CHAPTER 14

SOCIO-GEOGRAPHICAL RESEARCH AS A TOOL FOR FORMING SPATIAL POLICY FOR SUSTAINABLE TERRITORIAL DEVELOPMENT

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INTRODUCTION

In the 21st century, spatial aspects of development are considered an integral part of the strategic management of territories, which affects the balance, stability, and competitiveness of states and regions. Globalisation and structural crises in the world economy are changing the spatial configuration of socio-economic systems. The deterioration of the ecological situation and the growth of related risks create additional constraints on the sustainable use of territorial resources. Demographic asymmetry, accelerated urbanisation and digital transformation exacerbate spatial unevenness in development. In Ukraine, these processes are complicated by the consequences of full-scale war and the need for post-war recovery. All these factors underscore the need to reassess approaches to the development of modern spatial policy. In the context of transitioning to sustainable development models, the ability of society to manage not only individual sectors but also the holistic spatial structure of territories, ensuring a balance between economic growth, social justice, and environmental protection, is of particular importance.

Geography is one of the few sciences that integrates nature, population and economic activity into its subject area. Social geography provides the theoretical and methodological foundation for examining the territorial organisation of society, the interplay between society and nature, and spatial variations in development. For a long time, a strict division existed between the natural and social sciences, which made it challenging to construct a coherent scientific picture of the world and hindered comprehensive research. In modern conditions, integrative, interdisciplinary approaches are becoming the leading trend: a unified system of knowledge about the relationship between "man – nature – society – space" is being formed, in which social geography plays the role of a conceptual and methodological "bridge" between the natural, socio-economic and human sciences.

In the second half of the 20th century and early 21st century, European scientific practice and the system of territorial management developed an understanding of spatial policy as a tool for the targeted regulation of the territorial organisation of society and the balanced use of spatial resources. From classical concepts of productive forces and regional economies, spatial planning is moving towards integrated approaches that encompass the natural environment, social sphere, economy, infrastructure, cultural heritage, and settlement systems. For Ukraine, this issue is particularly relevant in connection with the decentralisation reform, the formation of a new regional policy, adaptation to European Union standards and the development of strategies for post-war recovery and transformation of territories.

In this context, socio-geographical research is not only a tool for scientific knowledge, but also a practical tool for the formation, implementation and evaluation of spatial policy. They provide analysis of spatial disparities, typification of regions and communities, identification of problematic and priority territories, justification of territorial development scenarios, modelling of the consequences of management decisions, and preparation of spatially oriented strategic documents.

The relevance of the proposed section is determined by the need to deepen the theoretical and methodological foundations of socio-geographical research in the paradigm of sustainable development. It is also important to understand spatial policy as both an object of research and a field of applied social geography. It is necessary to generalise the tools with which the results of geographical research are transformed into practical decisions for state authorities and local self-government bodies. Additional attention should be paid to contemporary challenges related to post-war reconstruction, spatial justice and the sustainability of regions and communities.

This section seeks to substantiate the significance of socio-geographical research as a fundamental instrument for shaping spatial policy aimed at supporting the sustainable development of territories. It emphasises the need to clarify the theoretical and methodological foundations of such research, to reveal the principal dimensions through which spatial policy is formed, and to examine the tools that ensure its scientific justification and effective implementation.

Within this framework, particular attention is devoted to analysing the evolution and contemporary content of theoretical and methodological approaches in social geography, especially those applied to the study of spatial development and the interpretation of its inherent patterns. A further objective is to explore the major socio-economic, demographic, environmental, infrastructural and cultural-geographical parameters that determine both the structure and priorities of spatial policy directed towards achieving sustainability.

The section also aims to delineate the methodological apparatus of socio-geographical research that underpins the design, development and realisation of spatial policy measures at national, regional and local scales. This involves identifying methodological tools and analytical procedures necessary for diagnosing spatial disparities, assessing territorial potential and substantiating policy interventions.

Finally, the role of social geography in addressing the challenges of post-war recovery is examined, with a particular focus on strengthening territorial resilience and facilitating the integration of Ukraine into the European framework of sustainable development. In this context, socio-geographical research is interpreted as an essential platform for evidence-based decision-making and for aligning national spatial policy with broader European standards and strategic objectives.

1. Theoretical and methodological foundations of socio-geographical research on spatial policy for sustainable development

Social geography has historically developed as a science of the territorial organisation of society, studying spatial differences and patterns in the distribution of population, economy, social infrastructure and forms of human activity. Its methodological specificity lies in its ability to integrate diverse natural, economic, social, cultural and political processes within specific territorial systems. It is this integrative nature that makes social geography one of the key disciplines for understanding the spatial dimensions of sustainable development, within which environmental, social and economic goals are considered as interrelated components of a single development model.

The formation of the Ukrainian socio-geographical school is accompanied by a systematic approach to the problems of the spatial organisation of society as the central object of scientific analysis. The concepts of territorial integrity and the historical and geographical unity of Ukrainian lands were already present in the works of P. Shafarik (1837). They were further developed by S. Rudnytsky (1914), who introduced the concepts of Ukrainian space, geopolitical position and the Baltic-Pontic system of relations into scientific discourse. These approaches were further developed in the works of V. Semenov-Tyan-Shansky (1910), who analysed the natural, ethnic and economic characteristics of southern Ukraine in his multi-volume description of the regions of the former empire, and Y. Lypa, who formed the Black Sea geopolitical doctrine, emphasising the strategic role of coastal territories[1].

[1] Топчієв О.Г., Мальчикова Д.С., Сич В.А., Яворська В.В. Територіальна організація суспільства: сучасні підходи й напрями досліджень. *Науковий вісник Херсонського державного університету*, 2019, (1). С. 73-80. URL: DOI: https://doi.org/10.32999/ksu2413-7391/2019-11-10

In the second half of the 20th century, the scientific paradigm underwent significant changes. The methodological opposition between nature and society, which in the 1960s and 1970s led to the division of geography into physical and economic geography, proved to be methodologically limited and slowed down the development of comprehensive research. Gradually, it became clear that spatial processes result from the interaction of natural, economic, and social factors and their analysis requires a unified interdisciplinary approach.

Contemporary general scientific methodology is characterised by a strengthening of integrative trends, among which human-centred and territory-centred approaches are of particular importance. For social geography, this means a transition from a descriptive study of the location of objects to an analysis of territory as a multi-level, open system where the natural environment, infrastructure, economic activity, social practices and management institutions interact. As a result, the scientific focus is shifting from recording spatial facts to studying structural links, territorial inequalities, and the mechanisms that form stable and unstable territorial systems.

The concept of regionalisation, which was actively developed in conjunction with the formation of European regional policy, had a significant impact on the development of the modern theoretical and methodological foundations of social geography. Ukrainian scientists, including O. Shablii, O. Topchiev, L. Rudenko, I. Dolishnii, F. Zastavny, L. Nemets, K. Nemets, and K. Mezentsev, have substantiated the need to transition from an administrative-territorial to a comprehensive regional approach based on natural-geographical, socio-demographic, cultural-historical, and economic criteria. These principles formed the basis of the modern understanding of regions as integral socio-natural systems[2], [3], [4], [5].

The further development of the theory of social geography was influenced by new scientific concepts of the late 20th and early 21st centuries. In particular, the formation of the transport and logistics paradigm contributed to the understanding of territory as a system of flows that combines production,

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[2] Палеха Ю.М. Планувальний каркас України як основа забезпечення її сталого просторового розвитку. *Досвід та перспективи розвитку міст України*, 2015, 29, С. 48-56. URL: DOI: https://doi.org/10.15407/ugz2022.04.013

[3] Руденко Л.Г., Лісовський С.А., Маруняк Є.О. Досвід стратегічної оцінки впливу на довкілля в процесі планування в Україні. *Український географічний журнал*, 2016, (2), С. 3-12. URL: DOI: https://doi.org/10.15407/ugz2016.02.003

[4] Руденко Л.Г., Лісовський С.А., Маруняк Є.О. Екологічні керівництва в пріоритетах процесу інтегрального планування в Україні. *Український географічний журнал*, 2016, 4, С. 9-16. URL: DOI: https://doi.org/10.15407/ugz2016.04.009

[5] Топчієв О.Г., Мальчикова Д.С., Сич В.А., Яворська В.В. Територіальна організація суспільства: сучасні підходи й напрями досліджень. *Науковий вісник Херсонського державного університету*, 2019, (1). С. 73-80. URL: DOI: https://doi.org/10.32999/ksu2413-7391/2019-11-10

distribution, and consumption. Within the framework of these approaches, a modern view of the territorial organisation of the economy has emerged as a complex of interconnected infrastructural and functional nodes and corridors that form the spatial structure of regional development.

Geodemography, which analyses the territorial features of demographic processes in the country, has also become an important area of study, particularly relevant in the context of depopulation, migration transformations and territorial unevenness. Today, social geography considers settlement systems not only as administratively defined, but also as historical, geographical and socio-cultural entities that need to be rethought in connection with the reform of local self-government and the updating of regional policy.

The development of geoinformation technologies, electronic mapping and big data also influences the formation of new theoretical and methodological foundations. The information paradigm, which has become decisive for geography at the beginning of the 21st century, provides a qualitatively new level of analysis of territorial systems and is the methodological foundation of modern spatial policy[6].

As a result, the theoretical and methodological development of social geography reflects a transition from a fragmented analysis of the natural and social components of a territory to a comprehensive understanding of space as a system of interactions. This approach lays the groundwork for the scientifically sound development of spatial policy for sustainable development, in which territory is viewed not only as a space for placement, but also as a multidimensional system of resources, opportunities and constraints.

The modern theoretical and methodological foundations of social geography encompass leading conceptual approaches that facilitate a comprehensive understanding of spatial processes, enabling the territory to be viewed as a complex, multi-level system. The systemic approach is a fundamental methodological principle that considers the territory as an integral system comprising interconnected subsystems, including population, economy, infrastructure, ecosystems, social institutions, and management mechanisms. This approach enables the analysis of the interaction and feedback between the subsystems of territorial systems, allowing for the identification of patterns in their functioning and development[7].

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[6] Маруняк Е. Територіальне (просторове) планування: зміст та еволюція основних сучасних тенденцій. *Український географічний журнал.* 2014 (2). С. 22-31. DOI: https://doi.org/10.15407/ugz2014.02.022

[7] Дронова О.Л., Маруняк Є.О., Руденко Л.Г. та ін. Генеральна схема планування території України: науково-методичні засади та результати. *Український географічний журнал*. 2023. № 3: 3-11. DOI: https://doi.org/10.15407/ugz2023.03.003

Territorial and regional approaches play a significant role in socio-geographical research, offering a holistic understanding of space as a multifaceted system. The territorial approach serves as a fundamental methodological foundation, as it enables the analysis of territory as an interconnected space of natural, socio-economic, infrastructural and institutional processes. The district approach is its specialised form, providing scientific zoning and identification of regions as holistic spatial entities with their inherent natural, historical-geographical, cultural and socio-economic characteristics[8]. Combined, these approaches enable a comprehensive analysis of territorial differentiation, establish regional specifics, and justify spatial development models, which are key to the formation of effective spatial policy and regional planning.

Landscape and geo-ecological approaches ensure that the natural resource potential and environmental constraints of territories are considered. Within these approaches, an understanding of the natural frameworks of ecological security is formed, which serves as the foundation for naturally balanced development and determines the permissible loads on the natural environment. These approaches are particularly relevant for contemporary research, given the exacerbation of environmental risks and global climate change.

The further development of social geography is linked to institutional and spatial-political approaches, which form the methodological basis for analysing the role of state authorities, local self-government, legal norms, strategic documents and regulatory decisions in shaping the spatial structure of development. These approaches allow us to consider space as the result of institutional interaction and political decisions, which is particularly important for analysing the processes of decentralisation, regional policy, territorial competitiveness and spatial justice.

Network and geoinformation approaches have made a significant contribution to the development of social geography methodology. The network approach is aimed at studying spatial flows, interrelations between territories, and the formation of network structures, as well as transport and communication systems. The geoinformation approach, which is based on the use of GIS, remote sensing of the Earth, spatial modelling and big data, provides the opportunity for in-depth analysis of spatial processes, forecasting of territorial changes and scientifically based development planning[9].

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[8] Kornus A.O. Regional features of the socio-economic component of the geographical process in the northeast part of Ukraine. *Journal of Geol., Geogr. and Geoecology*. 2008. 17, 3/2, 76-81. DOI: https://doi.org/10.15421/110913

[9] Палеха Ю.М. Планувальний каркас України як основа забезпечення її сталого просторового розвитку. *Досвід та перспективи розвитку міст України*, 2015, 29, С. 48-56. DOI: https://doi.org/10.15407/ugz2022.04.013

In the context of these approaches, the key concept of social geography remains the territorial organisation of society, which reflects the spatial structure of settlement, the location of production, infrastructure, recreational areas and nature conservation areas, as well as the network of interrelationships between these elements. In modern theoretical and methodological approaches to social geography, this concept is supplemented by the categories of territorial differentiation, spatial polarisation, the stability of territorial systems, and the spatial vulnerability of regions and communities. These categories offer a deeper understanding of the qualitative characteristics of space, which are shaped by global challenges, structural economic changes and the adaptive capacities of territories.

The paradigm of sustainable development, enshrined in international documents and the UN Sustainable Development Goals, is significantly transforming social and geographical research, shifting its focus from economic efficiency to the balance between society and nature, reducing risks and territorial vulnerability, and ensuring a high quality of life for the population. For social geography, this means an in-depth analysis of the spatial aspects of inequality and polarisation of development, territorial manifestations of the demographic crisis, migration and population ageing, spatial distribution of environmental risks and the impacts of climate change. A crucial component of contemporary research is the examination of models for economic and energy transformation at the regional level, as well as the development of spatially oriented strategies for restoring territories following crises and military actions.

In view of this, contemporary social geography offers a comprehensive methodological framework for understanding the complex nature of spatial processes and justifying sustainable development strategies that consider the territory's resources, social needs, environmental constraints, and institutional management mechanisms. This scientific approach offers the opportunity to develop effective spatial policies that address the challenges of the 21st century[10].

In modern conditions, social geography extends beyond the boundaries of traditional descriptive science, forming a scientific and practical platform that provides theoretical justification and methodological support for the development of spatial policy. The processes of decentralisation and the transition to strategic management of territorial development are leading to an increase in the importance of geographical research in decision-making related to the use of territorial resources, the optimisation of settlement, the

[10] Руденко Л.Г., Лісовський С.А., Маруняк Є.О. Екологічні керівництва в пріоритетах процесу інтегрального планування в Україні. *Український географічний журнал*, 2016, 4, С. 9-16. DOI: https://doi.org/10.15407/ugz2016.04.009

organisation of economic activity and infrastructure development. In this context, the geoinformation paradigm is of particular importance, as modern GIS technologies, remote sensing, satellite monitoring, large spatial data sets, and spatial econometric modelling methods provide a qualitatively new level of spatial analysis. The use of such tools creates opportunities for multifaceted analysis of territorial processes, identification of spatial structures and development clusters, justification of alternative scenarios for spatial transformation, and construction of cartographic models that are accessible to authorities, economic entities and the public[11].

A summary of the theoretical and methodological potential of modern social geography gives grounds to consider it as one of the leading methodological foundations for the formation of spatial policy for sustainable development. This applies both to the conceptual level, which involves defining the principles and objectives of territorial development, and to the practical level, which involves planning, organising the functional use of territories and the rational distribution of resources.

2. Socio-geographical dimensions of spatial policy for sustainable development of territories

Spatial policy is a comprehensive system of management decisions aimed at regulating the spatial organisation of society, optimising the use of territorial resources and ensuring the balanced development of regions and communities. Its content consists of a scientifically based determination of territorial development priorities, optimisation of infrastructure facility location, formation of functional zoning of territories, organisation of the settlement system, and coordination of socio-economic, environmental, and cultural-historical interests. Spatial policy performs an integrative function, as it coordinates the interaction of various types of activities, restrictions and opportunities that arise within a given space, and provides the basis for strategic management of territorial systems[12].

The formation of the concept of spatial policy in Ukraine is influenced by European approaches to spatial planning, which envisage a polycentric model of development, integration of sectoral policies, and increased territorial cohesion and environmental sustainability. Unlike the traditional view of regional

[11] European Commission. European Spatial Development Perspective: Towards Balanced and Sustainable Development of the Territory of the European Union. Luxembourg: Office for Official Publications of the European Communities, 1999. URL: https://ec.europa.eu/regional_policy/en/information/publications/reports/1999/european-spatial-development-perspective

[12] Руденко Л.Г., Лісовський С.А., Маруняк Є.О. Екологічні керівництва в пріоритетах процесу інтегрального планування в Україні. *Український географічний журнал*, 2016, 4, С. 9-16. DOI: https://doi.org/10.15407/ugz2016.04.009

development, which was based mainly on administrative boundaries, the modern approach focuses on territorial systems defined by spatial interrelationships, flows, accessibility, functional specialisation and natural-geographical characteristics. The transition to this approach entails strengthening the role of social geography, which provides a theoretical and methodological basis for analysing territory as a complex, multi-level system.

In the paradigm of sustainable development, spatial policy should be viewed as a tool for ensuring a balance among economic growth, social integrity, and environmental sustainability. Ukraine's spatial heterogeneity is manifested in contrasts in resource potential, differentiation in infrastructure provision, asymmetry in demographic development and varying capacities of territories to adapt to external influences. Particular attention should be paid to the combination of areas of environmental risk with territories of low socio-economic stability, which form areas of increased spatial vulnerability. A comprehensive socio-geographical analysis enables the identification of such territories, the assessment of their transformation, and the formulation of scientifically sound decisions regarding their development[13]. In this context, spatial policy should be viewed as a tool for overcoming imbalances and ensuring the integrated development of territories, with a focus on reconciling the interests of society, the economy and the natural environment.

Socio-geographical studies identify such imbalances by mapping territorial differences in key development indicators, including GDP per capita, employment rates, household income, investment activity and quality of life indicators[14]. Cartographic models enable the identification of spatial areas of economic activity concentration, the determination of polarised areas, the assessment of the degree of territorial unevenness, and the development of scenarios for optimising the territorial organisation of the economy. They are an important analytical tool because they provide data visualisation, identify trends that are not always identifiable by traditional statistical methods, and form the basis for management decisions. Methods of spatial statistics and spatial econometrics are critical, as they enable the analysis of territorial autocorrelation, interregional dependencies and the effects of spatial interaction[15].

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[13] Корнус А.О. Теоретико-методичні основи дослідження трансформації екологічної складової регіональних соціогеосистем. *Вісник Харківського національного університету імені В.Н. Каразіна. Серія: Екологія.* 2013. №9. С. 42-47.

[14] Корнус А.О., Корнус О.Г. Екологічні та суспільно-економічні індикатори сталого розвитку. Екологічний менеджмент у загальній системі управління: збірник тез доповідей Дванадцятої щорічної Всеукраїнської наукової конференції, Суми, 18-19 квітня 2012 року / Відп. за вип. О.М. Теліженко. Суми: СумДУ, 2012. С. 89-92.

[15] Топчієв О.Г., Мальчикова Д.С., Сич В.А., Яворська В.В. Територіальна організація суспільства: сучасні підходи й напрями досліджень. *Науковий вісник Херсонського державного університету*, 2019, (1). С. 73-80. DOI: https://doi.org/10.32999/ksu2413-7391/2019-11-10

Demographic processes form the fundamental basis of the spatial dynamics of regions. Depopulation, an ageing population, the transformation of migration flows and the formation of new spatial settlement patterns characterise the current demographic situation in Ukraine. Analysis of demographic development enables the identification of areas with a critical loss of human potential, assessment of changes in the structure of settlement systems, and detection of trends in agglomeration growth and the decline of peripheral settlements. Geodemographic studies provide forecasts of the needs for transformation of social infrastructure networks and determine which territories are capable of supporting sustainable development and which require additional investment in human capital or even correction of the administrative-territorial organisation.

Functional typology of territories is a crucial tool in social geography. It enables us to identify various types of territorial systems, including industrial, agricultural, recreational, transit-logistical, and innovative, and explain the nature of their economic specialisation. This approach enables the prediction of potential development trajectories, assessment of the potential for structural modernisation, and determination of the optimal types of activity for a particular territory. Typology forms the basis for strategic planning, as it allows us to identify territories that can become growth centres, as well as those that require structural support or economic diversification.

The environmental dimension of spatial policy focuses on assessing natural and geographical conditions, as well as artificial stress, air, water, and soil pollution, and the vulnerability of territories to natural hazards and climate change. Environmental factors determine the possible modes of land use, impose restrictions on the intensity of development and influence the choice of development directions. The application of the ecological framework concept and nature-oriented solutions enables the integration of natural conditions into the territorial planning system, forming spatial models that reconcile economic activity with the requirements of ecological balance[16].

The results of socio-geographical research form the basis for the development of strategic documents: general territorial planning schemes, regional planning schemes, regional development strategies, and integrated community development programmes. Geographical analysis provides scientific justification for the selection of priority development areas, identification of areas of economic activity concentration, and determination of depressed areas and areas of potential growth.

[16] Komelina O., Kondratieva H. Modern principles of sustainable spatial development of innovative territorial systems in Ukraine. Integration vectors of sustainable development: economic, social and technological aspects: *Collective monogr*. / The University of Technology in Katowice Press, 2023. P. 123-131. URL: https://reposit.nupp.edu.ua/handle/PoltNTU/14029

A complex configuration of spatial development characterises Ukraine. Its formation is influenced by the historical and geographical features of land development, the evolution of settlement systems, the transformation of regional economic specialisation, and administrative reform processes. Regions differ in terms of the structure of their settlement networks, population density, local labour markets and the level of labour mobility. The transitional nature of the economy exacerbates structural imbalances, while uneven infrastructure development creates areas of resource "oversaturation" and areas of "opportunity deficit"[17].

The current demographic crisis is manifested in depopulation, population ageing, increased migration flows and a decline in population in a significant part of the peripheral territories. Demographic processes create noticeable spatial imbalances between agglomerations, where human capital and developed infrastructure are concentrated, and peripheral regions, where population decline and the curtailment of social services are observed. Spatial polarisation between large urban agglomerations, medium-sized cities, small settlements and rural areas shapes different development trajectories and determines unequal starting opportunities for regional modernisation.

War factors have become a new determining element of spatial dynamics. The destruction of infrastructure, changes in the functional purpose of territories, the relocation of populations and enterprises, the reformatting of transport flows and the emergence of new security and risk zones are shaping the country's new spatial landscape. Geographical analysis enables the determination of the scale of changes, assessment of the capacity of territories for recovery, and the proposal of models of post-war reconstruction that are consistent with natural-geographical and socio-economic conditions[18].

The key task of modern spatial policy is to build territorial resilience. A combination of natural and geographical characteristics, infrastructure resources, the structure of human capital, and the level of integration of territorial systems determines this. Resilient territories can adapt to external influences, maintain the functioning of key infrastructure and social systems, and ensure longterm development. Identifying territories of resilience and vulnerability enables the development of adaptive management models that consider both natural and socio-economic constraints.

The geo-economic dimension in the structure of social geography focuses on studying the spatial organisation of transport corridors, the functioning

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[17] Топчієв О.Г., Мальчикова Д.С., Сич В.А., Яворська В.В. Територіальна організація суспільства: сучасні підходи й напрями досліджень. *Науковий вісник Херсонського державного університету*, 2019, (1). С. 73-80. URL: DOI: https://doi.org/10.32999/ksu2413-7391/2019-11-10

[18] Дронова О.Л., Маруняк Є.О., Руденко Л.Г. та ін. Генеральна схема планування території України: науково-методичні засади та результати. *Український географічний журнал*. 2023. № 3: 3-11. URL: DOI: https://doi.org/10.15407/ugz2023.03.003

of port-industrial agglomerations, the nature of cross-border links, and the intensity of flow processes. It enables the establishment of the degree of territorial connectivity, identification of infrastructure barriers, determination of areas of economic potential concentration, and assessment of the configuration of spatial interaction between regions. This approach provides a scientific basis for the formation of logistics clusters, industrial and transportation hubs, and network structures that support economic development[19].

The geodemographic dimension of spatial policy reflects territorial differences in natural and mechanical population movement, age structure, migration mobility and the configuration of settlement systems. Demographic processes give rise to distinct spatial differentiation, manifested in contrasts between agglomeration zones with a high concentration of human potential and peripheral territories with persistent depopulation trends. Changes in migration flows, population movements and the transformation of settlement structures in the postwar period have a significant impact on the socio-economic development potential of territories. Geodemographic analysis enables the assessment of the viability of territorial communities, the identification of areas of demographic stability and vulnerability and the justification of the need to modernise the social services network[20].

A comprehensive analysis of geo-economic and geodemographic processes forms the basis of an integrated spatial policy vision. A geographical approach enables us to establish patterns of territorial resource distribution, identify spatial centres of economic activity, identify depressed territories, and assess the effectiveness of interregional links. It provides a scientific basis for the formation of a system of support centres for development, a polycentric structure of settlements, the optimisation of transport and logistics networks, and the rationalisation of land use.

The analysis of possible scenarios of territorial transformation is becoming increasingly important in the priorities of spatial policy. Spatial modelling enables the assessment of the impact of infrastructure projects on the economy's structure and settlement systems, identifying potential changes in the configuration of industrial centres, logistics hubs, agro-industrial areas and recreational zones. War damage and population displacement have created new types of territorial imbalances that require systematic scientific assessment. Geographical analysis of the spatial consequences of war encompasses research

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[19] Руденко Л.Г., Лісовський С.А., Маруняк Є.О. Досвід стратегічної оцінки впливу на довкілля в процесі планування в Україні. *Український географічний журнал*, 2016, (2), С. 3-12. URL: DOI: https://doi.org/10.15407/ugz2016.02.003

[20] Лабінська Г. Просторове планування в Україні: навчально-методичні матеріали. Львів, 2024. URL: https://geography.lnu.edu.ua/wp-content/uploads/2024/09/Labinska_Prostorove-planuvannia-v-Ukraini_2024.pdf

into the extent of damage to infrastructure, changes in the functional purpose of territories, transformations in economic flows, and alterations in the regional structure of human capital. It is a necessary prerequisite for identifying priority areas for recovery and formation[21].

Socio-geographical studies offer an opportunity to comprehensively analyse the spatial dynamics of territories within the context of multidimensional socio-economic, environmental, and political processes. They enable the assessment of the degree of resilience of territorial systems to economic, social, military, and natural-ecological crises, determining the ability of regions to maintain functionality and adapt to external influences. Based on the analysis of the spatial configuration of resources, transport and communication infrastructure, and the distribution of human capital, socio-geographical research provides the basis for modelling possible recovery trajectories that take into account the structural, functional and natural-geographical characteristics of territories.

A key direction is the justification of territorial transformation scenarios that consider the potential for reformatting industrial centres, logistics hubs, agglomeration formations, and networks of territorial communities. This approach enables the assessment of prospects for changing the spatial organisation of the economy, identifying areas for strengthening intra-regional ties, and establishing a new configuration of spatial interactions. At the same time, socio-geographical studies enable the identification of territories of priority importance for investment, infrastructure reconstruction, restoration of critically important facilities, as well as for the implementation of innovative, recreational and environmental protection functions. All these elements form the scientific basis for developing balanced spatial development strategies that focus on the long-term sustainability and competitiveness of territories[22].

A comprehensive socio-geographical analysis provides a holistic understanding of the spatial logic underlying a country's development. It enables the integration of natural and geographical conditions, demographic dynamics, economic specialisation, infrastructure provision and flow processes into a single knowledge system that forms the basis for scientifically sound spatial policy. This approach enables a transition from fragmented territorial management to a systematic, strategic approach focused on long-term sustainable development.

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3. Tools of socio-geographical research in the formation of spatial policy for sustainable development

The implementation of spatial policy for sustainable development involves the use of a wide range of scientific methods and applied tools that enable the comprehensive collection, processing, interpretation and modelling of spatial information. Modern socio-geographical research is based on a multi-level analytical apparatus that combines traditional approaches to geographical science with innovative tools of digital geospatial analytics. This combination enables a thorough and objective assessment of the structure of territorial systems, diagnosis of spatial imbalances, prediction of transformations, and informed decision-making based on scientifically sound management practices.

At the classical level, the foundation of the toolkit for socio-geographical research is formed by statistical, cartographic, comparative-geographical, historical-geographical, and field methods. They constitute the basic scientific framework on which the analysis of territorial systems, their internal structure, dynamics and external interrelationships is carried out[23].

Statistical analysis is one of the key methods, as it provides processing of territorially differentiated data on population, economy, employment structure, income, investment activity, state of social infrastructure, environmental indicators and parameters of spatial mobility. It enables the determination of the structure and dynamics of regional development, the measurement of the intensity of socio-economic processes, the identification of types of territorial structures, and the localisation of areas of concentration and centres of peripheralization. The statistical approach allows not only to analyse existing spatial differences, but also to identify long-term macro trends, form assessments of the stability and variability of territorial systems, make interregional comparisons and study the heterogeneity of processes within individual regions.

Mapping is the primary method of spatial representation and interpretation of data. It provides a transition from a set of numerical indicators to their spatial-structural representation, which allows identifying spatial patterns, characteristics of territorial contrasts and areas of concentration of phenomena. Thematic maps, cartograms, cartodiagrams, analytical series, and synthetic and complex cartographic models enable the study of the spatial configuration of demographic, economic, social, environmental, and infrastructural processes. The cartographic method provides an in-depth analysis of the territorial organisation of regions, forms the basis for zoning, assessing territorial development, identifying centres of gravity, flow structures and zones of influence.

[23] Diomin M., Habrel M., Kovalchuk I. Ergatic approach to reconstruction and modeling of the spatial future of Ukraine. *Urban, Planning and Transport Research*, 2024, 12(1). DOI: https://doi.org/10.1080/21650020.2024.2374719

The comparative-geographical method is aimed at analysing the standard and distinctive features of territorial systems. It enables the assessment of the degree of similarity or contrast between regions, identifies the factors that determine the differentiation of development levels and categorises types of territorial complexes based on their structural and functional characteristics. Comparative analysis enables the substantiation of regional development models and the formation of classification systems necessary for planning and management[24].

The historical-geographical method provides research into the stages of formation of territorial structures, the dynamics of settlement, changes in economic specialisation, the evolution of spatial interrelationships and the transformation of natural and anthropogenic complexes. It allows us to establish the genesis of modern territorial systems, identify factors of long-term stability or, conversely, instability, and analyse the historical preconditions of modern spatial imbalances.

Field research, which involves direct study of the area, plays a crucial role in collecting primary information. It includes field observations, morphological description of territories, recording of landscape features, assessment of the state of infrastructure, social and environmental situation, and surveys of the local population. Field methods enable us to confirm or refine the results obtained from statistical and cartographic sources, providing a deeper interpretation of spatial processes[25].

Together, these methods form the systematic basis of the classical methodology of social geography and provide a comprehensive analysis of the spatial organisation of territories. They are used to form generalised scientific conclusions necessary for assessing territorial development, justifying spatial policy, determining the potential and limitations of regional systems and developing models for future transformations.

In the 21st century, traditional methods are significantly enhanced by the development of geoinformation technologies. Geoinformation systems integrate statistical, cadastral, environmental, economic, social and infrastructure data, as well as remote sensing materials, in a single spatial environment. Such integration enables the creation of multi-layered analytical models of the territory, allowing for the study of the interaction between numerous natural and

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[24] Топчієв О.Г., Мальчикова Д.С., Сич В.А., Яворська В.В. Територіальна організація суспільства: сучасні підходи й напрями досліджень. *Науковий вісник Херсонського державного університету*, 2019, (1). С. 73-80. DOI: https://doi.org/10.32999/ksu2413-7391/2019-11-10

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socio-economic factors, the identification of spatial patterns, the assessment of the intensity of territorial processes, and the prediction of their transformation directions. Geographic information systems open up the possibility of applying a full range of spatial statistics methods, including autocorrelation analysis, identification of local concentration zones, clustering of territories, modelling of spatial trends, as well as cartometric and morphometric procedures necessary for high-precision territorial studies.

Remote sensing of the Earth is an integral part of modern socio-geographical research. Multispectral and radar satellite images enable the monitoring of changes in land use, vegetation dynamics, soil conditions, water resources, urban areas and areas of technogenic load. They are significant for analysing the consequences of war damage, assessing the extent of degradation of natural complexes, evaluating the degree of landscape transformation, and identifying areas that have undergone critical changes in the structure of spatial functions[26].

Spatial planning as an applied field of social geography is based on the use of analytical and design tools. At the national level, general plans for territorial planning, concepts of territorial development and models of spatial economic organisation are being developed. They include the construction of schemes for the formation of natural frameworks, assessment of the ecological sustainability of territories, identification of major transport routes, designation of key centres of economic activity, and forecasting of settlement development. At the regional and territorial community levels, important tools include regional planning schemes, comprehensive spatial development plans, integrated urban development plans, detailed territorial plans and specialised functional zoning maps.

Functional zoning is one of the key results of socio-geographical analysis. It covers the identification of residential, industrial, recreational, nature conservation, agricultural, and transport and logistics zones, as well as the determination of their interactions and regulations for their use. The geographical rationale for zoning is based on data on natural conditions, environmental constraints, demographics, infrastructure, functional specialisation and socio-economic trends. Landscape planning complements zoning, taking into account natural and territorial complexes, ecological capacity, landscape stability and permissible load parameters[27].

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[26] Mulska O., Bil M., Leshchukh I., Baranyak I., Voronko O. Socio-economic resilience vs vulnerability: spatial modelling under sustainable development conditions (the case of Ukraine's regions). *Agricultural and Resource Economics*, 2025, 11(3), pp. 130-164. DOI: https://doi.org/10.51599/are.2025.11.03.05

[27] Руденко Л.Г., Лісовський С.А., Маруняк Є.О. Екологічні керівництва в пріоритетах процесу інтегрального планування в Україні. *Український географічний журнал*, 2016, 4, С. 9-16. DOI: https://doi.org/10.15407/ugz2016.04.009

Within the analysis of transport systems, social geography uses network models to assess the capacity of transport corridors, the efficiency of logistics hubs, the level of accessibility and the degree of integration of regions into the national and global transport space. For port regions, border areas and large agglomerations, specialised models are used that combine data on freight flows, passenger movements, industrial functions of territories and the dynamics of economic specialisation.

A separate segment of the toolkit consists of methods for analysing settlement systems. They enable the determination of the structure and hierarchy of cities, the assessment of the role of centres of gravity, the identification of areas of commuter migration, the characterisation of urban agglomerations, and the formulation of models of polycentric systems. Analysis of transportation and social accessibility enables us to evaluate the provision of educational, medical, cultural, and administrative services to the population. The use of isochronous models enables the identification of territories within reach of critical services, as well as areas of territorial deprivation[28].

Scenario spatial modelling is one of the most innovative tools in modern social geography and spatial planning. This method involves creating alternative scenarios for the development of territories, followed by an analysis of possible trajectories for transforming spatial systems. The scenario approach enables the assessment of the consequences of various management decisions, identification of potential changes in land-use structure, and prediction of the response of territorial systems to infrastructure interventions, reconfiguration of transport networks, changes in land use and demographic dynamics.

Scenario modelling provides the opportunity to assess the impact of large-scale investment projects scientifically, including the formation of new industrial, logistics, or recreational centres, the transformation of agro-industrial chains, as well as potential changes in the spatial structure of the economy resulting from crisis events or external shocks. The use of this tool enables the identification of critical points, spatial risks, areas of potential land-use conflicts, and territories with varying degrees of resilience to external influences.

The scenario approach enables the comparison of several alternative configurations of territorial development, creating a reliable basis for strategic planning, optimisation of spatial solutions, and the formation of long-term models of territorial structure[29].

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[28] Корнус О.Г., Корнус А.О., Шищук В.Д. Роль медико-екологічних досліджень у геоекологічному аналізі регіону. *Наук. вісн. Чернівецького нац. ун-ту.* 2012. Випуск 614-615. Географія. С. 66-69.

[29] Удовиченко В.В., Пасько В.Ф. Територіальне планування : Навчальний посібник. Київ, 2024. 120 с.

In the modern spatial planning system, methods of involving the local spatial experience of the population and territorial communities are becoming increasingly important. Their use enables the supplementation of traditional geographical research results with data that reflect the actual conditions of territory functioning, its everyday use, and the assessment of the spatial accessibility of key infrastructure elements. Such methods include mental mapping, digital mapping platforms, interactive geoinformation services, and various forms of collecting localised information from residents. The use of these tools enables the refinement of functional zone boundaries, the identification of spatial barriers, the detection of areas with high socio-spatial tension, and the localisation of local resources not recorded in statistical sources.

Such methods are crucial for areas that have suffered destruction, changes in functional purpose, or significant demographic transformations. In these conditions, the inclusion of local sources of spatial information provides the opportunity to reproduce the current configuration of spatial processes more accurately, supports the formation of scientifically sound decisions on the restoration and transformation of territories, and contributes to improving the quality of spatial planning at all levels. This approach allows combining the results of formalised socio-geographical analysis with empirical information obtained directly from the territories, thereby ensuring a comprehensive understanding of the dynamics of spatial development[30].

In the context of Ukraine's post-war reconstruction, the tools of social geography are becoming particularly important. Comprehensive plans for the restoration of territories require a detailed analysis of the ecological situation, the identification of areas of critical destruction, an assessment of infrastructure losses, population movement patterns and the transformation of settlement systems. Spatial assessment of vulnerability involves studying a territory's resistance to repeated threats, assessing artificial risks, the vulnerability of natural systems, adaptation capabilities, and the potential for rapid recovery. This process utilises various types of models that enable the combination of geographical data with forecasts for the development of territories. Cognitive models help to identify key relationships between natural, social and economic processes. System-dynamic models enable the assessment of potential changes in territorial systems over time. Ergatic models consider the interaction between the population, infrastructure, and the natural environment, enabling more

[30] Топчієв О.Г., Мальчикова Д.С., Сич В.А., Яворська В.В. Територіальна організація суспільства: сучасні підходи й напрями досліджень. *Науковий вісник Херсонського державного університету*, 2019, (1). С. 73-80. URL: DOI: https://doi.org/10.32999/ksu2413-7391/2019-11-10

accurate predictions of how territories will respond to management decisions and external influences[31].

The systematic application of socio-geographical research tools in the formation of spatial policy for sustainable development requires comprehensive generalisation, since each group of methods provides its own type of scientific information. However, only their combination forms a complete picture of territorial organisation. The interaction of statistical, cartographic, geoinformation, modelling, field and historical-geographical methods creates a multidimensional analytical space in which social, economic, demographic, environmental and infrastructural processes are reproduced in their spatial dimension. It is this integration that is a prerequisite for scientifically sound spatial management, as it allows us to determine the spatial logic of territorial development, assess its sustainability and predict the trajectories of future transformations.

The further development of socio-geographical research tools is driven by the need to improve methods for analysing complex territorial systems characterised by multi-level spatial dynamics, structural multi-componentity and rapid changes in development parameters. In this context, a key direction is to expand the possibilities for integrating spatial data of various types into unified analytical models. Classic sources are supplemented by operational mobility data, anonymised GPS tracks, information on the intensity of land use, and real-time infrastructure performance indicators. Such an expansion of the information base enables a significant increase in the accuracy of reconstructing spatial processes and a more detailed analysis, down to the level of individual local systems[32].

The methodological completeness of social geography tools lies in their ability to combine different scales of territorial analysis. At the macro level, the use of generalised statistical indicators, cartographic models, and network methods enables the assessment of the structural parameters of a country's territorial system, the identification of primary spatial development axes, and the reproduction of the configuration of national regional interactions. At the meso level, methods of infrastructure accessibility analysis, settlement models, functional typology of regions and scenario modelling of economic flows prevail. At the micro level, field research, analysis of local socio-economic structures, detailed territorial plans, assessment of the state of

[31] Руденко Л.Г., Лісовський С.А., Маруняк Є.О. Екологічні керівництва в пріоритетах процесу інтегрального планування в Україні. *Український географічний журнал*, 2016, 4, С. 9-16. DOI: https://doi.org/10.15407/ugz2016.04.009

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landscapes, and identification of environmental constraints and opportunities for local development are important. This multi-level methodological structure ensures a seamless transition from national strategies to specific decisions at the local level, a key requirement of modern spatial policy. An essential aspect of improving the toolkit is rethinking its boundaries and limitations. Many classical statistical methods remain dependent on the availability of reliable data, its relevance and representativeness. Much of the socio-economic information has time lags or lacks the detail necessary for decisionmaking at the local level. Cartographic methods, even when combined with GIS, rely on the completeness and accuracy of input data, as well as the accuracy of spatial referencing. Network models can distort real situations when using outdated information about transport corridors or the functioning of logistics hubs. Spatial modelling contains uncertainties arising from the complexity of socio-economic processes and their sensitivity to external factors. Identifying such limitations enables the enhancement of methodological reliability in research and the formulation of realistic management decisions.

Special attention should be paid to analytical tools that enable the study of transformation processes inherent in peripheral territories, agglomeration zones and cross-border regions. For peripheral territories, models for assessing accessibility, analysing infrastructure fragmentation and indexing socio-economic vulnerability are important. For agglomeration systems, the key tools are models of intraagglomeration flows, analysis of commuter migration, and reconstruction of polycentric configurations. In cross-border regions, network analysis methods are crucial, as they enable the study of the intensity of cross-border exchanges, the identification of asymmetries in infrastructure functioning, and the assessment of the role of border nodes in shaping integration processes[33].

Modern approaches to spatial analytics involve the active use of computational geography methods based on machine learning and artificial intelligence algorithms. In particular, classification and clustering algorithms enable the automatic determination of functional types of territories, the identification of spatial clusters with similar development parameters, and the detection of hidden patterns in the spatial data structure. Forecasting methods facilitate the development of medium- and long-term scenarios for changes in settlements, infrastructure networks, and demographic systems, which is necessary for strategic planning in post-war conditions.

A further direction for improving the toolkit is the development of digital geoinformation platforms that combine the capabilities of GIS, monitoring

[33] фон Левіс С. Соціально-просторові відмінності та репрезентації минулого та його відображення у західній Україні. *Український географічний журнал*, 2019, 1, С. 59-68. DOI: https://doi.org/10.15407/ugz2019.01.059

systems, modelling and project management. Such platforms provide rapid data updates and allow the integration of statistical resources, satellite data, analytical models and local information sources. Unlike traditional cartographic solutions, digital platforms allow users to interact with spatial information, perform various types of analysis, build models and generate scenarios directly in an interactive environment[34].

The development of geoinformation verification and model calibration methods is important for improving the accuracy of spatial simulations. In the context of Ukraine's post-war recovery, this is critically important, as it enables the verification of information about infrastructure objects, the extent of their destruction, the actual configuration of transport networks, the scale of land-use changes and other parameters that significantly affect the quality of spatial decisions.

One of the most promising areas of development for social geography tools is the creation of digital twins of territories. A digital twin is a comprehensive, three-dimensional model that accurately reproduces real-world systems, including natural conditions, infrastructure, social facilities, transportation networks, demographic characteristics and the dynamics of spatial processes. This tool enables the modelling of a territory as a holistic system, assessing the consequences of crisis phenomena, planning reconstruction, and optimising the location of infrastructure facilities[35].

Another important area is the development of geo-analytical approaches to modelling the resilience of territories. These methods enable the assessment of a territorial system's ability to withstand external influences, adapt to them, and recover from crises. Resilience models take into account parameters such as infrastructure stability, socio-demographic situation, economic specialisation, natural conditions and environmental risks. Their application enables the formation of strategic priorities for territorial planning, the identification of areas with varying recovery capacities, and the forecasting of long-term development trajectories[36].

Finally, the development of spatial monitoring systems, which utilise open data, satellite observations, sensor networks and automated systems for collecting environmental and infrastructure information, is becoming an

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[34] Mulska O., Bil M., Leshchukh I., Baranyak I., Voronko O. Socio-economic resilience vs vulnerability: spatial modelling under sustainable development conditions (the case of Ukraine's regions). *Agricultural and Resource Economics*, 2025, 11(3), pp. 130-164. DOI: https://doi.org/10.51599/are.2025.11.03.05

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increasingly important tool. Such systems enable continuous monitoring of spatial processes, prompt the identification of critical changes, determine areas of environmental hazard, and assess the actual state of territories.

All of the above areas of tool development create the basis for forming a modern spatial management system based on objective data, accurate models, and scientifically sound forecasts. They enable the transition from reactive forms of management to proactive decisions that consider future trends and ensure the long-term sustainable development of territories.

CONCLUSIONS

Due to its integrative nature, social geography is one of the key sciences capable of providing the theoretical and methodological foundations, as well as the practical instrumental basis, for spatial policy in support of sustainable territorial development. It combines the analysis of natural, socio-economic, demographic, environmental, institutional and cultural factors in a single spatial dimension, which makes it possible to comprehensively assess territorial systems and propose balanced models for their transformation.

The development of general scientific integrative approaches, the strengthening of the role of the sustainable development paradigm and the information revolution have contributed to a significant renewal of the theoretical and methodological foundations of social geography. It is increasingly focused on studying the sustainability and vulnerability of territories, spatial justice, territorial cohesion, and integrated risk and resource management.

Socio-geographical research in the field of spatial policy performs a number of key functions: diagnostic (identification of spatial imbalances, clusters, problem and priority areas), prognostic (modelling of development and recovery scenarios), project (justification of functional zoning schemes, territorial planning, formation of ecological networks and transport and logistics systems), communication (visualisation of results in the form of maps, diagrams, infographics that are understandable to a wide range of stakeholders).

In the context of the profound transformations that Ukraine is undergoing, including post-war reconstruction, economic modernisation, and adaptation to European standards of spatial policy, social geography has all the prerequisites to strengthen its role as the intellectual core of integrated spatial planning. It can provide a scientific basis for strategic decisions on the configuration of the territorial structure, investment priorities, environmental protection, human development and the formation of new models of spatial justice and sustainability.

Prospects for further research are related to the deepening of the theory of territorial organisation of society in the context of digital transformation,

the development of new indicators of spatial justice and sustainability, and the integration of geoinformation, ergatic, cognitive and participatory approaches into a unified decision-making support system in the field of spatial policy for sustainable territorial development.

SUMMARY

This section examines the role of socio-geographical research as a key tool in shaping spatial policies for sustainable territorial development. It demonstrates that modern social geography, based on systemic, territorial, landscape, institutional, network, and geoinformation approaches, ensures the integration of natural, socio-economic, demographic, and environmental factors into a single spatial dimension. The main socio-geographical dimensions of spatial policy are analysed, specifically the diagnosis of spatial imbalances, the assessment of regional sustainability and vulnerability, the identification of geo-economic and geo-demographic priorities, and the formulation of ecological and infrastructural frameworks for territorial development. The tools of social geography are outlined, including statistical analysis, cartography, zoning, geoinformation technologies, spatial modelling of scenarios, landscape and spatial planning, and participatory methods. It is emphasised that in the context of Ukraine's post-war reconstruction and adaptation to European spatial policy standards, socio-geographical research is of particular importance as a basis for developing integrated plans for territorial recovery, enhancing territorial cohesion and ensuring spatial justice. The conclusion was drawn regarding the need for further development of the theoretical and methodological foundations of social geography and the expansion of its applied potential in the field of spatial policy for sustainable development.

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