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ON THE PROBLEMS OF GEOGRAPHY AND THE TASKS OF POPULARIZING GEOGRAPHICAL KNOWLEDG.

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Abstract: A Moscow University geographer who advocates a unity of geography uses the medium of the Znanive [Knowledge] Society, an organization for the popularization of scientific knowledge and communist ideology, to review the basic problems confronting geography as a research discipline. He reviews the historical sequence of philosophic concepts relating to the man-environment system in an attempt to justify his approach to the system as one in which both natural and social laws operate. Anuchin stresses the need for pure theoretical research in geography and polemicizes with those who seek prompt practical results. He restates his definition of the geographical environment as that part of the earth's landscape sphere in which nature and society interact as two parts of a single whole governed by distinctive laws. The metachronous character of development of the landscape sphere, with several parts formed at various times, is cited as an example of such a universal law. Anuchin agrees with the authors of The Science of Geography, the 1965 report of the Ad Hoc Committee on Geography, Division of Earth Sciences of the National Academy of Sciences-National Research Council, that geography's overriding problem is to gain an understanding of the man-environment system and to develop tools for geographical prediction. An ability to predict the consequences of man's interference in natural processes is depicted as the principal contribution that geography can make to the pursuit of knowledge at the present stage of human development. If geography is unable to meet its responsibilities, the problem of geographical prediction may have to be taken over by other disciplines. Soviet biologists have already suggested the creation of a new science, geohygiene, to deal with the man-environment relationship.

Introduction

The entire world, and first of all our Soviet homeland, have celebrated the 50th anniversary of the victory of the Great October Socialist Revolution, which laid the basis for a new social system. Under the leadership of the Communist party, the Soviet people created the world's first state of working people without exploitation of man by man, a country that now occupies a leading position in many fields of science, technology, literature and art, and is in the vanguard of all progressive mankind.

The results of fulfillment of the economic plans of 1966 and 1967 are clear evidence of the successful implementation of the directives of the 23d party congress [of 1966], which represent an action program for the building of new so-

82



1. Problems of the Geographical Sciences

What are the problems that geography is facing nowadays? What processes occurring in real life and having significance in practical application can and should be investigated from the geographical point of view? What theoretical ideas in geography are particularly timely for realization of the new tasks it is now facing?

The notion that is of fundamental importance for the evolution of geography as a whole and of its branches is an understanding of the character of the mannature relationship. It may therefore be useful to show how this relationship was understood at various stages in the history of mankind.

The materialist philosophers of ancient Greece and other countries of Antiquity already had a concept of the unity of the material world on earth. But in viewing man as part of that material world, many of them denied that there were qualitative differences between man and the other elements of terrestrial nature. Their naively materialistic concept may be graphically represented as follows (Fig. 1):

> A unified material world of nature on earth

Fig. 1

Later philosophers began to oppose man to nature, viewing all characteristics of a social character as distinctive nonmaterial properties. This gave rise to the idealistic concept, which rejected the material unity of the earth's nature and excluded man from that unity. That idealistic system, rejecting the existence of a man-nature relationship, is now called indeterminism (Fig. 2).



Fig. 2

The indeterministic views prevailed during the time of feudalism, but they can still be found in various manifestations to this day. According to these views, the world falls into opposed parts: inanimate nature and God's special creation

cial relations. In this effort an ever-growing role is being played by Soviet science.

An important part in this steady advance of the Soviet people is being performed by the popularizers of science in the Znaniye [Knowledge] Society, whose aim is the indoctrination of active fighters for communism, the indoctrination of new people worthy of living under communism. The 23d congress and the plenary meetings of the party's Central Committee assigned all organizations of the Znaniye Society the task of further raising the level of ideological work with the aim of insuring the successful creation of the material and technical foundations of communism and of forming a scientific outlook on life and communist morals. The popularizing of scientific knowledge should be combined with the ideological indoctrination of the broadest masses of Soviet people. It should be so organized that every speech by a scholar be ideologically purposeful and awaken the creative thinking of the audience.

The over-all tasks of popularization of scientific knowledge through lectures also guide the activities of the organizations concerned with the popularizing of geological and geographical knowledge. The seminar of geologists and geographers on problems of multipurpose use and renewal of natural resources of Siberia and the Far East, held by the Znaniye RSFSR Society in May 1967 in Angarsk, represented a concrete step toward the solution of important problems facing the geological and geographical sciences at the present stage of the building of communism.

An important aspect of the seminar was a discussion of the principal directions and concrete methods of a more effective popularization of geological and geographical knowledge. It was emphasized that we should not, and do not have the right to be popularizers of yesterday's science. All popularization should be based on the latest achievements of Soviet and world science, deal with the problems now facing science, and explain the ways in which they are being solved.

Unhappily this is not always the case in practice. What is often being popularized is not what is important in the evolution of a particular science, it is not the "last word." There are times when preference is being given to the popularization of firmly established ideas that arouse no controversy and do not infringe on the authority of any of the leading scholars. Generally known and generally accepted truths, of course, do not suffer from repetition... But does this popularizing of well-known truths arouse the thinking of the listeners? We think not.

The popularization of scientific knowledge should be more effective and active and be accompanied by discussion and debate. It should familiarize the broad masses of the Soviet people with new concepts, hypotheses, and theories now discussed among scholars. The broader the range of participants in such discussions, the more fruitful will be the feedback, i.e., the influence of the broad public on the scholars themselves. It is quite obvious that, in addition to the popularization of present achievements, the discussion should also encompass the principal problems now facing the earth sciences, problems that are likely to determine the future direction of these disciplines and, consequently, their popularization as well. — spiritual man. The internal laws of nature are rejected in this system, and evolution is associated with the reflection of a self-developing spirit.

The establishment of the capitalistic mode of production gave rise to the concept of an inconsistent, vulgar materialism, in which the naive views of the ancient materialistic philosophers were reiterated on a higher scientific level. When applied to the problem of the man-nature relationship, this system of views is now known as geographical determinism (Fig. 3).



Fig. 3

The materialistic basis of geographical determinism is evident in all cases where scholars use it in the study of purely natural processes and phenomena. Under this system, the world is unified and material, and its entire development is subordinated to natural laws peculiar to the material world. The existence of God is denied. The brilliant antireligious writings of proponents of geographical determinism are still regarded as masterpieces of that type of literature. In underscoring the material character of all phenomena and all objects, the determinists saw the causes of evolution in the motion of matter, without any influences from the "hereafter." But when it came to the history of mankind, the proponents of these ideas usually viewed events through the "eyes of idealists."

In subordinating all evolution to the laws of nature, the determinists failed to recognize the specific character of the laws of social development. Man was viewed simply as a part of nature, and the entire evolution of society was explained in terms of the laws that govern animate and inanimate nature. The geography of man (anthropogeography) was regarded as a purely natural science, a branch of biogeography.

The natural environment was therefore viewed as the decisive causal factor of all social phenomena. Whatever the physical environment is, the deterministgeographers used to say, it will determine the forms of social life. Such an absolutization of the significance of the natural environment led to the worst kinds of idealism, all the way to fatalism. Geographical determinism turned into a variety of idealism in all cases when processes of social development were investigated and explained from that point of view. The unsoundness of that concept for modern science should be obvious, and the philosophical and geographical literature contains thorough repudiations of this system of views.

Together with geographical determinism, there arose an opposite, but also erroneous, concept based on a sort of symbiosis between Neo-Kantian philosophy and a distortion of Marxism in the definition of the geographical environment (Fig. 4).



The Neo-Kantian schools of philosophy were based on the idealistic, reactionary aspects of Kant's theories. They sought to resurrect the indeterministic ideas that predominated under feudalism and attempted to lay the foundations for a philosophy of subjective idealism. A particular effort in this direction was made by the Baden (Freiburg) school of Neo-Kantians, which suggested that natural science be totally opposed to social science. The Baden Neo-Kantians proposed that sciences be classified, not by objects of study, but from the point of view that there is a single object and that it is the aim of the study that varies. One of the best known exponents of this school was Heinrich Rickert (1863-1936), who used geographic material for his philosophic theories, dividing all science into generalizing sciences (natural sciences) and individualizing sciences (social sciences). Rickert completely separated the social sciences from the natural sciences. He viewed history as a set of isolated events that do not repeat themselves and therefore cannot be compared to the recurrent events in the sphere of nature. In breaking up the unity of the material world (which was a step backward even compared with geographical determinism), the Neo-Kantians sought to demonstrate the impossibility of scientific investigation and prediction, especially in the historical sciences. They used their opposition of nature to society, and consequently of the methods of the natural sciences to the techniques of the historical sciences, in a classification of the sciences that rejected the notion of objective relationships and regularities in the phenomena of the external world. Relationships and laws were considered to be derived from the human mind.

It should be noted, incidentally, that another group of Neo-Kantians (the Marburg school) supported another set of views. They tried to establish unity in diversity by using mathematical constructs of concepts. One of them, Hermann Cohen (1842-1918) absolutely opposed the natural-mathematical sciences to the social sciences. Mathematics (symbolizing unity) was defined as the principal science, and all the others, especially the social sciences, were treated as secondary. Lenin criticized this approach in his book *Materialism and Empiriocriticism*. He wrote: "Hermann Cohen, who, as we have seen, has become enraptured with the idealistic spirit of the new physics, goes so far as to advocate the introduction of higher mathematics into schools for the sake of inculcating in students the spirit of idealism that has been lost in our materialistic era" (V. I. Lenin. *Sochineniya* [Works], Russian edition, Vol. 14, p. 294). Here we should digress a bit to

draw attention to attempts to use mathematics in the interest of idealistic philosophy.

An important problem in modern geography is the need of establishing a certain uniformity within the limits of known forms. When relatively stable (especially mappable) forms of study phenomena encompass these phenomena with sufficient completeness and precision (for the purpose of the particular study), it is important for geographers to establish a structural uniformity among these forms. In this case, geographers cannot get along without mathematics. In fact, any geographical investigation is concerned with establishing not only the geographical specifics, but also the common features of the earth's landscape sphere. Therefore, mathematics can be highly useful even in the selection of the primary data, let alone the further processing of the data. The dynamics of geographical phenomena can be studied and compared very fruitfully with the aid of mathematics. Mathematics is applicable and necessary in all cases where, within the limits of certain forms, geographers have to solve complex problems requiring the use of mathematical symbolism or a special algorithm. Without a mathematical algorithm we would be incapable of logically analyzing the whole mass of accumulated data and would therefore be incapable of logically analyzing complexes delimited within the geographical environment.

Mathematics is being fruitfully employed in geography especially in those disciplines that have the greatest need for quantitative indicators in establishing common properties. This is true particularly of the physical-geographic disciplines. The problem of using mathematics is more complicated when it comes to geography as a whole or its social disciplines, where qualitative differences tend to be more significant and where the need for quantitative indicators is less evident. We must not forget that qualitative differences between areal complexes of the social environment are particularly significant because of differences in social systems. These differences make it difficult to arrive at general schemes of areal social complexes formed under different modes of production. It would therefore be a mistake, in the enthusiasm over mathematics, to construct general schemes of productive complexes that evolved under different modes of production. It would be equally wrong to apply general schemes to the regionalization of territories with different social systems, or to apply identical quantitative methods in delimiting economic-geographic regions in countries with significant differences in socioeconomic structure. We cannot delimit regions in capitalist countries without considering the effect of "indigenous" and foreign monopolies, without preliminary consideration of the political factor. Such use of mathematics may be used to gloss over class contradictions and class struggle and may conceal under "general, average" indicators the antagonistic character of capitalist society. Lenin's warning that mathematics may be used by reactionaries for their own class or party interests still applies at the present time.

The philosophy of Rickert and the other Neo-Kantians clearly influenced the views of some Russian scholars. This gave rise to the concept of the "dualistic" nature of geography and the notion that there can be no general geographic investigation because one group of geographic disciplines consists of generalizing sciences and the other of individualizing sciences. Such a classification of the sciences would have a certain logic if the material unity of the world were denied. If the world really consisted of two different unrelated wholes, then the sciences investigating the world would also have to consist of two groups that would be fundamentally different and not directly related.

In the Soviet Union the concept gained ground that the earth sciences were only natural sciences. Geography as a whole thus had no place in the system of earth sciences. (This was reflected in the organizational structure of research institutions. The Division of Earth Sciences of the Academy of Sciences USSR includes only physical geography. Economic geography and other branches of social geography are not part of the Division of Earth Sciences. Geography in the Academy of Sciences USSR, to use N. N. Baranskiy's expression, turned out to be "dehumanized.") But it so happens that the surface of the earth is the abode of man, shaped to a large extent by man. Society itself is a specific part of terrestrial nature, a consequence (result) of the evolution of that nature, and we can regard man and the earth's nature as opposed to each other only if we clearly understand the relative character of such an opposition. Society and the earth's nature represent not only different forms of matter, but also a certain unity, which cannot be studied exclusively by the method of differentiation.

Many Russian earth scientists, for example, V. V. Dokuchayev and D. N. Anuchin, were aware of the scientific unsoundness of the Neo-Kantian views, which tended to split geography into two absolutely opposed parts. For a long time, however, this split was considered incontrovertible because of the mechanical application to geography of the definition of the geographical environment in [Stalin's] *Short Course on the History of the All-Union Communist party (Bolsheviks)*, a definition that opposed the earth's nature to mankind. Any departure from the definition of the geographical environment offered in the *Short Course* was long regarded as a departure from Marxism. In view of the fact that there are still advocates of the concept that splits the material world of nature on earth into two wholes, we will try briefly to analyze the character of this concept and its significance for modern geography. (The concept splitting the unity of the material world of nature on earth we call a manifestation of neo-indeterminism, and the system of views based on that concept and denying the very possibility of a unity of geography, we have called the concept of a split geography.)

The geographical environment was defined in the Short Course as purely external nature. "Over a period of 3000 years three social systems succeeded one another in Europe: the primitive communal system, the slave-owning system, and the feudal system, while in the eastern part of Europe, in the USSR, actually four social systems followed one another. During the same period, however, geographical conditions in Europe changed either not at all or so insignificantly that geography does not even bother to talk about it. This is understandable. Millions of years are required for any significant changes to take place in the geographical environment while just a few hundred or a couple of thousand years are sufficient to produce significant changes in the social system of man. It follows that the geographical environment cannot be considered the principal cause of social development since something that remains unchanged over tens of thousands of years cannot serve as the principal cause of development of something that undergoes profound changes over a period of hundreds of years" (Istoriya VKP(b), Kratkiv kurs [History of the All-Union Communist party (Bolsheviks). Short Course]. Moscow, 1945, p. 113).

The tremendous gap between society and earth's nature proclaimed in this

definition excluded the possibility of an understanding of the unity of the material world and, consequently, of the unity of the natural and social sciences. Dogmatically accepted by some Soviet scholars, this definition served for a long time as the philosophic basis for what was essentially a restoration of Rickert's classification of the sciences, splitting the material unity of terrestrial nature. "The definition of the geographical environment as an exclusively natural factor has remained to this day the theoretical foundation for some Soviet scholars, who have erected an insurmountable wall between the natural and the social sciences" (quoted from a speech by Academician L. F. Il'yichev. See the volume *Metodologicheskiye problemy nauki* [Methodological Problems of Science], Moscow: Academy of Sciences USSR, 1964, p. 46). But "the geographical environment cannot be viewed as purely natural or studied solely from the point of view of the natural sciences. Geography offers a particularly good example of the impossibility of an absolute division between the natural and the social sciences" (*idem*, p. 46).

That the natural environment of the USSR has not changed as a result of the fact that its society became socialist, affirms, for example, S. V. Kalesnik, contrary to his own writings in earth science and landscape science. (In some of his polemical-theoretical articles, Kalesnik insists that there is an absolute descrepancy in time between the development of society and that of terrestrial nature [see his articles in *Izvestiya* VGO, 1962, No. 1 (*Soviet Geography*, September 1962) and 1965, No. 3 (*Soviet Geography*, September 1965)]. However, Kalesnik elsewhere defends what, in our view, are entirely correct ideas. He talks about interaction between society and nature, geography as a whole, and not only physical and economic; he talks about significant changes in terrestrial nature as a result of human activity, and so forth [see, for example, his article "Both the pupil and the minister of science . . .;" *Nedelya*, September 1966].)

Anyone who affirms the time gap in the evolution of nature and society ignores the brilliant thoughts expressed by V. I. Vernadskiy that "man will become the greatest geological force, he must through his labor and his thinking reconstruct the sphere of his existence, reconstruct it thoroughly compared with what went before" (V. I. Vernadskiy, *Biosfera* [The Biosphere]. Moscow, 1967, p. 356). "Mankind, as living matter, is intimately related to the material-energetic processes of a certain geological shell of the earth, namely its biosphere. Mankind cannot for a single minute be physically independent of that shell" (*idem*, p. 351).

Marxist-Leninist philosophy and research experience have now made possible a more correct understanding of the character of the man-nature relationship. Human society is clearly a qualitatively distinct form of the material world of nature on earth, having arisen as a result of its advance from lower to higher forms. Its evolution is governed by specific laws, but it is also subject to the laws of nature. But these natural laws operate in mutable form, i.e., as man becomes familiar with these laws, he can increasingly alter the character of their operation in a desired direction.

On the basis of the foregoing, the entire man-nature relationship can also be understood (and investigated) as an internal process in a unified system where the anthropogenic factor, namely human society, plays an increasingly important role. We are thus restoring the view of a unity of the material world of terrestrial nature, rejecting the indeterministic split between individual forms, but at the same time we are also clearly aware of the determining significance of specific laws in the evolution of each of these forms (Fig. 5).



(b) biological laws

(c) social laws

Fig. 5

If the laws of lower forms continue to operate in higher forms, then the laws of higher forms, in turn, also affect the evolution of lower forms. But there is a basic difference. The laws of higher forms affect the lower forms indirectly. For example, the social law of value in itself does not operate among animals, plants, or within other components of terrestrial nature. But through the intermediary of the production process, it does have a powerful effect on nature by altering the soil and vegetation cover, the animal world and, in some cases, even such ostensibly stable components as hydrography, climate, and landforms.

The direct effect of the laws of lower forms of matter among higher forms and the reverse indirect effect of the laws of higher forms on the evolution of lower forms do not, of course, justify the assertion that the higher forms can therefore be completely reduced to the lower forms. Among the higher forms of matter, the lower forms play the role of subordinate forms, the sum of which would not constitute a complete or correct picture of the essence of the higher form. The higher form represents a new quality. Although physical-chemical laws operate in organic nature, life represents a distinctive quality, a higher (and more complex) form of motion of matter. Knowledge of physical-chemical laws alone is essential but not sufficient for an understanding of the nature of life. "Engels said that the laws of chemistry continue to operate even when, as a result of the increasing complexity of chemical processes, life arises as a higher form of motion of matter, with its own specific laws. In other words, Engels demonstrated that the laws of chemistry will also operate under those more complex conditions in which the chemical process becomes subordinate to the dominant biological process" (B. M. Kedrov. Klassifikatsiva nauk [Classification of the Sciences], II. Moscow, 1965, p. 232).

The same statement can be made in considering human society a qualitatively distinctive part of the earth's nature. The laws of lower forms, say, biological laws, continue to operate even when, as a result of the increasing complexity of biological processes, human society arises as an aggregate of persons having common conditions of material life determined by the mode of production. The productive relationships that form society do not deprive it of its material character. People do not stop being biological individuals even though they are no longer exclusively biological individuals, but also bearers of particular social functions. Society includes the implements of labor [the means of production], the objects of labor [raw materials], and the results of labor, all of which are clearly affected by the laws of nature. If the laws of nature (physical, chemical, biological laws) were to cease operating in society for just a fraction of a second, society would perish. And society is equally unthinkable outside the context of productive relationships because these are the forces which, having arisen in the primitive herd of man-like animals, transformed the herd into a society, separating it from the biosphere as a qualitatively distinctive form of the material world on earth.

Such a modern interpretation of the man-nature relationship opens up broad prospects for the development of an integrated trend in geography because it serves as the theoretical foundation for sciences that have some branches in the natural sciences and others in the social sciences. We now have a theoretical framework for the evolution of boundary sciences. The wall between the natural and the social sciences has been breached, clearing the way for wide research on a variety of social-natural areal complexes.

The theoretical foundation of the unity of nature and society also makes possible a correct understanding of the geographical environment, and this is now of great practical significance. Mankind is entering into a new stage in its history. It is facing problems that either did not exist in the recent past or were not very significant, and only few people were able to detect these problems over the horizon of the approaching future.

A progressive growth of population and qualitative changes in the needs of society are now posing the acute problem of an assured supply of natural resources for social production. The technological revolution, by equipping man with powerful means of acting upon nature, would seem to provide all that is needed for effective use of available resources. But is that really true? We think not at all.

No matter how tremendous the achievements of technology might be or how powerful the tools it places in man's hands, that alone is not enough. Moreover, man may fall victim to that very technology if it is improperly used.

The marshaling of new forces and resources of nature in the process of production is giving rise to new forms of social influences over nature. This involves not simply an intensification of such influences, but changes of a qualitative character. "Man has introduced into the structure of a planet a new form of living interference in the exchange of atoms between animate and inanimate matter. He extends his influence over all chemical elements. He changes the geochemical history of metals, forms new compounds, and reproduces them in amounts of the same order in which minerals were created as the products of natural reactions. This is a fact of extraordinary importance in the history of chemical elements. For the first time in the history of our planet we are witnessing the formation of new bodies, unheard-of changes on the face of the earth. . . . With further evolution of civilization, we may expect the influence of these processes to grow, the migration of atoms on a biogenic basis will increasingly expand, and the number of captured atoms will grow at the same time" (V. I. Vernadskiy. *Izbr. soch.* [Selected Works], Vol. II. Moscow, 1954, pp. 222-23).

Of course, in the past, man was able to change nature by actively adapting himself to it. But that required a relatively long time. Now man is facing the prospect of making fundamental changes in the earth's nature in a very short time. "Mankind has become capable of such a tremendous scope of activity that the consequences may assume a global character and become a major geological factor in the biosphere. Mankind arose and evolved in the evidently very unusual environment that existed at the time of the appearance of man on earth. It may be said that, as a natural phenomenon, mankind arose as a function of the aggregate of physical, chemical and even biological conditions in that environment. By changing the qualities of the environment, man, in turn, is evidently capable of changing his own nature" (Ya. M. Glushkov and N. V. Lazarev, "Mankind as a geological factor," in the volume *Vvedeniye v geogigiyenu* [Introduction to Geohygiene]. Moscow-Leningrad, 1966, p. 30).

(There exists another view denying the possibility of fundamental changes in the earth's nature as a result of human activity in taxonomic units of natural complexes of any large size. According to this view, human activity may affect a land-scape facies [of the order of, say, the slope of a ravine] or a small landscape unit [for example, a ravine] or, as an exception, an entire landscape [as a result of cultivation], but natural zones will forever remain outside the sphere of human activity [see: S. V. Kalesnik, "Some results of the new discussion about a 'unified' geography," *Izvestiya VGO*, 1965, No. 3 (*Soviet Geography*, September 1965), and S. V. Kalesnik, "A few more words about the geographical environment," *Izvestiya VGO*, 1966, No. 3 (*Soviet Geography*, December 1966). For a critique of Kalesnik's views, see: Yu. G. Saushkin, "Concerning a certain controversy," *Vestnik MGU*, 1965, No. 6 (*Soviet Geography*, February 1966)].)

Modern society disposes of powerful implements and colossal (and growing) energy. Science and technology are constantly enhancing these capabilities. And irreversible changes, whether beneficial transformations or, on the contrary, irreplaceable losses and waste of natural resources, have become a real possibility that must now be borne in mind in the process of production. Human society has become a purposeful factor in the evolution of nature on the earth's surface. Society is facing the tremendous prospects of unheard-of rates of progress, but there is also a great danger that did not exist in the past. Mankind is now capable of effecting a grandiose leap forward, but it has also obtained the possibility of committing suicide.

The process of investigation of the material world (scientific progress) is guided directly by social needs. And these needs have resulted in a somewhat one-sided development of science. Priority has always been given to the means of production and to consumption. Throughout its history, mankind has always been intent on taking as much as possible from nature, with little concern over the consequences of this interference, on the assumption that the forces and resources of nature were virtually inexhaustible. And if mankind wanted to take more and more from nature, it required increasingly powerful implements. It was these implements that were given priority in development. Hence an uneveness in the evolution of science. Some of its branches have been greatly stimulated. These are the sciences that equipped mankind with powerful implements and assured the progress of technology. These are the sciences that provided society with the implements of labor and . . . the implements of destruction. It is not surprising that the sciences that provided man with powerful tools of interference in nature were the ones that received priority and made a rapid advance while other sciences found themselves in a position of being "public charges."

As a result, mankind, though equipped with powerful implements, does not know how to use them properly. Man is like a boy who suddenly finds himself with powerful means of construction and destruction.

We have learned how to build great hydroelectric stations, but we cannot always predict all the negative consequences of such projects. We have irrigated huge areas of arid lands while previously irrigated land became salinized, so that the total area under irrigation has been increasing but slowly. We introduced new cropping systems without considering the specific requirements of individual natural zones. As a result, large areas ceased to be productive agricultural lands. In some cases, we have even produced new deserts and a sharp increase in erosion, again as a result of improper interference in natural processes. Pollution of the atmosphere is causing great harm to mankind. Irrational use of fresh-water sources has produced a "water problem" of increasingly serious proportions.

These are all well-known facts, and effective measures are being taken in the Soviet Union to remedy the situation. The laws of nature conservation that have been adopted at the union-republic level are evidence of the concern shown by the Soviet state for proper use of the geographical environment. But laws alone are not enough. Proper use of the geographical environment presupposes thorough familiarity with that environment and its areal differences. However, the sciences that provide man with knowledge about the environment, with knowledge that would have enabled him to predict the consequences of the use of his technology, were precisely the ones that developed more slowly than the engineering sciences. We can speak nowadays not of an insufficiency, but of an absence of geographical prediction. Geography, let's be frank, is far from occupying a vanguard position in Soviet science. With all its wide-ranging construction effort, the Soviet Union to this day does not have a single specialized institution of geographical prediction. Hence the threat of unforeseen consequences of man's interference in nature is not lessening, but growing.

2. The Importance of Theory

Under existing conditions, as geography is confronted with new tasks (geographical prediction) and with new prospects, as it is called upon to solve one of the most important problems facing mankind (American geographers call it a "superproblem"), a particularly significant role is being assumed by theory. This situation is also related to the generally increasing complexity of the process of cognition, requiring improved methods of research. And this is possible only on the basis of an improved general theory of geography as a whole.

The theory of a science consists primarily of a definition of the subject and its methodology. A system of basic ideas and concepts constitutes a scientific theory only when it is founded on a definition of the subject that not only corresponds to the existing level of the science, but anticipates its future evolution. A correct theory corresponding to the existing level of a particular science must be able to open the way for further progress. If there is no progress, it means that the theory is either outdated or wrong.

Theory cannot be limited to experimental data, as is sometimes asserted. The significance of theoretical conclusions based entirely on empirical research is also very great. There is a great danger in isolation from concrete content. But there is no less a danger in "theoretical unconcern," as A. A. Borzov noted (see: N. A. Solntsev, "The theoretical ideas of A. A. Borzov," *Vestnik MGU*, 1961, No. 2), or in the disregard of philosophy that natural scientists have expressed in the geographical literature in articles directed against special-purpose theoretical research. (Geographers sometimes make statements to the effect that "philosophy produces no good, but can cause harm" and "the farther we stay away from philosophy, the better." Unfortunately, past statements of Soviet philosophers have contributed to such an attitude. This was particularly evident when certain philosophers interfered in the development of cybernetics and genetics, in no way promoting their progress.)

In our view, scholars are profoundly mistaken in contending that theory must be objective and in condemning all abstraction, all special-purpose theoretical research that is not directly related to empirics, laboratory experiments, or field work.

A good example of such an attitude may be found in the [unsigned] article "Let us educate active builders of communism" (Vestnik MGU, 1963, No. 5), which in effect rejects the very possibility of special-purpose theoretical research. It says: "Geography's position on the boundary between the natural and the social sciences requires that geographers have a particularly well-grounded and thorough knowledge of Marxist-Leninist methodology. The geographer, more than any other scientist, has to deal with both the laws of nature and the laws of society." We know that economic geography is a social science, and physical geography a natural science. So that if the authors of that article say that geography is "on the boundary between the natural and the social sciences," they evidently acknowledge the unity of geography as a science. But the same article also states: "The need for an integrated investigation of nature, population, and economy, for a close relationship between physical and economic geography and cartography derives from the very needs of life itself and does not require . . . a 'super-integrated' geography as a science." In other words, geography as a science is both acknowledged and rejected on the same page of the same article in the same journal. This article has got everything. And whatever view about the nature of geography may prevail, the authors can safely say: "But that is what we wrote."

It is well known that practice is not only the basis, but also the aim of cognition. As the sole absolute criterion of truth, practice encompasses the entire cycle of cognition, proving the objective truth of any theory, and at the same time serves as the basis for the creation of new theories, new quests of the mind. But practice is not immutable. The precision of its criterion is a historical category. And no matter how important this criterion is, it should not be reduced to the role of an absolute at any particular time. The absolute character of the criterion of practice becomes evident only in the final analysis. It should also be noted here that the concept of practice is much broader than presented, say, by the authors of the article "Let us educate active builders of communism." We are in total agreement with K. K. Markov when he writes: "The utility of any piece of research is often viewed too narrowly. The practical and the productive use [of research] is not the same thing. The concept of practical use, meaning the application of theory in practice, is broader than the concept of productive use. The same point was made by N. N. Baranskiy. The practical use of geography includes, for example, its contribution to the peaceloving foreign policy of the Soviet Union and to the development of the culture of nations" (K. K. Markov, "Geographical science and higher geography education in the university," *Vestnik MGU*, 1965, No. 3, p. 61).

The absolute character of the criterion of practice should not be construed to mean that any piece of research must necessarily have direct practical significance. There can and should be research, there can and should be scholars, whose efforts are directed toward solving problems unrelated to the practical demands of the time. This type of research, seemingly divorced from practical needs, later often assumes tremendous practical significance.

Science is a social category. Man studies the material world with a purpose, to satisfy his needs. But this practical orientation must not be oversimplified. A particular line of research may not have any practical significance at a given time. Even centuries may pass between a piece of research and its practical application. To meet the needs of practice does not mean to "chase" after it in an effort to satisfy its current requirements. Practice is much better served if its needs are anticipated.

This important theoretical principle was well formulated by M. V. Keldysh [president of the Academy of Sciences USSR]: "We have achieved almost universal recognition of the fact that science is not an abstract cognition of the world, that it does not exist for its own sake, but for the sake of practice, for the improvement of human life. But this gives rise to a certain danger. It is sometimes expected that direct and completely concrete practical results always be visible in the planning of research. People say that research makes sense only when everything is planned beforehand, from theory to practice. But that is wrong, it would lead to narrow practicism, to a loss of perspective in research, without which no scientific progress is possible. We must know a great deal more about nature and its character than we can use at a given moment. . . . Did we require all we knew about the nucleus to create modern electric power systems and nuclear weapons? Of course not. But even the small part of the scientific discoveries that did find application in practice has already paid off tremendously. Yet, without far-reaching investigations on the nucleus we would never have discovered those facts that provide the basis for the use of nuclear, energy" (Metodologicheskive problemy nauki [Methodological Problems of Science]. Moscow: Academy of Sciences USSR, 1964, p. 226).

Geography should anticipate practical applications. We cannot agree with those who contend that geography should limit itself to solving problems of immediate significance for the present generation. (Such views have been expressed in the geographical literature. See, for example, *Vestnik MGU*, 1963, No. 4, p. 16 [an article by V. V. Vol'skiy, "On some problems of theory and practice in economic geography," criticizing V. A. Anuchin's theory of a unified geography:

see *Soviet Geography*. October 1963].) The farther ahead scholars have been able to see, the deeper they have looked into the well of the unknown, the more valuable in every respect has their work been. Chasing after timeliness and interpreting practical needs narrowly lead to an underestimation of the significance of theory. Geographers who underestimate the significance of theory reiterate the old positivistic formula that "every science is its own philosophy" and usually advocate a highly departmentalized specialization, regarding geography not as a science, but as a system of separate disciplines. According to this view each particular geographical discipline is supposed to limit itself to its own theory. "We oceanographers have no need for a general theory of geography, our own theory suffices," it has been asserted. Similar statements have been made on occasion by representatives of other branches of geography.

The unity of theory and practice is sometimes oversimplified. According to this view, theory supposedly plays no active role, and simply reflects and generalizes present-day practice. We consider this kind of statement fallacious. Chasing after today leads one into yesterday.

Things are even worse when geographers try to fit theory to previous "directives." This kind of adaptation of theory to practice, the rejection of an active role for theory, prejudiced criticism, and a striving to establish a monopoly for "one's own" interpretation of the theoretical principles of geography and of its future course of development tend to narrow the front of the pursuit of knowledge and to retard the development of Soviet geography. The path from theory to practice is in no way equivalent to an adaptation to practice. "A person who seeks to adapt science to a particular point of view, not derived from science itself but dictated by interests outside of and alien to science, that kind of a person I consider 'low'," (Marx and Engels, *Soch.* [Works], Russian edition, Vol. 26, Part II, p. 125).

To reduce theory to a generalization of facts, to make it dependent on empirical research, and only on "today's" research to boot — that is the road to positivism. The essence of a subject cannot be ascertained in the process of direct investigation alone. Only phenomena can be perceived directly. The transition from cognition of phenomena to cognition of the subject requires theory, specialpurpose theoretical research. Theoretical thought should not be limited to direct experimental data. It should move ahead of empirical research. "Theoretical natural science, which seeks to combine its views about nature as far as possible into a harmonic whole and without which even the most unimaginative empiricist cannot get along, often requires us to work with incompletely known magnitudes, so that a consistency of thought must always assist our insufficient knowledge in moving ahead" (Engels, Dialektika prirody [The Dialectics of Nature], Russian edition. Moscow, 1955, p. 16). Theory should move farther ahead than factual data allow. It should contain assumptive elements (hypotheses) that would later either become part of the theory or be rejected as wrong. Theory moves farther ahead than the data of direct experiment. It represents a newer, more profound and, most important, a more comprehensive and generalized body of knowledge which reflects the results of the active penetration of human thought into material reality. Theory (like hypothesis) goes beyond the limits of direct observation and has as its principal aim the unraveling of objectively existing relations that define the character of the study object. In suggesting a general conception of the object

and in uncovering the relationships that characterize the object, theory helps to cement (combine) the efforts of all the scholars working in the particular field. Theory is the means by which a science overcomes the danger of a complete breakdown of the subject matter in the process of differentiated study.

In investigating a particular form of matter, particular sciences seek to establish the laws of development of that form. And here we must be clear about the relations and the differences between theory and scientific laws.

By relying on known laws, theory helps uncover as yet unknown laws. Theory involves a particular world outlook and, in that sense, it may be either progressive or backward. Theory is capable of promoting scientific progress, but it is also capable of retarding progress and of directing the pursuit of knowledge into the wrong channels. Theory may be correct or wrong (at any particular time). A law cannot be "progressive" or "backward" and it cannot be "wrong." This does not exclude the relative character of a scientific law, which, though operating under a particular set of conditions, may no longer operate or may change its character under another set of conditions.

A theory may be correct at a particular stage of development of a science and may become outdated at another stage, but even the outdated theory requires a positive assessment in the history of the science. The theories of different historical periods are stepping-stones in the process of cognition through the sum of relative truths. By opening up new prospects in the pursuit of knowledge, theory itself develops as it changes together with changes in the scientific concepts of a particular field. Otherwise, theory would turn into its opposite, namely dogma.

3. The Geographical Environment

The entire life of mankind takes place in the surface shell of our planet, often called the landscape sphere (or shell). The landscape sphere consists of the earth's surface (including the bottom of seas and oceans) together with the hydrosphere and the atmosphere. In addition to the lithosphere, air masses, water, soil cover, and biocenoses, the landscape sphere also includes a whole series of components that arise as a result of human activity, as well as population. This particular part of the sphere should be viewed as a biosocial category.

All the complexes formed in the process of production, and usually called territorial-production complexes, are the results both of human activity and of the man-nature relationship, and enter organically into the landscape sphere. An altered soil and vegetation cover, an altered composition of the atmosphere, artificial structures such as cities with their factories and the residential neighborhoods, transport routes, mines, power-generating facilities and much, much more that has been made by man — all this lies within the landscape sphere and is part of it. The landscape sphere thus represents a complex aggregate of elements that arose and evolved under the influence (and through the interaction) of fundamentally different sets of laws.

Within the landscape sphere, life arose and evolved. Obviously the landscape sphere did not at once or in its entirety become the environment of society. At first there were only small segments where "ecumenes" with their primitive communities were formed, and only later, as society developed, did these "ecumenes" expand to the point that it is now difficult to delimit large areas that remain totally unused in the interests of mankind.

In addition there have always been relationships between the "ecumenes" and the rest of the landscape sphere. People do not live on the summits of the Himalayas, but these summits, by distributing moisture (and not only moisture) over vast areas, do exert a strong influence on these areas, and determine many of their characteristics. Changes in the relief of the sea bottom are capable of affecting the environment of land areas. Polar ice may influence the sea level: if it were to melt, many areas inhabited by man would be flooded.

In its indirectly related form, the entire present landscape sphere may be viewed and studied as the geographical environment. But there are certain practically significant differences between those parts of the landscape sphere where elements of nature have been drawn into the production process and those parts where they either have not been drawn into that process or participate in it only as a rare exception. In other words, complexes of the landscape sphere must be distinguished in terms of the level of human activity. And though we realize that there is a fundamental unity between landscape sphere and geographical environment, it is important in practice that we distinguish those parts of the sphere that are directly affected by society. If we were to use such a vardstick, we would certainly not say, for example, that the ocean bottom is an areal complex of the geographical environment. There is an obvious difference between landscape sphere and geographical environment. The geographical environment is part of the landscape sphere. The environment concept is somewhat narrower, but there are cer-1 tainly no partitions between the environment and the landscape sphere. Even though the differences here are extremely arbitrary, they are practically significant. Potentially the entire landscape sphere can (and should) be viewed, and studied, as the geographical environment of human society. The most significant difference is that the sphere is an absolute concept. It existed long before the appearance of society. The geographical environment is a relative concept, meaningless in the absence of society.

The man-nature relationship does not exclude interaction between the two. There are people who oversimplify reality and, on the basis of formal logic, argue roughly as follows: "If fishes swim in water, then water represents the environment for the fishes, and fishes and water can be viewed only in opposition to each other. The same is true of society. It is to the geographical environment what the fishes are to water."

But even if we were to limit ourselves to the fish-water relationship, we can show the fallacy of formal logic in opposing one to the other. Fishes, after all, by adapting themselves to the water, affect the composition of the water. Furthermore, the environment of fishes consists not only of the water, but of the sources of nourishment, including other fishes. (Some fish species may be viewed as an element of the environment for other species.) In general, all living organisms who arise in a particular evironment subsequently alter both the environment and themselves. If we take the life of society, then its environment has long ceased to be a purely natural category, to such an extent has it been altered by human activity. Mankind is actively shaping the geographical environment, which is changing not only as a result of productive activity, but also as a result of the biological life activity of man.

Marxism tells us that human society is primarily a part of nature. Man is part of the geographical environment and represents its most active and purposeful force. The contradiction that the "surrounded" element would thus be part of the "surrounding" element is a formal contradiction. If we take an ear of rye in a rye field, the surrounding environment is not just the soil and the local climate, but also other ears of rye and the rye field as a plant community. And the development of an individual ear depends both on the density of planting and on the presence of weeds.

When we consider the geographical environment and human society, we both link them into one and oppose them to each other. That is the dialectic of their conjugate development. If the geographical environment were simply "external nature," then it would not be subjected to those changes that necessarily occur and in fact do exist as a result of the development of society. And in that case, there would indeed be a huge gap between the rates of social development and the rates of development of the geographical environment, even though not so great a gap as the *Short Course* would have us believe. "Qualitative differences between society and nature do not mean an absence of unity between them" (Yu. G. Saushkin, "The geographical environment of human society," *Geografiya i khozyaystvo*, No. 12, 1963 [*Soviet Geography*, December 1963]).

Human society is part of the earth's nature, related to the rest of nature through unbreakable bonds. While making use of the earth's material conditions and resources for its own purposes, mankind is at the same time a constituent part of these conditions and resources. "He himself (i.e., man — V. A.) is opposed to the substance of nature as a force of nature" (Marx, *Kapital*, Russian edition, Vol. 1, p. 184). The results of man's productive activity are also part of the conditions and resources for further productive activity and are part of the environment of social development.

There is no complete identity between society and nature. Society is not a mechanical aggregate of nature, a sum of biological individuals. It is a specific entity subject to its own regularities. But its specific character does not place society outside or above the landscape sphere. It simply represents a qualitatively distinctive part in which a process of conscious transformation of nature takes place.

The qualitative differences between society and nature require a dual approach to the man-nature relationship: (a) as a relationship between two wholes (or between a subject and an object), and (b) as a relationship between two parts of a single whole, as a relationship within humanized nature. The social-economic sciences, which deal with society as a whole, view the man-nature relationship between two wholes. The earth sciences (which include economic geography) deal with the man-nature relationship as an internal relationship that determines the evolution of the geographical environment.

There has always been a contradiction between society and the rest of nature. It is being resolved in the process of production, but always re-emerges anew, and represents the principal factor that determines the development of the geographical environment and, consequently, of society as parts of a single whole. The mode of production can control the effect of that factor and determine its specific character, but cannot eliminate it altogether.

The question of the character of the landscape sphere as the environment of social development requires additional investigation. But even now there is no doubt that many statements made by Soviet scholars in this connection are on the right track. The following six may be cited:

L. I. II'yichev's speech published in the volume *Metodologicheskiye problemy* nauki [Methodological Problems of Science], Moscow, 1964 [Soviet Geography, April 1964]; F. V. Konstantinov, "Interaction between nature and society and modern geography," *Izvestiya AN SSSR*, 1964, No. 4 [Soviet Geography, December 1964]; V. A. Anuchin, *Teoreticheskiye problemy geografii*, Moscow, 1960; V. A. Anuchin, "The problem of synthesis in geographic science," *Voprosy filosofii*, 1964, No. 2 [Soviet Geography, April 1964]; Yu. G. Saushkin, "The geographical environment of human society," Geografiya i khozyaystvo, No. 12, 1963 [Soviet Geography, December 1963]; V. G. Konovalenko, "About S. V. Kalesnik's article on monism and dualism in Soviet geography," Geografiya i khozyaystvo, No. 12, 1963 [Soviet Geography, December 1963].

Let us briefly review what have now become virtually generally accepted definitions of the geographical environment.

1. The geographical environment is the earth's landscape sphere in which 'human society directly develops and interacts with the rest of nature. It is not the infinite universe of external nature, but a distinctive form of nature on earth, endowed with distinctive laws of development.

2. A highly characteristic feature of the environment is the fact that it is being altered by purposeful human activity and is saturated with the results of human labor. In the process of being altered by labor it evolves at a more rapid rate than the rest of nature. The environment may undergo substantial change within a very short time, in some cases within an even shorter time than it takes society to change. The rates of development of the geographical environment depend primarily on the level of social development.

3. The components of the earth's nature that are drawn into the process of production become the productive forces of society, the objects of labor, the implements of labor, the results of labor (or, what amounts to the same, the social elements of the geographical environment). The process by which new components of nature are drawn into production is a social process that makes use of the laws of nature. Both the produce'rs and the means of production reproduce themselves according to the laws of nature controlled by the mode of production. Under any mode of production, there can be no reproduction of productive forces and no technical progress without the use of the laws of nature. This completely self-evident truth underscores once again the fallacy of absolutely opposing natural laws to social laws, which are equally objective in character, and hence of opposing the social sciences to the natural sciences. The geographical environment evolves not only as a result of the elemental operation of natural process-

es within the environment, but also as a result of the effect of social laws as they manifest themselves indirectly through the process of production.

4. The influence of the geographical environment on society involves not only the influence of nature because the environment embodies the mass of human labor of all preceding generations. The influence of the environment is thus the influence not of "pure" nature, but of the humanized age-old process of labor. It is the indirect influence of bygone human societies.

5. Society and its environment cannot exist without each other. Society arose, and through its material essence will always be, in unity with the environment, forming a distinctive complex of elements within it. To the extent that man has gained knowledge about the laws of nature, he can create the environment. "In the geographical environment, there is an interweaving of the operation of natural laws and social laws, which make it a distinctive sphere of the earth, with qualitatively distinctive features. It could be called an 'anthroposphere' [or the social-natural sphere that is developing on earth]. The mutual interpenetration within that sphere of natural and production processes requires an integrated geographic approach, combining the efforts of all the geographic sciences, in short, their unity" (Yu. G. Saushkin, in the volume *Ekonomicheskaya geografiya v SSSR* [Economic Geography in the USSR]. Moscow, 1965, p. 155 [*Soviet Geography*, October 1966, p. 86]).

The process by which society alters the geographical environment intensifies from era to era in accordance with the growing social needs determined by the mode of production. The geographical environment is a historical concept. It changes with the course of the historical process of social development. The Soviet Communist party's Program, which envisages an unheard-of transformation of the environment, is expected to create many new qualities (properties) in the environment. The altered environment, in turn, is expected to exert new influences on society that may differ substantially from the influences exerted before alteration. The party's Program in its geographical aspect is thus a program for the transformation of the geographical environment, which as a result of increased mechanization, electrification, and chemicalization of the process of production, will provide the material and technical basis for a communist society.

6. The unquestioned fact that man is capable of changing and even of creating the geographical environment does not mean that the environment always conforms to the human needs of each particular era. Society's influence on the environment in each particular period of history is limited by the degree to which man is familiar with the laws of development of nature and society. And this limitation will always exist. Moreover, in altering their environment, people always act under specific social and historical conditions that determine the character of the effected changes. In a capitalist society, for example, the use, and therefore the alteration, of the environment is often associated with despoliation of resources, particularly evident in dependent countries. Only the creation of a communist social system will enable mankind to make proper use of and to renew the geographical environment in accordance with science.

Thus the geographical environment is not a cause of social development (as the geographical determinists maintained) but, on the contrary, society is the cause of a qualitatively distinct evolution of nature on earth and the sole purposeful factor in that evolution. The decisive role in controlling the use of the environment is played by the productive relationships. The mode of production in the final analysis determines the character of the evolution not only of the productive forces, but of the geographical environment as a whole. And changes in the mode of production happen because of internal contradictions within society, and not within the environment, which is therefore incapable of determining the causes of social development.

The intensification of social influences on the evolution of nature on earth has now reached a stage where we can say that the social factor has become predominant within that part of terrestrial nature that is associated directly with human activity. But the strengthening of the social factor together with the increasing dependence of society on the resources of nature and the growth of the qualitative differences between society and nature strengthen the wholeness of the geographical environment as a distinctive system, turn it into a more clearly defined distinctive form of matter, strengthen its specific characteristics, and lead to the appearance of new regularities in its future evolution. Here it may be appropriate to recall Hegel's statement that any form of organization increases in strength with a growing differentiation of functions among the component parts. This statement, which contradicts formal logic, has been repeatedly confirmed by actuality.

7. The geographical environment is a complex aggregate of social-natural conditions on the earth's surface. The process of interaction between society and the rest of nature (in other words, the process of production in general) actually exists only in certain specific forms in which some forms of production serve as the environment for other forms. Agriculture with all its complex specifies is a form of social production. But it serves, in turn, as the environment for the development of, say, the food-processing industry, which is also a form of social production. Food processing, in turn, may be viewed as a condition for the development of some farming activities (for example, the fattening of livestock on industrial by-products).

People do not live in a "primary," purely natural environment, but in a "secondary" environment that has usually been made favorable for human life and in areas where life was virtually impossible in the past. They live in an environment in which many elements were created by society, function under certain social influences and are controlled (or guided) by society. This accounts for the tremendous increase in social responsibility for use of the environment, a responsibility that the present generation bears in relation to future generations.

Progress in science and technology opens up new prospects for changing the geographical environment with a view to satisfying even more completely the constantly growing needs of society. This statement points up the fallacy of the view that the environment should be defined simply as external nature surrounding society. Man "has not only relocated plants and animals, but also altered the external appearance and the climate of his place of habitation, and has even changed plants and animals to such an extent that the results of his activity will vanish only with the total end of life on earth" (Engels, *Dialektika prirody* [The Dialectic of Nature], p. 14).

Engels was referring to changes made by man in the past. And what if we look at the world of today? We evidently do not require special proof to show that changes on earth resulting from human activity have greatly increased in significance. Man no longer affects simply the plant and soil cover and the animal world. Drainage patterns are being reshaped, major changes are being introduced into climatic conditions (the microclimate), and even the landforms, that most "stable" component of the earth's nature, are undergoing changes. We are living at a time when many geological, chemical, and biological processes on earth cannot be properly understood unless we include among the earth sciences geography in its entirety together with its social group of disciplines, which ought to be encouraged and not liquidated, as happened in the Soviet Union in the not-so-distant past. Above all, the earth sciences should include economic geography, which is definitely geography and not a branch of economics.

8. There is a fallacy in the view that the environment, because of its supposed stability, cannot produce changes within society. Actually humanized nature, with its results of past human labor, is capable of influencing society both indirectly and directly. This is because the development of the environment and the development of society are merged in a single process. Natural and social regularities are coming increasingly close to one another in the course of the rapidly expanding process of production. We can no longer adhere to the old views that the geographical environment does not determine social development. Instead we should try to determine what aspects of social development indeed cannot be decisively influenced by the environment and what aspects are or can be influenced. Development does not consist only of "leaps," only of revolution, but also of evolution. It is wrong to reduce all social development simply to the passage from one socio-economic form to another without considering also the concealed processes that lead society to these transitions.

Society does not simply exploit nature. It also changes it, introducing new qualities. In the process of this interaction, not only does the geographical environment undergo change, but the effect of the geographical factor on society also changes. Changes (mainly intensification) of the effect of society on nature result in changes in the effect of nature on society. We are dealing here with a direct proportionality. Changes induced in society by the geographical environment will increase with society's growing influence on the environment.

9. Society's influence on the environment increases in a complex progression with the growth of production as determined by the mode of production. Hence it does make a difference to the earth's nature which mode of production prevails at a particular time, in a particular place. The mode of production determines not only quantitative, but also qualitative changes in nature as a result of social influences. Each significant change in production brings about a change in the character of social influences on nature. This is related to the changes in social needs that inevitably accompany every significant change in production.

10. Marxism teaches us that the geographical environment itself does not determine the causes of the historical process. But this does not mean that it cannot exert a decisive influence on individual aspects of the life of society, especially in the economic field. Environmental elements that are drawn into the process of production can indirectly affect the development of many sectors of the economy, particularly specialization.

The mode of production determines the character of the use of the environment in production. But once the trend has been set and social life proceeds under a certain socioeconomic system, then the geographical environment does produce areal differences in individual aspects of social life.

The task of organization in a planned economy is not to reject nihilistically the significance of the environment and to ignore it in management of the economy, but to take full account of its possible influence. The determinant influence of the geographical environment on certain aspects of human activity requires that its effect be considered in terms of economic profitability.

11. We must stop looking only for socioeconomic factors or, worse, simply economic factors in everything that happens. Such an approach would be nothing but economic determinism, which, though opposed to geographical determinism, is no less fallacious. Economic determinism can lead to absurd conclusions, as Engels himself cautioned at one time. "One could certainly not explain in economic terms, at the risk of seeming ridiculous, the origin of the High German consonant shift, which widened the geographical division formed by the mountains from the Sudetens to the Taunus to the present rift extending through all of Germany. . . Marx and I are partly to blame for the fact that young people sometimes attach greater significance to economic aspects than they should. We were mainly concerned, in responding to our opponents, with stressing the basic principle that they denied, and did not always find the time, the place or the occasion to deal with the other aspects entering into the interaction" (Marx and Engels, *Izbrannyye pis'ma* [Selected Letters], Russian edition. Moscow, 1953, pp. 423, 424).

4. The Most Important Aspect is Prediction

During the 50 years of Soviet rule a great deal of progress has been made in the geological and geographical sciences. Much of this progress is evident from the anniversary volume edited by Academician A. P. Vinogradov and published by the Institute of the History of Science and Technology of the Academy of Sciences USSR (*Razvitiye nauk o Zemle v SSSR* [The Development of the Earth Sciences in the USSR]. Moscow: Nauka, 1967, 716 pp.).

In geography much has been accomplished in the differentiated study of the geographical environment. Research on individual components of the environment has achieved a great deal of depth, and new techniques now yield precise definitions where only recently we had to content ourselves with description. New disciplines have taken shape, particularly in physical geography.

More broadly based geographic research has also been promoted to some extent, especially for particular purposes (medical geography, agricultural geography, complex cartography), but in general the synthetic approach is still lagging behind the analytical, holding up the resolution of new problems confronting geography as a whole. This applies particularly to geographic prediction.

The object of study of geography as a whole is the environment of social development. (Individual branches of geography, the particular disciplines, are concerned with individual components of the environment, geomorphology with landforms, climatology with climate, and so forth.) And the basic aim of the study of this object continues to be the determination of all possible consequences in the environment as a whole or in an isolated areal complex resulting from the process of the man-nature relationship. To repeat, we live in a time when knowl-

Prediction is thus the basic contribution that is now expected from geography, and this particular aspect is being poorly implemented. All geographic research and geographic education are designed to resolve particular problems, which are admittedly of great significance at times. We can now say, with greater or lesser precision, what happens with landforms or with the climate, with hydrography or with soils as a result of a particular human interference in natural processes. But we are unable to say what effect such interference will have in a particular areal complex of the geographical environment as a whole. The wellknown tenet of Marxist-Leninist philosophy that the whole is not a simple sum of its parts is still being poorly applied to geography.

The present official geography is often incapable of a comprehensive resolution of problems. This has been well stated by I. P. Gerasimov: "The Kara Kum Canal alone will thus ultimately produce fundamental changes in the water budget of the Aral Sea as well as create huge new oasis areas. But we do not know what this project will ultimately do to the physical setting of the Aral Sea and of all southern Turkmenia. We are moving ahead blindly, and this is hardly commendable" (I. P. Gerasimov. *Problemy preobrazovaniya prirody Sredney Azii* [Problems of Transformation of the Natural Environment of Central Asia]. Moscow: Nauka, 1967, p. 19). "We are moving ahead blindly," says Gerasimov, "whereas geography should in fact be the 'vision' of our society by predicting all the consequences of human interference in nature, particularly the consequences of human interference in nature, particularly the consequences that will ensue in the specific case of Turkmenia from construction of the Kara Kum Canal." Gerasimov's lament about our "blind" advance is a serious reproach against geography, which is certainly not in the vanguard of Soviet science in this respect.

Geographers do not make enough practical recommendations on proper use of a particular region. Preliminary designs of the location of productive forces often lack a "geographical basis." Geographers rarely predict possible changes in the environment as a result of proposed projects, even when it concerns a major development project such as the Kara Kum Canal, affecting entire regions. Geography is still taking a gingerly approach to the resolution of "constructive" problems in transforming the home of mankind.

Geographical prediction is impossible under the present situation, with virtually all research limited to particular topics. The situation derives from the inadequate theoretical foundation of geography as a whole and from continuing strong relapses into the concept of a split geography. We hear statements to the effect that the theoretical concept of the unity of geography is not supported by practical research, that it has no application, and is therefore useless. There is some bitter truth in these statements. As a matter of fact, the theory of the unity of geography is persistently not being permitted to find its application in practical research, even though supporters of the theory are happily no longer being accused of anti-Marxism.

It must be recalled that general geographic research in the Soviet Union was long considered a relapse into geographical determinism and was ignored even in those few cases where it was actually carried out. Now that geography as a science has been rehabilitated, that rehabilitation (in contrast to genetics) remains limited to pure theory.

Geographers are not investigating complexes of the geographical environment as a whole or the general laws of evolution of the environment or the interaction of different kinds of laws (physical, chemical, biological, social) in the geographical environment. We do not even have any good descriptive studies of regions of the Soviet Union and of foreign countries reflecting the present level of knowledge. A definitive geography of the Soviet Union is still lacking although such a project has been repeatedly proposed to the Soviet geographic community.

In periodicals, under the banner of the struggle against geographical determinism, we continue to find occasional papers directed against geography as a science. These statements deliberately confuse the concept of a "unified" geography based on geographical determinism, with the concept of the unity of geography, based on Marxist-Leninist philosophy. They also deny that there are general laws of development of the geographical environment and that such laws may be discovered and investigated.

In this connection, it may be useful to point to at least one general law that operates in the geographical environment and must be considered in geographical prediction. That law is the metachronous character of development of the earth's landscape sphere [various parts developed at various times]. This metachronism requires that the landscape sphere be investigated in terms of areal complexes and that geographers be extremely cautious in using common approaches to the study of particular phenomena in different areas.

Metachronism is a universal law of development of the entire landscape sphere of the earth. "Europe's mammal fauna at the end of the Pliocene consisted both of older forms (mastodons, three-toed horses or hipparions) and newer forms (elephants, cattle, horses). However, there are no grounds for assuming that this stage of development occurred everywhere simultaneously under all spatial conditions . . . This notion simplifies the actual process of development: the mastodons in Europe became extinct a million years ago, and in North America only 6,000 years ago" (K. K. Markov, "Space and time in geography," *Priroda*, 1965, No. 5, p. 60).

Legends about monsters supposedly surviving in lakes in uninhabited areas do have a certain basis in fact. Evidently many animals, after having become extinct in their principal area of distribution, did survive in some places where conditions were particularly favorable.

The convincing examples of the metachronism of development of nature cited by Markov are a result of the effect of natural laws. But the present environment evolves also under the influence of social laws, which tend to intensify the metachronism of the entire development of the geographical environment. Not only mastodons became extinct at various times. A similar phenomenon may be observed in socioeconomic systems and in the life of society as a whole. In fact, the present generation is witness of the simultaneous existence in various areas of a society that is building communism, of a capitalist society, and of surviving precapitalist social forms. The simultaneous existence of various socioeconomic systems undoubtedly intensifies the metachronous character of the geographical environment and enhances areal differences in it because people tend to act differently and adopt different attitudes toward the environment under various socioeconomic conditions.

We will not be able to gain definite knowledge about the earth's landscape sphere if we treat it only as an object evolving through time. The areal differences that are found simultaneously in it are too great for that. Nor can we gain knowledge about the landscape sphere outside of the context of temporal evolution. For that, the differences are too great not only from place to place, but also from era to era.

Geography must therefore constantly deal with the spatial and temporal changes taking place on earth, and to investigate phenomena both in time and space. Areal complexes in some parts of the landscape sphere are endowed with systems of relationships that do not apply to other parts of the landscape sphere. The relationships inherent in a particular area often determine the rate and the direction of historical development of the areal complexes of the geographical environment. Without consideration of the metachronous aspect, without consideration of the areal specifies of historical evolution of the geographical environment, we would therefore be unable to gain definite knowledge about the environment and to predict its future evolution.

In our view, this theoretical principle formulated by K. K. Markov is one of the most important in the modern earth sciences. It forces us to review critically the entire periodization both of the history of nature and the history of society. The geologists who established periods in the evolution of the earth were guided to a large extent by finds of the remains of extinct animals, which can lead to errors in the millions of years. Archeologists, in establishing periods in the history of mankind, relied on finds of artifacts. But, at any given time, the level of culture varied greatly from place to place. Can we therefore speak of a Stone Age on earth? Or a Bronze Age? In some areas, man may in fact have used primitive stone tools while elsewhere, during the same historical period, scientific debate raged about the structure of the atom.

The importance of geographical prediction for mankind is understood by many scientists, and not only in the Soviet Union. Of particular interest in this connection is the American publication *The Science of Geography*, which represents the credo of a rather influential group of American geographers (*The Science of Geography*, Report of the Ad Hoc Committee on Geography, Earth Sciences Division, National Academy of Sciences — National Research Council, Publication 1277. Washington, D.C., 1965).

This publication is interesting primarily because it is the result of the work of a special committee appointed in 1963 by the Earth Sciences Division of the National Academy of Sciences on the initiative of President John F. Kennedy. The committee, headed by Edward A. Ackerman, was asked to consider promising methods for geography, to identify problems and concepts that require greater attention, and to evaluate the general contribution of geography to the general progress of science. The committee report does not deal with the present state of geography in the United States, but is concerned with its prospects of development and identification of the most important "growing edges." It attempts to provide a theoretical foundation for the strategy of geography in the future.

A weak aspect of the Ackerman report is its isolation from the present state of the earth sciences in the United States and its poor tie-in with applied research. The neglect of reality is also evident in the structure of the report, which, after a short summary, includes the following sections: (1) Geography's overriding problem and organizing concepts; (2) Four problem areas and clusters of research interest; (3) Conclusions and recommendations; and (4) References.

The gnoseological roots of geography are found in the sense of place deeply ingrained in the human race, and man's effect on the environment and the reverse influences of the environment on man are viewed in isolation from the mode of production or the needs of society.

But, like some Soviet geographers, the authors of the report believe that the significance of the earth sciences is rapidly increasing because the rise in population and man's growing capabilitity of interfering in the environment have made an understanding of the man-environment system a vital necessity for mankind. The authors consider an understanding of the system, which includes man together with his natural-social environment, for the purpose of predicting the outcome of any measure affecting that system (i.e., the geographical environment) an overriding problem facing mankind together with the problem of the structure of matter and energy, the structure and content of the cosmos, and the unity of life forms.

There certainly can be no argument against such a view, which has in fact been formulated repeatedly by some Soviet geographers (see, for example, the editorial introduction in *Geografiya i khozyaystvo*, No. 1, 1958, and V. A. Anuchin, *Teoreticheskiye problemy geografii*, Moscow, 1960).

The Ackerman report also refers to the interconnection between scientific and social progress and to the interdependence of the sciences. Judging from the report, many ideas first stated by Soviet scholars have now been adopted in the United States.

The timeliness of the problem of prediction in the use of the geographical environment or, to put it differently, the problem of the organization of a territory in the broad sense, the problem of a more rational location of production and the conservation of natural conditions vital to man does not need elaboration. And it is quite indicative that the problem is being discussed by scholars of different countries, particularly by scholars of the USSR and the United States.

An interesting comparison can be made between the American report and the Soviet volume *Vvedeniye v geogigiyenu* [Introduction to Geohygiene; Moscow-Leningrad, 1966]. Both publications actually deal with the same thing. Both stress the need for geographical prediction even though they differ substantially on the surface.

In a contrast to the American report, the Soviet volume is more closely related to practical needs and is saturated with examples demonstrating the vital necessity for serious research on the man-environment system. (The Soviet authors approach the problem from the biological point of view. Even though they are discussing the basic problem of geography, they consider it a biological rather than a geographical problem, but they do realize that it extends beyond the framework of biology. Hence the idea of a distinctive discipline called geohygiene.) The fact that the authors do not even mention geography and see the need for the creation of a new discipline of geohygiene clearly demonstrates that the problems they discuss are far removed from the areas of interest of representatives of the earth sciences. The problems discussed in Vvedenive v geogigivenu are basically geographical problems. Moreover, it seems to us that the authors, possibly without realizing it, have formulated the principal tasks of modern geography. And this should not be surprising. In the absence of geographers' contributions to the problem of geographical prediction and in their awareness of the danger to mankind posed by the discrepancy between man's capability to change nature and his knowledge about possible consequences, the authors decided that there was need for a special research discipline. Actually it is not the name that matters, and if Soviet official geography turns out to be incapable of resolving the problems it faces, then they will have to be resolved outside the framework of the official geography. The problems of the proper use of the geographical environment, the prediction of the consequences of such use must be resolved, and if geography, now wandering off in all directions, is incapable of resolving them, this will be done by other disciplines.

We had similar situations in the past. Dokuchayev's theories, which served in effect as the theoretical foundation of geography, were formulated by a man who stood outside of the official geography. It happened again in the first years after the Great October Revolution, when the official geography (both at the academic and at the university level) was unable to handle the problem of economic regionalization, of vital importance at the time. The problem was resolved by scholars who did not consider themselves geographers, and it was worked out in the Gosplan [State Planning Commission] and in the system of [Communist] party instruction rather than in the Academy of Sciences or the universities, where most geographers were then concentrated. Research in Gosplan and in party schools, particularly the Communist University, gave rise to the regional school of economic geography, which turned out to be highly fruitful in the resolution of applied problems. The outstanding representative of that school was Professor N. N. Baranskiy, a Hero of Socialist Labor.

The fact that nowadays basic geographic problems are again being discussed outside the framework of the official geography is, of course, not to the credit of geographers. But no matter where geographic problems are being investigated, they do ultimately strengthen the position of the geographical sciences.

As far as we are concerned there is no doubt that the proper use of the geographical environment, the setting of parameters for any interference of a productive character in the environment, the setting of rules for its proper use, and the identification and investigation of its general laws are becoming a problem of increasing timeliness with every passing decade, a problem of international significance.

The effect of society on the geographical environment is assuming global proportions. It is not a matter of indifference for residents of the USSR what human activities influence the environment in the United States or somewhere in the heart of Africa. The world is one. Mankind lives on one planet, in a common home, and this must be borne in mind more and more.

Geography is a science for which new prospects are opening up. It stands on the threshold of an unheard-of stage of development. Such are the requirements of practice, the requirements of life. And here we should stress yet another point that is important for the dissemination of geographical knowledge.

The natural sciences in general, and geography in particular, have an important role to play in the shaping of a world outlook. Geography inculcates a love for nature, a love for one's homeland. It is both profoundly patriotic and international. By its very nature, geography, whose practitioners work in the thick of the nation, is colored by a sense of patriotism, by deep love for one's country. At the same time, the practical, vital significance of the ideas of internationalism is probably nowhere so visible, so evident, as in geography, a science concerned with the abode of all mankind.

Geographers are professionally particularly aware of the danger that mankind faces because of improper use of the environment, a danger that is increasing so rapidly these days, a danger compounded by the arms race. It is quite natural, therefore, for geographers throughout the world to make a noticeable contribution to the cause of peace and of disarmament and the use of all types of energy for the benefit of mankind.

There is only one geographical environment. Its use at present levels of production requires international agreement. And that necessity will become more urgent with every passing decade.

American geographers have urged the establishment of a committee under the National Academy of Sciences that would be charged with study of the geographical environment in the United States. Soviet geographers, long before the Americans, have proposed the creation of a government geographical service (see the editorial introduction in *Geografiya i khozyaystvo*, No. 1, 1958). We have here a clear case of coincident proposals, and this should not be surprising. The need for this type of national organization has long been obvious, and its continuing absence demonstrates the difficulties that are always confronted by new ideas, even if they are self-evident.

But now it is time to think about the next step. What is needed is an international geographical committee based on reputable scientific organizations and endowed with substantial powers. That committee should concern itself with geographical prediction and prevent interference in natural processes in those cases where it would threaten the well-being of mankind.

We must always remember that the world's population will reach six billion in a third of a century, that the use of natural resources will grow at a more rapid rate than population, that electric power requirements per capita will rise at least ten-fold, and that the problem of a fresh-water supply is becoming steadily more acute. So far we cannot even imagine the scale of the changes that are taking place, to say nothing of their ultimate results. Yet we should be able not only to imagine, but to know. This is actually the basic contribution expected from geography, and if it is not made, man's interference in natural processes may have catastrophic consequences for society. Geographical prediction is indeed the overriding problem, in this the American geographers are quite right, and the efforts of Soviet geographers should be directed primarily toward resolving that overriding problem.

Geography is a highly complex science, occupying a "bridge" position between the natural and the social sciences. This complexity of geography often leads to a lack of understanding of its nature, and hence to wrong attitudes toward geography.

To use modern concepts, it may be said that geography deals with complex dynamic areal systems covering both natural resources and the aggregate of conditions (natural and social) of human life. Geographers have started to use quantitative methods in the study of these complex areal systems, they have even begun to build models. These advances will undoubtedly accelerate the development of research leading ultimately to geographical prediction.

In concluding this review of the basic theoretical and methodological problems confronting geography, one more point needs to be made. The dialectic of the evolution of science as a whole and of geography in particular demonstrates the unity of the process of cognition and hence the fallacy of assertions that there are "major" and "second-rate" sciences, that there are practically "significant" and practically "useless" sciences. The process of cognition is a single process. And in those cases (rather common in real life) where some sciences have achieved "breakthroughs" while others are lagging behind, there always will be and always has been a need for the research results of precisely these "lagging" sciences. This is one of the ways in which the dialectic of the process of scientific cognition manifests itself. As a result of the acute practical need for the development of temporarily lagging sciences, the front line of the process of cognition of the material world is then smoothed again.

In this pamphlet we have tried to formulate the general and most significant problems confronting geography. The popularization of geographical knowledge should take account of these problems and demonstrate the ways in which they can be resolved. To some extent this is already being done in the organizations of the Znaniye Society, where increasing attention is being given to topics related to rational location of productive forces, the complex characteristics of new pioneering regions, and the conservation and renewal of natural resources. Lectures delivered on these topics are giving concrete meaning to the basic problems that we have formulated here and that are designed to create a situation in which geographical prediction will precede any significant interference in natural processes on earth.

Bibliography

- 1. Lenin, V. I. "Materialism and empiriocriticism," Soch. [Works], Russian editions, Vol. 14.
- 2. Marx. K. Kapital. Russian edition, Vol. 1.
- 3. Marx, K., and F. Engels. *Izbrannyye pis'ma* [Selected Letters], Russian edition. Moscow, 1953.
- Engels, F. Dialektika prirody [The Dialectics of Nature]. Russian edition. Moscow, 1955.
- 5. Anuchin, V. A. Teoreticheskiye problemy geografii, Moscow, 1960.

