches in the Study of Mountain Landscape Transformation

Methodological Tool	Educational Function	Practical Application in Secondary Education Institutions
Cartographic Method	Visualization of changes and structures	Creating maps, analyzing relief and landscapes
Remote Sensing (Satellite Images)	Monitoring changes	Identifying deforestation, landslides, urbanization
GIS	Spatial modeling	Building digital models of the terrain
Case Methods	Analysis of real situations	Examination of local ecological problems
Project-Based Activities	Formation of research skills	Creating student projects: "Transformation of the Carpathians"
Local Studies Approach	Motivation and local research	Field studies, interviews, terrain mapping

Interdisciplinary educational projects on the transformation of mountain landscapes promote the integration of knowledge from geography, ecology, economics, social studies, and other disciplines. Examples of such projects include: "Globalization and the Carpathians," "Tourism and Landscapes," and "Energy and Mountain Nature" (Melesko V., 2003).

The use of a local studies (kraieznavchyi) approach in studying the transformation of mountain landscapes in the Ivano-Frankivsk region is particularly significant, as it allows for a deeper understanding of the local characteristics of the interaction between natural and socio-economic processes. Through this approach, students can analyze specific cases of landscape changes in their area, such as: the impact of tourism development in the Carpathians on vegetation and soils; the consequences of agricultural and forestry activities; manifestations of erosion, landslides, and changes in the hydrological regime in the region (Chervinska I., 2020).

This approach includes field research, working with local maps and historical data, and conducting interviews with residents, which contributes to the development of students' spatial, ecological, and socio-economic competencies. It also enhances motivation through a direct connection to their native region and develops skills for comprehensive analysis of landscape transformations within the regional context, which is an important component of sustainable development in Ivano-Frankivsk.

Education for Sustainable Development serves as the foundation for harmonizing the interaction between human activity and nature, especially in mountain regions such as the Carpathians. It aims to foster in students a holistic understanding of the ecological, economic, and social aspects of sustainable natural resource management. This type of education develops young people's skills for responsible resource use, critical thinking, and the ability to make balanced decisions that consider both nature's and humans' needs. In the mountain regions of Ukraine, particularly in Ivano-Frankivsk, education for sustainable development incorporates an interdisciplinary approach, the use of local studies examples, and modern methods for analyzing landscape transformation.

Legislative and strategic documents, as well as the experience of European programs ("Alpine Space"), emphasize the necessity of integrating education for sustainable development into national and regional policies. This contributes not only to the protection of natural resources but also to socio-economic development, the preservation of cultural heritage, and the improvement of quality of life.

CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

Geographical education is influenced by demographic changes, declining interest in the exact sciences, and the need to update curricula. Addressing these challenges is possible through the modernization of teaching methods, the development of digital literacy, and the implementation of project-based approaches. Studying the transformation of mountain landscapes is crucial for understanding the interaction of natural, socio-economic, and ecological processes and for developing ecological and spatial competencies. A regional approach deepens the understanding of local changes and motivates students to explore their native region.

Combining topics of global economy and mountain landscape transformation fosters a systemic understanding of global and local challenges, helping students recognize the impacts of urbanization, tourism, industry, and ecological changes. Such an integrated educational approach develops ecological awareness and competence in future specialists. Adapting global trends to local conditions makes geographical education modern and practically oriented.

The prospects for further research on the educational aspects of studying mountain landscape transformation in secondary education institutions are driven by the need to deepen the interdisciplinary approach and strengthen the



practical orientation of school geography education. A promising direction is the development of innovative educational technologies that combine the use of GIS, remote sensing, interactive maps, and digital platforms for monitoring changes in mountain landscapes. This will allow students to develop spatial, ecological, and geo-economic competencies at a new qualitative level.

Future research should focus on creating educational and methodological materials that adapt complex global processes to students' age capabilities and consider the specific features of mountain regions, particularly the Carpathians. It is also relevant to develop models for integrating the local studies approach into the school geography curriculum, allowing students to study transformation processes using examples from their native region, thereby enhancing motivation and research activity.

Equally important is the assessment of the effectiveness of interdisciplinary educational projects that combine geography, economics, biology, ecology, and social sciences. Such projects contribute to forming a comprehensive understanding of contemporary challenges related to the transformation of mountain landscapes in a globalized economy.

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