

**Nikolay V. Bagrov**<sup>1</sup>, **Leonid G. Rudenko**<sup>2\*</sup>, **Igor G. Chervanov**<sup>3</sup>

<sup>1</sup> V.I. Vernadsky Tauric National University; Ukraine, Autonomous Republic of Crimea, Simferopol, 95007, Vernadsky avenue, 4; Tel.: +38 (0652) 51-64-98, e-mail: rector@crimea.edu

<sup>2</sup> Institute of Geography of the National Academy of Sciences of Ukraine; Ukraine, Kiev, 01034, st. Vladimir, 44; Tel.: +38 (044) 2346163, fax: +38 (044) 2343230, e-mail: lgrudenko@rambler.ru

\* **Corresponding author**

<sup>3</sup> V.N. Karazin Kharkiv National University; Ukraine, Kharkov, 61077, Liberty Square, 4; Tel. +38 (057) 707-54-54, 7-149-404, e-mail: chervanyov@ukr.net

## “NEW” GEOGRAPHY IN UKRAINIAN REALITY: MISSION AND DEVELOPMENT TRENDS

**ABSTRACT.** It is a well-known fact that science is international in nature and has no national boundaries. The authors of the paper presented herein used the combination of the words “new geography” and “Ukrainian reality” in attempt to focus attention on the complexities of geography in a fundamental change of social development objectives and methods of management. The authors are concerned about the decrease in the degree of influence of geography on various spheres of human life and consider the distinctive characteristics of geographical science through the presentation of the features of its construction methods (object-oriented, subject-oriented, and problem-solving methods). The weakness of geography is manifested in the lack of knowledge refined to natural laws. But it is precisely a geographer who forms a specific individual model matrix of relations using geographic logic his/her perceptions.

Given the current transformation processes taking place in Ukraine, there is now a new international challenge in complex conditions of development: limited resources; environmental, demographic, and financial problems; and much more – “re-discovering of the world”. It is natural that each country meets challenges in its own ways. Therefore, by using the combination of the words “new geography” and “Ukrainian realities”, the

authors attempt, on the one hand, to focus attention on the complexities of the modern formation and development of geography and, on the other hand, to emphasize the advantages of geographical studies of various spheres of human activity. They demonstrate that in Ukraine, own vectors and the development trends of geography were formed and brought real results that were positively valued not only by the scientific community, but also by society as a whole. There is a large gap between scientific and educational geography. Two possible options to reduce this gap are suggested. Examples of the implementation in Ukraine of some projects based on achieving “new geography” are provided.

**KEY WORDS:** informational geography, geoinformatics, National Atlas, sustainable development, geographical space, regional geopolitics.

### INTRODUCTION

The history of any science is a path of self-cognition in a changing world and of understanding the driving forces behind its development and marketing advantages of its capabilities in the development of human civilization. Geography, for two and a half thousand years, has gone through several stages in its development.

The first stage was associated with the ancient natural philosophy; it determined the main directions of the geographical understanding of the Universe and of the Earth's surface as the elements of the environment. The name of the second stage, defined as the epoch of the Great Geographical Discoveries, reflects, in general, the vanguard role of the most active part of humanity rather than that of geography. Due to the activity of many "pioneers" – the researchers of "blank spots", the map of the Planet Earth was created, which became the object of the spatio-temporal organizational study of the world in many sciences, including geography.

Geography has reached its maturity in the third stage, when it became the family of diverse sciences visibly useful and necessary to solve many challenging problems. Scientific geography, as part of natural sciences, sought to bring together, in relation to geographical features, analytical laws of natural science, based on the proposed by A.A. Grigoriev notion of a single physical-geographical process, while relying on the duality of the science of human habitation, that has become, starting from K. Ritter, the most convincing embodiment of knowledge about the environment (geoecology, environmental ecology) [Bagrov, Rudenko, Chervanyov, 2010, Rudenko, 1999]).

At present, we believe a new stage – the geography of information (according to A.D. Armand [Armand, 2002], N.V. Bagrov [2005], and L.G. Rudenko [1999]), is emerging. These authors recognize that geography of the future is based on knowledge of the object through the information about it, available for the study of modern systems via information gathering, ordering, processing, and interpretation, and applying modern GIS technology. In significant part, this geography examines the pragmatic function and is increasingly linked with geoinformatics addressing together real problems of development of humanity. Thus, we believe, that the stage of "new geography" has commenced.

Information geography encourages immersion into the traditional object of knowledge with a greater understanding of geospace and of its inherent properties, with a deeper knowledge of different types of structures, including real and virtual networks; it is a new approach to resource assessment that measures not only material, but also intangible resources.

Modern geography should consider the fact that although the world has changed significantly, its economic growth remains uneven: three dimensions – density, distance, and disconnection that are manifested in such market mechanisms as agglomeration, migration, and specialization, define its spatial economic landscape. These trends pose a new task to the geography – to define the role and importance of market factors at different geographical levels in the development process.

All this, naturally, should affect the change in the style of thinking of geographers, the style of the development of new methodological concepts, requiring rather complicated methods and technologies for its realization. The latter is impossible without a radical update of the research framework of geography through distance learning methods in conjunction with information technology.

New economic development conditions and the activity of related sciences have exacerbated the dilemma of "to be or not to be" that have periodically challenged the geographical science. This has led to increased activity and even to the enhancement of the practical relevance of research.

The most active response to these challenges have already come from the cartographers who received a new object of cartography – an independent state with its new external and internal features of a transformed economy, infrastructure, and new problems not inherent in the previous Ukraine. Cartographers, using modern computer and GIS technology, have created on-line maps

of emergencies in response to the request of the Ministry of Emergencies of Ukraine and of other agencies and organizations; they have been already compiling topographical maps of cities and regions for wide use, tourist maps, and digital maps. The most significant examples of such activities include the National Atlas of Ukraine (paper and electronic versions) based on the concept of the Institute of Geography (National Academy of Sciences of Ukraine), which has been used in the managerial, educational, and scientific activities and convincingly represents the State at the international level. In the process of its creation, its own sophisticated database on the nature, population, economy, and resources of the State has been generated and applied [National Atlas..., 2007]. This Atlas was preceded by its pilot electronic edition in Ukrainian and English (2000).

The project on the compilation of an atlas in the GIS format that evaluates the risks of emergencies in Ukraine is currently under way; the project unified the efforts of the geographers and experts of the Ministry of Emergencies of Ukraine [Rudenko et al., 2010]. These, as well as other not mentioned herein works, integrate information about new Ukrainian reality and all its positive and negative implications in the development of society.

Speaking about the most successful national projects in the field of new economic and social geography, we should limit ourselves to the discussion of the most representative of them. First, this includes a series of reviews of the status of the Ukrainian economy in the developing world, written by economic geographers and resource experts of the Institute of Geography (National Academy of Sciences of Ukraine). The most notable among them is the collective monograph "Ukraine: main trends of interaction between society and nature in the XXth century (geographical aspect)" [Topchiev, 2010]. The project was conducted on the postulate that the world is built on a balance of natural forces and that the wedging of human activity into natural processes, despite its

different directions, has, unfortunately, many negative consequences. Thus, the monograph analyzed the major trends in the components of nature, population, and economy in Ukraine over the past 100 years; it showed the effects of interaction between society and the nature and was the first to present the conceptual strategy of balanced development of Ukraine and its regions.

We should also note the emergence of new fundamental results on the completions of Doctor of Sciences theses. Among them are: V.I. Zakharchenko [2006] – on the processes of transformation of the industrial market of the Ukrainian territorial systems; S.P. Son'ko [2002] – on the socio-natural systems in their current and future perspective; S.A. Lisovsky [2004] – on economic-geographical factors of balanced development of Ukraine; I.M. Yakovenko [2004] – on the theoretical and methodological foundations of the recreational resource use; G.P. Pidgrushny [2007] – on the role of industry in regional development; I.V. Gukalov [2008] – on the assessment of quality of life of the population; A.V. Gladkyi [2010] – on the modern vision of the essence of the development of the agglomeration forms of territorial organization of production; Yu.N. Palekha [2009] – on new approaches in the economic evaluation of land. There was also a certain "penetration" of geography into public administration through a Doctor of Sciences dissertation by T.N. Bezverhnyuk [2009] devoted to regional resource management. There should be also mentioned a phenomenological study of "new geography" based on the concept of the founder of the philosophical phenomenology E. Husserl (intentional paradigm of A.G. Topchiev) incorporating, in a very timely fashion, awareness of humanity's place in the nature-society system [Topchiev, 2010].

In the geomorphology field, a series of new works has been published too. For example, S. Kostrikov defended his Doctor of Sciences dissertation and, together with I.G. Chervanyov, published a monograph on the synergy of fluvial topography, which is

based on strict principles of natural sciences [Kostrikov, Chervanyov, 2010].

Scientists of the Geomorphology Department of the Institute of Geography (National Academy of Sciences of Ukraine) have published monographs on the environmental aspects of the geomorphological studies, on neogeodynamics of the Baltic Sea depression and adjacent areas, on the common problems of paleogeomorphology, on development of the Earth in the Phanerozoic, on the dynamics of the modern topography of Ukraine [The current dynamics..., 2005, etc.], on the geomorphological-mapping approach and on structural-geomorphological and neotectonic studies in the active fault zone platform part of the territory of Ukraine.

The publication of a unique three-volume Encyclopedia of the Environment of Ukraine [The Ecological Encyclopedia..., Vol. 1-2006, V.2-2007, V.3-2008] became the impetus for the further development of the integral work in the field of wildlife management and conservation; this, for the first time ever, was carried by a public organization – the All-Ukrainian Ecological League, with the active participation of the national geographers. There was a flow of publications, including ones by geographers, on sustainable (balanced) development of Ukraine and its regions [Assessment of the outcomes..., 2004]. There began trends in the areas of research and development, which may be considered unique in the sense that some projects were customer-tailored and served the customer to achieve profit. At the Xth Congress of the Ukrainian Geographic Society (2008), a discussion of business-geography, initiated by scientists from Kharkiv, was specifically discussed. They understand business-geography as a body of different trends and methods of the use of geographical knowledge and approaches to investigate territories for business purposes and sound investments [Chervanyov, Ignatyev, 2008]. In contrast to the traditional application of geography, business-geography has all the features of a scientific enterprise (including the image and financial dependence of

the fate of a participant undertaking such activity on its outcomes). This direction of geography requires a careful weighing of personal capabilities, strengths, and risks and avoidance of “bottlenecks”.

In this review, we restrict ourselves to just a few examples of works of Ukrainian geographers. In general, in our opinion, in order to improve the innovative potential of geography and to expand its effective use, the priorities, at this stage, are as follows:

- determination of the overall strategy of the territory to achieve the optimal organization and harmonization of relations in the “society–nature” as the basis for relevant business sectors in the utilization of natural conditions, resources, and assets of the territory;
- creation of multi-purpose databases and knowledge bases for assessing existing natural and economic resources, the effectiveness of their use, and the rationale for optimization of the economic trends of land use;
- solution of environmental problems on the basis of assessment of risk, appropriateness, effectiveness, and efficiency of the use of the natural resource potential and environmental protection;
- assessment of the significance of geographic innovative industry developments to ensure the balanced development of objects of different hierarchical levels (national, regional, local) as well as improvement of the efficiency of the individual business areas in which we operate together with our Russian counterparts in the IAAS [Geographic aspects..., 1999];
- increase in accuracy and precision of geographical research using the established infrastructure of spatial data, information obtained at experimental sites, and monitoring the functioning of terrestrial systems (including, of course,

economic and social information as well) [Bagrov, 2010].

We would also like to emphasize that now the specialization of research is not only objects-based, as in classical geography, but is oriented more toward problems and methods for their solution. This is due to the fact that geography became involved in the development of certain socially significant human and large regional problems receiving, along with it, the status of problem-oriented knowledge.

Geospatial approach is the leading mission of geography in such research and development [Rudenko, Gorlenko, 2010; Son'ko, 2002]. Geography is unique because only it accepts responsibility for the analysis and description of complex phenomena in their territorial combinations and interactions, introducing them to the public as an integral resource [Nahirna, Pidhrushny et al., 2011]. In recent history, methodologies, results of geographical research, and different visions of its essence have intertwined. It is normal to the science located at the crossroads. It is very important to preserve the pluralism of approaches, methods, and the mission. In this sense, we consider it necessary to draw attention to a number of fundamental provisions relating to the new challenges of our science.

Geography is the science about the resources of society (social development) defined by a certain territory (or water area). The novelty of the modern approach here is that the territory is now not only a cognitive object, as a carrier of properties, not only the placement of certain objects and interactions between them, but it also acts as an integral resource that represents its characteristic attributes; geography considers the territory as a unique formation of geosystems capable of self-organization.

The "geographic highlight" of this vision is that the territory as an integral resource creates a new property due to diverse combinations (spatial, functional, and

spatial-functional) because the space of development is the most important, indispensable, and scarce resource [Rudenko, 2003; Rudenko, Gorlenko, 2010]. At the same time, in this interpretation of the territory (land, in the common sense), the land is finally recognized not so much as capital in terms of a productive resource of society (which is also important), but as capital valued even more than other forms of human capital. Moreover, it is capital of special properties. Mastering it makes geography some new "political economy of space," and the "key" for the disclosure of, as previously mentioned, the intangible features of the territory, interpreted, taken together, as the intangible natural asset [Bagrov, Rudenko, Chervanyov, 2010]. It should be noted that those countries and regions that have recognized this earlier than others are already receiving rent from the exploitation of this asset. From these considerations, the key scientific challenge follows, i.e., to develop a methodology that would be based on such requirements and would allow finding appropriate methods for evaluating and optimizing resources in their territorial integrity and the ways of their description, inventory, reporting, analysis, and synthesis – all that is covered by the vision of the territory as an integral resource.

In the natural science sense, the new quality should be reflected in the identification of properties caused by precisely such (and not by some other) combination of properties (the positional principle according to V.A. Bokov, G.E. Grishankov, and E.A. Pozachenyuk). But there are also economic, social, legal, and informational relationships [Bagrov, 2002], which are now left out the discussion, but should be borne in mind.

The subject of science is a conceptual point, which consists in choosing the answer to the question, what is the geography of today: the object-oriented science, which has the ontological evaluation of the form existing outside our mind material

world and the section of the fundamental knowledge needed by science itself for the construction of its skeleton; or the subject-oriented and epistemological science and the combination of visions of the world – hypotheses, theories, laws, ideas about the subject; or, finally, continuously changing relational knowledge, i.e., object-object and subject-object, and also spatio-historical and relative?

The situation in this third vision of geography is exacerbated by the fact that the carriers and users of knowledge about the environment (“environment” in the common usage in the former Soviet Union, or, according to the world’s scientific concept of “environmentology”) are other professionals and especially – public figures. It should alert geographers: we are missing something if, contrary to the established status of the ancient classical geography, humanity has been forced to seek new, still growing, but extremely active areas of knowledge.

The purpose of this paper is to discuss the model of building the “new geography”. This problem has been discussed many times in Ukraine. In staging and methodological approaches (not always under this specific term), it adequately reflects the “collective wisdom” of the authors of the publications [Bagrov, Rudenko, Chervanyov, 2010; Bagrov, 2010, Geographic aspects..., 1999; Petlin, 2010; The spatial analysis..., 2009; Rudenko, 1999; Ukraine: main trends..., 2005; Shabliy, 2001; etc.]. Addressing the problems of this “new geography” allows implementation of the principles of strict science and their incorporation into the fabric of geographical knowledge; it serves as a model that organizes it.

Thus, the specific question is what are the distinct differences of geography in respect to other and primarily to related fields of knowledge and what are its indispensability and uniqueness? With this in mind, let us focus attention on the *ways of formation of geographical science*.

## THE OBJECT-ORIENTED APPROACH

More often in the national science of the last century (and implicitly now), the main attribute of fundamental science was considered to be a material object of knowledge, which would exist independently of a certain dialectically defined form of matter motion. In this respect, geography was not able to achieve success, even though the problem of finding a place in the chain of material forms was addressed by such outstanding scientist as A.A. Grigoryev; V.S. Lyamin attempted to incorporate a kind of logical “loop” into the system of forms of matter in motion, which covered several well-known forms – however, unsuccessfully.

We believe that the reason for this failure is that the object of knowledge was identified with the object of science. The areas that, in our opinion, are lacking sufficient attention are as follows:

1. Understanding differences between the ontological essence of what is the target of cognition (*the natural object*), cognitive epistemological object (*the object of scientific geography*), which is isolated from the object of science through its paradigm, method, and aim, and the subject “constructed” by a researcher (by science directly) and then studied: simulated, refined, improved, etc., in a certain logical loop of the learning process [Chervanev, Bokov, Timchenko, 2004].
2. A clear awareness that the scientific object and the subject (the latter in particular) **are not** the segments of the material world (in the common usage of the word). They must be the internal (for science) images of the external material reality, but existing as the ideal constructs. In the information world, they may not have realistic analogues (to be the purely epistemological positively oriented constructs).
3. Observance of scientifically defined rules (the theory of similarity) where scientific knowledge about the object (subject) is transferred to the natural object or exists by itself as knowledge about the perfect

model constructs, becoming the foundation for obtaining the next level of theoretical knowledge, etc. [Dyakonov, Kasimov, Tikunov, 1996].

4. The fact that geography is able to study not only the material environment, but also the virtual environment. It most of all relates, apparently, to socio-economic geography and geographical mapping, covered by information geography. After all, in this and in other aspects of geography, a scientific object is constructed from the secondary, tertiary, and other information that does not have, so to speak, a material primary natural object (e.g., identification and mapping of electoral preferences). Cyber-maps that have appeared recently (maps of cyberspace), mental maps, and other are in the same category of the virtual objects of research [Bagrov, Rudenko, Chervanyov, 2010].

#### THE SUBJECT-ORIENTED APPROACH

It is commonly known that the same object may represent a number of research subjects. We should add that, for true science, it is essential to learn to abstract away from a natural object for the sake of creation of its scientific objects, i.e., of the perfect representation (ideal model). This requires a priori determination of the essential aspects of the ideal model – the subject of research (conceptual, structural, functional, simulation, synergetic, and any other model of a research object). If, in the middle of the XXth century, philosophers and geographers were able to evaluate, for example, the teachings of A.A. Grigoriev about the single geographical process, it would have allowed avoiding a known conflict, which has put the outstanding scientist to his knees – he has designed his own object of study in the form of the geographical environment and its dynamics – a single physical-geographical process [Academician..., 2011].

Note also that spatiality and complexity are considered the attributes of knowledge and a measure of the geographical content since N.N. Baransky.

Spatiality. The treatment of spatial relationships varies from a fairly simple, according to A. Hettner, interpretation of chorology to a very complex investigation of the metrics, topology, and organization of space [Lastochkin, 2002] and the territory [Rudenko, Gorlenko, 2010; Son'ko, 2002]. These (and other) works show that there is not only and not so much a renaissance of science propagated by Hettner, as a significant deepening of science, methodology, and instructional equipment of spatial analysis as specific means of knowledge about organization of geosystems. At different spatial scales, the chorological approach is expressed differently; it has also a hierarchical structure of "embedded spaces". In no other science, except for a family of geographical sciences (if geology is also included), the chorological approach and its inherent methods of spatial identification, function, location, and neighborhood are not, perhaps, as important as in geography. It becomes clear that in no science there is space as comprehensive as in geographical sense – a certain order of objects co-existing at the same time. There are no properties of inhomogeneous space, such as anisotropy, anisomorphism, and respectively, properties derived from them: originality, noncommutativity, and irreversibility. No complicated forms of symmetry are sufficient to determine terrestrial objects. All of them are isolated as subjects if the "new geography" is aware of the relevant cognitive structures – the research object (unlike a natural object) and the scientific subject.

From the viewpoint of the authors, three aspects of understanding of the spatial aspects of geography are important and timely:

- the introduction and development of the concept of "geographical topology of space" with the fundamental concepts of "type of space" (Euclidean, spherical, conical, bilateral) and its derivatives – "symmetry", "position" and "neighborhood";

- the introduction of geographical realm as continuity of research of simultaneously co-existing objects;
- the introduction of abstract space of properties and characteristics – usually multidimensional, being isolated from the continuum of properties.

Complexity. By the definition of N.N. Baransky, this is the second attribute of the geographical content of the object-oriented approach. During the last 30 years, complexity has been also sometimes identified with systematicity as a certain criterion of geographical typology. This conflict has been adequately presented by V.N. Petlin [Petlin, 2006, Petlin, 2010]. But not even once have the researchers determined the necessary and sufficient list of delineating attributes that should always be followed in determining the cognitive status of the subject matter of geographical research, battling each other in nuisance: in fact, as noted above, it is possible to construct a set of subjects on the same object of research. Because of this, analyticity (for components and geospheres), complexity, and systematicity are different subject constructs reflecting, in varying degrees, various aspects of the research object.

At the same time, more and more the “up-to-dateness” of a geographer is determined by how he/she looks like an expert in a very narrow particular subject area, e.g., analysis of remote sensing information, computer processing of geodata, GIS technology, etc. [Kostrikov, Chervanyov, 2010; Lastochkin, 2002]. Consequently, there is a specialization of research not only in terms of the objects, as in classical geography, but more through the subject and method of research. A presentation of the landscape synergetic principles by V. Petlin is a fair example of the newest approach in landscape research. He believes that the synergetic approach based on the principle of system integrity rejects the classical approach in landscape research, which is based on the postulate of

homogeneity. This is an extremely important and necessary process for geography in general.

## THE PROBLEM SOLVING APPROACH

The third methodological approach in geography that exists in reality has been discussed rather apart from other issues and, at this point, vaguely; this is the problem-oriented approach. We would like to recall unconditional success of such geography, for example, of the development of regional environmental management in Ukraine. This extensive research program was overseen by the National Academy of Sciences of Ukraine and was implemented by the efforts of geographers unified through the regional centers of the Ukrainian Geographic Society for more than ten years. The results have been recognized through the awarding of the State Prize of Ukraine to a cycle of monographs on the regional resources management. Since then in Ukraine, constructive geography, which had been conceived by I.P. Gerasimov specifically as the problem-oriented branch of geography, exists as a scientific field and as a specialty at universities and the State Commission for Academic Degrees and Titles.

The prospect of the participation of geography in the development of different urgent issues is also promising. Medical geography has existed as such branch for quite a long time; more or less known various other branches of geography – military, reclamative, and environmental. Another convincing example in favor of the high potential of the problem-oriented concepts of geography are solid modern editions of the Institutes of Geography of the National Academies of Sciences of Russia and of Ukraine, devoted to the geographical aspects of sustainable development and the interaction between society and nature [Geographic aspects..., 1999, Assessment of the outcomes..., 2004, Ukraine: main trends..., 2005]. The discussion of the problem-oriented approach as a methodological problem opens a fundamental “Social Geography”, by

A.I. Shably [2001]. We should also note a useful attempt to teach environmental management at the geosystem level [Romanov, Yaromenko, Martyniuk et al., 2010].

Having presented the aforementioned information, we should try to define the relationships that exist between the object-, subject-, and problem-oriented approaches in geography and how these approaches should be treated. The attitude of geographers to these three approaches, which assume significance of “three geographical dimensions”, is ambiguous. Some scientists believe that it is impossible to be just a geographer without having determined which subject domain a geographer has mastered and may be trusted, so to speak, as a guru. On these grounds, there is the separation of physical, economic, and social geography, where each of them, in turn, is divided into branches based on the principle of dichotomy, regardless of how this “tree” is called as a whole. Others, with a different degree of flatness, deny this, insisting that a geographer is only a “synth” of knowledge about the territory. The followers of this vision of geography contract experts from particular fields (geophysics, landscape geochemistry, regional economics, demographics, etc.) for the analytical work. These methodologists position the synthetic approach (often regional analysis), as a positive one, against the subject-methodological differentiation of geographical science, as a definitely negative concept.

Evidence that synthetic geographical thinking, which previously was the subject primarily in educational fields, has acquired the scientific and constructive significance is associated with progress in addressing economic, social, and environmental problems of social life, with improvement of research of phenomena in the geosphere, which translates epistemologically into the polysystem methodology [Son'ko, 2002] and even into an entirely new paradigm of science (analysis by A.G. Topchiev of the aforementioned intentional paradigm [Topchiev, 2010]).

## THE “NEW GEOGRAPHY”

Geography teaches a person to compile the image of the World from a variety of scenarios and, largely, through reflection. People have been puzzled for centuries trying to explain **geographic phenomena**, limiting themselves to observation and logical explanation (approximately at the level of formalism of black or gray boxes in cybernetics). A deeper knowledge was frequently not pursued, because the explanation of phenomena that have already occurred is already controlled by the past and is socially irrelevant.

With the space age began the phase of the **informatization of geography**. The emergence of technical instruments provided opportunities to obtain an enormous flow of information. Then, there was the emergence of GIS technology, which allowed better integration of geodata. These two factors combined have led to the loss of the very need in obtaining primary information related directly to the geography of the Earth, which has always been the preference of geographers. Studies of human environment – the original object of geography – are becoming the subject at the junction with technical sciences (technical geography according to V.S. Preobrazhensky). Under this influence, the primary scientific geographical knowledge goes by the wayside, drops to the second-rate importance, and the study focuses on specific ways of visual perception and the increasingly sophisticated visual analysis of certain territorial integrity (in both physical and economic geography, and therefore, they should not be separated).

As a vivid example of such a transformation of relationships, we should mention the drift of the concept of “landscape” – the fundamental concept in the empirical branch of physical (and now in economic) geography, and derived notions of “landscape organization”, “landscape planning”, “image of the landscape”, “landscape architecture”, etc. In the past 20 years, this concept has transitioned from a fairly unique concept of a

specific (landscape) level of geographic shell (it had only three aspects of consideration – regional, typological, and individual) to a variety of interpretations, mainly aesthetic categories important culturally, however retreating from geography [Grodzinsky, 2005].

Somewhat generalizing the situation, we should also note that there appeared a “dualism” of the landscape science:

- First of all, landscape science continues the traditional study of natural territorial complexes as a reality, that is, of ontological objects; hence, landscape science in this respect remains the branch of natural science, as it has been treated beginning from A. Humboldt and Z. Passarge, the classical landscape scientist V.V. Dokuchaev (through the soil landscape), F. Ratzel (through “soil” geopolitics), the most consistent proponent of the classical materialistic view of the landscape L.S. Berg; then it was continued by N.A. Solntsev, K.I. Gerenchuk, A.G. Isachenko; and now, in this sense, it is examined by V.A. Bokov, A.V. Melnik, V. Petlin, etc. The latter introduced this subject fully in the aforementioned constructive landscape study [Petlin, 2006] having created a sort of the “multi-vector” antithesis to M.D. Grodzinsky’s landscape approach [Grodzinsky, 2005].
- At the same time, landscape studies have returned to the roots of the original non-geographic concept – as the subject of cultural studies for consideration of a much broader, but the diffused scope (as is characteristic of humanities). This is an image of space, significantly different (up to the opposite extreme) in the different visions of different ethnicities, different cultures, and even different strata of society; the different standards and assessments, as we can read with interest in L.N. Gumilev’s and D.N. Zamyatin’s works. A good deal of interesting and diverse discussions about this subject

is presented by M.D. Grodzinsky (and not only in the two volumes cited above, but also in other works, such as on landscape aesthetics). Obviously, this dualism divides the cognitive process: to some extent undermining the basis of the classical landscape studies while simultaneously giving more weight to the general cultural vision of space (“meta-geographic” according to D.M. Zamyatin). Everything has a meaning, but also takes its toll.

We think (contrary to the alternative assessments) that the landscape should be viewed as a complex territorial resource, together with properties of space and a set of individual resources that are not normally associated with the landscape. In this sense, we remove the conflict between the two alternative visions – physical and cultural geography.

#### NATURAL CAPITAL AND GEOGRAPHY

A set of two possibilities – a clear expression or delineation, on the one hand, and the expansion of the “field” of values for the humans, on the other hand, allows one to take another important step – to give the landscape a pragmatic status of natural capital in a very broad interpretation of the rather important concept of post-nonclassical environmentology.

In our perception of the post-nonclassical economic vision of the problem [Bagrov, Rudenko, Chervanyov, 2010], this is a set of three components:

- share capital of the common use resources: air, water, and vegetation, in the situations where they can not be isolated, alienated, or become the objects of civil law. As necessary conditions for life and its comfort, these properties now serve as the values that are in the structure of business, facilitating (or hindering) profit;
- critical capital of some properties and relationships inherent or missing in the

environment (geosystems): water in arid areas, groundwater position, the manifestations of adverse exodynamic (maybe endodynamic, but we do not know exactly) processes, etc.; in each case, the presence / absence of this, that, or other properties, or their combination changes the view of other components of the natural capital;

- the anthropogenic component of natural capital (we should note now, to not dwell on this later, that the south coast of Crimea is now almost entirely man-made).

### WEAKNESSES AND STRENGTHS OF GEOGRAPHY

Geography has little knowledge refined to the natural science law; it does not have its certainty, a manifestation of an irresistible force (such as the physical, chemical, and, in part, biological laws). Geographical knowledge is probabilistic since it correlates with stochastic systems. It is nonlinear, because a geographer will never say with confidence that A inevitably follows from B. However, quite often a geographer can name many potential impacts, several chains of interactions, and much more, following a kind of special geographical logic: geographical analogies, indirect observations, specific experience, etc. How does a person thinking geographically, with virtually no possibility of a rigorous proof, accomplishes it? N.V. Bagrov states that it is done through a certain individual sample matrix of relations that humans create, develop, and maintain continuously in their minds, both individually and as members of society, that is, through culture. A geographer calls it *the world reflection matrix*, referring to the multi-faceted human world. Due to the presence in the mind of such a matrix, humans more or less successfully cope with cognition of the difficult undifferentiated (not refined) systems generated by the various states, fluctuations, etc., and forced or spontaneous inhomogeneities. With this, geography more clearly and adequately, although less precisely and often little less

formally, characterizes the existing world order. N.V. Bagrov calls this order (spatial, spatio-temporal, and functional), by analogy with the previous matrix, *the matrix of world comprehension*. The way in which geography is forming the image of the World is important. Try to drop geographical knowledge of high school (at times, there were attempts to do so, and still, not in each country, geography is taught in school) and make an image of the World from the refined physical (chemical, biological, and social) laws. Indeed, in each case, one has to solve such, for example, tasks:

A) what are the laws manifested at the moment and specifically here?

B) how do they interact (repeated each time), depending on specific terms of engagement and the environment?

C) why other physical (chemical, etc.) laws do not manifest themselves? And so on.

We are confident that this will not work. Physics, chemistry, and biology, in some sections, strive toward the purity of knowledge, go to the depths, but they lose the broad scope in the process. For the sake of the purity of an experiment, they remove all side effects that complicate the matter, or just random factors, which force them to go to laboratories, to instruments, to an unbelievably sophisticated experiment in an incredibly refined conditions, etc. Geography walks along a radically opposite way, seeking to know phenomena in their entirety, without dismembering, "in-situ", as close as possible to their natural conditions. This makes the task incredibly difficult to solve, however, no other science does it.

### GEOGRAPHY, SOCIETY AND PUBLIC CONSCIENCE

How are these motions manifested in educational geography and real geographic research? Primarily as a kind of eclecticism: in the fundamental part, from the standpoints of natural philosophy and, to a certain

degree, of the exact (instrumental) natural science, but in a much more simplified and, regrettably, an arbitrary form, i.e., outside the strict system of knowledge – from the point of view of country studies that were formed in the epoch of the Great Geographical Discoveries. In the sectional disciplines, the presentation is very often associated with translation into the common knowledge of specific concrete achievements (visions, concepts, points, of view, well-known names – therefore, again, in the natural philosophical way. Regarding the dualistic approach, it is being “washed out” of geography via its artificial separation into groups of disciplines among the physical-geographical and the socio-geographical fields, through which the aforementioned duality nourishes the “great” ecology representing the extremely beneficial source of knowledge about the environment to it. This situation’s outcomes and tolls for the geography are well known.

The relationship of geography and society are manifested in the highest degree through problem-oriented solutions, or participation in programs and projects. Previously, these were planned activities, as a rule, large-scale economic projects. Nowadays, there is none, and problem orientation is limited to aspects of geocology, territorial organization, recreation, population distribution, and the creation of protected areas.

But there are exceptions in the current difficult conditions: the consolidation of all geographers (and not only) in the problem-oriented projects that target the integral representation of the product (the general scheme of planning of the territory of Ukraine, the National Atlas of Ukraine, the pilot edition of the Environmental Atlas of Ukraine, landscape planning, etc.).

In different countries or sectors of society, different geography or, rather, different mentality prevails and manifests itself in the understanding and design solutions. Everyday consciousness is focused subjectively. It is largely self-centered or, at best, anthropocentric: only pragmatically

significant issues are under attention. Why have ecological studies prevailed so quickly over geography, biology, and even physics? Because ecology includes problem stating and knowledge that is constructed based on the object-subject principle oriented, however, subjectively. People in general care about what relates to their own (personal, group, corporate) interests: what is helping or, conversely, preventing satisfaction of basic needs.

## GEOGRAPHICAL SCIENCE AND EDUCATION

How are these processes manifested in educational geography and the actual geographical research? What is the solution? We believe there are two ways to improve these relationships.

The first way is palliative: keep the content of geographical education in schools and recompose it as follows: in primary school, whatever is possible through observation, contemplation, or a school experiment (geographical test plot, weather monitoring, monitoring of the school territory); in middle school, through whatever connects geography with physics, chemistry, and biology, i.e., through ecology; in high school, through such aspects as geosciences, geography of the world economy, political geography, that require a completion of the formation of *the matrix of world comprehension*.

The second option is radical. It requires the separation of school geography from geographical science. It involves the formation, in school, of *the world reflection matrix* (initially, using local history and, then, country studies and national geography); *the matrix of world comprehension* should be addressed through interpretive geography (geographical method, its application in everyday life, in analysis of environment, even in modern global problems assessment). Then, all this should be done based on a plan, a map, or an atlas, with the mandatory active use of modern audio-visual mapping,

GIS technology, and educational web programs for achieving knowledge. In this second approach, school geography is much different – it may be more socially perceived and more focused. The time would demonstrate the effectiveness of this approach.

### THE ACHIEVEMENTS OF THE “NEW GEOGRAPHY”

It is unlikely that we will be able to cover, in one paper, all the achievements of the “new geography.” The choice will be driven primarily by several examples in those areas in which the authors are involved.

**The geographical dimension of regional geopolitics.** Increasingly, geopolitics is considered as political science, with which we have difficulty agreeing in principle. This is because traditional geopolitics as a form of gaining power by influencing spatial relationships of countries has been known for a long time, and its “power” doctrine as often admired, as condemned. There are issues to discuss from a political-geographical point of view. Geopolitics as a branch of knowledge, which has reached a certain degree of institutionalization (the large number of textbooks, curricula, university departments, the emergence of such institutions as the Academy of Geopolitical Problems), is actively “professing” and transmitting to neophytes (and to general masses of the population) a series of its own ideas and conclusions, not being able, however, to become a fully *scientific discipline*. In other words, a certain professional community has formed around geopolitics, but there are still no disciplinary rules and restrictions that actually transform this or that branch of knowledge from the similarity of “art” and “craft” into a *“scientific discipline”*.

In Ukraine, primarily due to the efforts of the emerging regional geopolitical school of V.I. Vernadsky Tauric National University, geopolitics has remained in the realm of geography, but much has changed in the direction and status. The most powerful and productive school of geopolitics of the

Crimean region has actively introduced itself into the concept of the development of the Autonomous Republic of Crimea (ARC) as part of its paradigm. This paradigm, in particular the following fundamental points: the awareness and adoption, including – through the Constitution of the ARC – of the special status of Crimea as the *central element of the Eurasian geopolitical space* (which, incidentally, almost 10 years later, was accepted even by such a world-known geopolitician as Z. Brzezinski) is the proof of the fact that the development vector of Crimea should be different than the one that existed during the long preceding period. Crimea should become the paragon, model, and proving-ground of the *post-industrial noospheric sustainable development* [Bagrov, 2010]. We will not review the problems and substance of “neogeography”, a concept introduced into science by E. Turner (2006), because the representatives of “neogeography” have confused geography with cartography (we are referring to geographical data in raster formats in a single coordinate system using the open hypertext format).

### **Geographical study of alternative energy.**

The regional energy crisis, with Ukraine turned out to be in its center, showed the necessity of transformation of energy policy. The concept of Energy Program adopted recently presents the “30 + 30” model – with the target to achieve, by 2030, 30% of energy production from alternative sources.

Any geographer understands that alternative energy sources are a new natural resource. It is either natural objects, or processes, or products with a certain attitude toward them, and therefore requiring an appropriate geographical support. Two Ukrainian Universities – Tauric and Kharkiv – are jointly working on the problems of alternative energy as the potential for its development. Tauric National University created one of a kind UNESCO Chair “Energy Ecology and Sustainable Development” (2005). There is every reason to believe that this line of research that combines geography and very promising business

(in Ukraine, there are nearly 10 major non-governmental wind and solar power plants), will also raise interest in the “new geography”, filling it with a non-traditional content.

**Territorial planning.** The territory as the object of complex geographical research is the eternal field of activities of geographers. In the current conditions in Ukraine, there have been fundamental changes in this area. The Land Code of Ukraine has been adopted (2002); under this Code, there are three forms of land ownership possible: state, collective (municipal), and private; governmental property has lost its traditional priority. Ukraine ratified the Convention on the establishment of the Pan-European Ecological Network (2002). The interest in land management among the new landowners has intensified, while environmental conflicts related to the proximity of various forms of land use and other traditions of land management have become more frequent.

In such circumstances, the spatial mission of geography is reappearing at a new level. The new vision of the integrated potential of the territory in the context of economic activities at the regional level, as an independent resource for development, appears highly promising in terms of the overload of the most part of the territory with commercial facilities, what we see by analyzing active geopolitical, geoeconomic, and other relationships, conflicts, and alliances. We see in practice the correctness of the theoretical concept of geoversum whereby geospace reflects, explains, and allows one to organize co-existing terrestrial space objects of different quality (territorial management) [Bagrov, 2010]. Geospace is becoming an attractive environment resource, particularly for land business. Naturally, the concept of land capital (the main part of natural capital) has become apparent. Land rent is the basis of monetary and fiscal valuation of a land owner’s relationships with the State. It can potentially fill the treasury of some main regions such as Crimea [Bagrov, Rudenko, Chervanyov, 2010]. These opportunities remain still just a potential

and they require a profound professional definition, cataloging, and studying for their transformation into economically relevant resources, and deployment of sustainable resource use technologies attractive to both the government and business. Unfortunately, these solutions are still rare, but they already exist (for example, the aforementioned the integrated territorial planning schemes of Ukraine, approved in the form of the Law of Ukraine in 2002).

It is known that in the Soviet Union there existed a certain dualism in the organization of the territory: theoretical issues have successfully been developed by geographers (often in collaboration with foreign counterparts), but the practical side of things were implemented by agricultural science and urban planning. This led to different interpretations of the problem, of course, of geoen지니어ing.

Currently, the scientific-practical direction of territorial analysis based on theoretical principles of B. Rodoman and A.Yu. Reteyum, on methodological works of K.N. Dyakonov, N.S. Kasimov, and V.S. Tikunov, generalized for Ukrainian conditions by V.A. Bokov, Ye.A. Pozachenyuk, and A.G. Topchiev, is developing. There are several geographical centers for territorial planning, including the one most practically advanced – the Tauric. Here, over 10 years ago, the Scientific Center for Sustainable Development Technologies has been established at V.I. Vernadsky Tauric National University. This Center is focused on planning of territorial facilities [Bagrov, 2010]. Similar studies are conducted at the Institute of Geography of the National Academy of Sciences of Ukraine and other regional centers.

## CONCLUSION

The discussion presented above allows us to conclude the following:

- geographical science has its own field of research, which is not covered by any other science;

- geographical studies integrate new knowledge and information about space due to the high significance of the concepts of location, purpose, and development resources;
- geography in Ukraine, preserving and developing the traditions of the Russian geographical school, is looking for its own scientific concepts and methods of implementation, seeking to be the “growth pole” of environmental economy, in order to become, in alliance with it, a “new geography” at the science forefront ensuring the sustainable-noospheric development. ■

## REFERENCES

1. Academician Andrei Aleksandrovich Grigoriev. Life and scientific work (1883–1968). (2011) Compiled by T.D. Alexandrova. V. Kotlyakov (Ed). – “KKM” Press. Moscow. – 416 p.
2. Armand, V.D. (2002) Geography of information age. *Izv. Academy of Sciences, Series Geography*, № 1. P. 10–14.
3. Assessment of the outcomes of World Summit on Sustainable Development (Johannesburg, 2002) in Ukraine (2004) Rudenko, L.G., Bilyavsk, G.A., Gorlenko, I.A., et al. – Kiev.: Academperiodica Press. – 208 p.
4. Bagrov N.V., Rudenko, L.G., Chervanyov, I.G. (2010) Status, mission and perspectives of Geography: the modern foundations of the ancient science // *Ukrainian Geographical Journal*, № 2. P. 3–13.
5. Bagrov, N.V. (2005) *Geography in information world*. – Kiev: Libid’ Press.
6. Bagrov, N.V. (2002) *Regional geopolitics of sustainable development*. – Kiev: Libid’ Press. – 187 p.
7. Bagrov, N.V. (2010) *Sustainable-noospheric regional development. Problems. Solutions*. – Simferopol: Educational Informational Center of V.I. Vernadsky Tauric University. – 207 p. (in Ukrainian)
8. Bezverhnyuk, T.N. (2009) *The resource support system of regional governance: the conceptual framework and mechanisms of development*. Thesis. Dr. Sc. of Public Administration. Classical Private University. – Zaporizhzhia. (in Ukrainian)
9. Bokov, V.A. (2003) *Spatio-temporal analysis of territorial planning*. – Manual. – Simferopol: V.I. Vernadsky Tauric University. 281 p.
10. Chervanev, I.G., Bokov, V.A., Timchenko, I.E. (2004) *The geosystem foundations of environmental management*. – Kharkiv.: V. Karazin Kharkiv National University, 142 p. (in Ukrainian)
11. Chervanyov I.G., Ignatyev, S.E. (2008) *Business geography: perspectives or attempt to catch a train that is already moving?* // *Ukrainian Geographical Journal*, № 1. P. 61–64. (in Ukrainian)
12. Dyakonov, K.N., Kasimov, N.S., Tikunov, V.S. (1996) *Modern methods for geographical research. Book for teachers*. – Moscow: Prosveschenie Press. 117 p.

13. Geographic aspects of the problem of transition to sustainable development of the countries of Commonwealth of Independent States (1999) IAAS: Joint Council on Fundamental Geographical Problems. Kiev–Moscow. 199 p.
14. Gladkyi, O.V. (2010) Computer science and industrial agglomerations of Ukraine: Theory, methods, practice / Thesis. Dr. Sc. – Taras Shevchenko Kyiv National University.
15. Grodzinsky, M.V. (2005) The perception of the landscape: place and space.– Kiev: Libid' Press. – In 2 vol., Vol.1 – 467 p. – Vol. 2 – 503 p. (in Ukrainian).
16. Gukalova, I.V. (2008) The quality of life of the population of Ukraine: the theoretical and methodological foundations of social and geographical research / Thesis. Dr. Sc. of Geogr. – Kiev.: Institute of Geographiy of National Academy of Sciences of Ukraine (in Ukrainian).
17. Kostrikov, S.V., Chervanyov, I.G. (2010). The research of the fluvial landforms self-organization phenomenon on the foundations of synergetic paradigm of modern natural science / V. Karazin Kharkiv National University. 142 p. (in Ukrainian).
18. Lastochkin, A.N. (2002). A systemic morfological presentation of the Earth Science: geotopology, structural geography, general theory of geosystems. – St. Petersburg: St. Peterb.University. 762 p.
19. Lisovsky, S.A. (2004) The economic-geographical foundations of sustainable development of Ukraine / Thesis. Dr. Sc. of Geogr. Kiev.: Institute of Geography of NAS of Ukraine. (in Ukrainian).
20. Nahirna, V.P., Pidhrushny, G.P. et al. (2011). Human-geographical fundamentals of investigations of integral potential of the territory: theoretical and methodological approaches and assessment experience / / Ukrainian Geographical Magazine, № 3. P. 42–48.
21. National Atlas of Ukraine. Scientific fundamentals for the creation and implementation (2007). L.G. Rudenko. (Ed.) – Kiev.: Academperiodica Press. 408 p.
22. Palekha, Yu.M. (2009). Theory and practice of determination of territories and assessment of inhabited areas of Ukraine (economic-geographical research) / Thesis. Dr. Sc. Kiev.: Institute of Geography of NAS of Ukraine.
23. Peresadko, V.A. (2009). The cartographical support of ecological research and protection of nature. Kharkiv: Kharkiv National V. Karazin University. 212 p. (in Ukrainian).
24. Petlin, V.M. (2006). Constructive landscape – study. Lviv: Lviv National Ivan Franko University. 357 p. (in Ukrainian).
25. Petlin, V.M. (2010). The state and perspectives of natural geography development // Ukrainian Geographical Journal, № 2. P. 14–21 (in Ukrainian).
26. Pidhrushny, G.P. (2007). Industry and regional development i Ukraine (the theory and practice of social and geographical research) / Thesis. Dr. Sc. of Geogr. – Kiev.: Institute of Geography of NAS of Ukraine.

27. Pozachenyuk, K.A. (2010). Prospects and modern state of geoexpertology // Ukrainian Geographical Journal, № 2. P. 54–59 (in Ukrainian).
28. Romanov, O.Ya., Yaromenko, O.V., Martyniuk, V.O., et al. (2010). Students' research work in geography: methodology and technique. Rivne Press. 180 p. (in Ukrainian).
29. Rudenko, L.G. (2003). The fundamental geographical research and its practical significance in modern conditions // Ukrainian Geographical Journal, № 1. P. 9–15 (in Ukrainian).
30. Rudenko, L.G. (1999). The role of Geography in the implementation of the agenda of the XXI century // Ukrainian Geographical Journal, № 1. P. 6–21 (in Ukrainian).
31. Rudenko, L.G., Dronov, A.L., Liashenko, D.O., Putrenko, V.V., Chabanyuk, V.S. (2010). The concept of the Atlas of natural, technological, and social hazards and risks of disasters in Ukraine. – Kiev.: Institute of Geography of NAS of Ukraine. 48 p.
32. Rudenko, L.G., Gorlenko, I.O. (2010). The problems of regional policy in Ukraine // Ukrainian Geographical Journal, № 2. P. 26–31 (in Ukrainian).
33. Shably, O. (2001). Social geography: theory, history, Ukrainian studies. Lviv: Ivan Franko Lviv State University. – 744 p. (in Ukrainian).
34. Shevchuk, V.Y., Bilyavska, G.A., Satalkin, Yu. M., et al. (2002) Rio de Janeiro – Johannesburg: beginnings of noospheregenesis and responsibility for the future. – Kiev. 118 p. (in Ukrainian).
35. Son'ko, S.P. (2002). Spatial analysis of socio-natural systems – the way to a new paradigm. – Kiev: Nika Center Press. 286 p. (in Ukrainian).
36. The current dynamics of the relief of Ukraine (2005). Palienko, V.P., Matoshko, A., Barshevsky, M.E., Spitsya, R.O., et al. (V.P. Palienko (Ed.)) NAS of Ukraine. Institute of Geography. – Kiev.: Naukova Dumka Press. 267 p.
37. The Ecological Encyclopedia of Ukraine. In Three Vol.: Vol. 1, 2006-740 p., V. 2-2007 – 724 p., V. 3-2008 – 760 p. (in Ukrainian).
38. The spatial analysis of natural and technological risks in Ukraine (2009). Institute of Geography of NAS of Ukraine. 271 p. (in Ukrainian).
39. Topchiev, A.G. (2010). Methodological transformation and contemporary paradigms of Geography // Ukrainian Geographical Journal, № 2. P. 22–25. (in Ukrainian).
40. Topchiev, A.G. (2010). The territory: modern context, functions, resource potential // Ukrainian Geographical Journal, № 4. P. 3–9. (in Ukrainian).
41. Ukraine: main trends of interaction between society and nature in the twentieth century. (Geographic dimension) (2005). Rudenko, L.G., NAS of Ukraine (Ed.). Kiev. 316 p. (in Ukrainian).
42. Yakovenko, I.M. (2004). Theoretical and methodological foundations of recreational use of natural resources (the human geography study) // Thesis. Dr. Sc. of Geogr. Kiev.: Institute of Geography of the NAS of Ukraine. (in Ukrainian).
43. Zakharchenko, V.I. (2006). The process of market transformation of industrial territorial system of Ukraine: Theory, methodology, economic analysis, and practice / Thesis. Dr. Sc. – Kiev.: Institute of Geography of the National Academy of Sciences of Ukraine.



**Nikolay V. Bagrov** is Doctor of Geographical Sciences, Professor, Academician of the National Academy of Sciences of Ukraine, Chair of Department, and President of V.I. Verndasky Tauric National University. The areas of his research interests are economic and social geography, geopolitics, and problems of sustainable development of the noosphere. He published over 250 scientific works, including monographs: "The regional geopolitics of sustainable development", "Geography in the information world", "Sustainable development of the noosphere in the region. Problems. Solutions". He is Honored Worker of Education of Ukraine and Laureate of the State Prize of Ukraine.



**Leonid G. Rudenko** is Doctor of Geographical Sciences, Professor, Academician of the National Academy of Sciences of Ukraine, Director of the Institute of Geography, National Academy of Sciences of Ukraine, Honored Scientist of Ukraine, and Laureate of the State Prize of Ukraine. He was born in Poltava. He graduated from the Faculty of Geography of T.G. Shevchenko Kiev University and conducted postgraduate studies at M.V. Lomonosov Moscow State University. His research interests are in the fields of geography and cartography. He is the author of 380 scientific publications, including 19 monographs; he is Editor in Chief of the National Atlas of Ukraine and the author of many texts and maps in the Atlas.



**Igor G. Chervanov** is Doctor of Technical Sciences (1982), Professor (1984), Professor Emeritus of V.N. Karazin Kharkiv National University where he has worked since 1962 to present). He is Honored Worker of Science and Technology of Ukraine (2008) and Laureate of the State Prize of Ukraine (2004). He graduated from the Faculty of Geography of M. Gor'ky Kharkov State University (1960). His research interests include geomorphology (three monographs) and general geography (four textbooks). He introduced the concepts of structuralism and synergetics into geomorphology and geography. He is the author of more than 270 publications, including 41 monographs, textbooks, and teaching aids.