MISCELLANEA GEOGRAPHICA

WARSZAWA 1986

Andrzej Richling

PHYSICAL GEOGRAPHY: ITS STATE AND PERSPECTIVES

Physical geography is a group of domains studying the structure and dynamics of epigosphere in a spatial aspect with an assumption of mutual relation of all natural elements and processes. This group embraces disciplines concerning the particular components of nature: geomorphology, hydrology, climatology, geography of soils, plant geography and complex physical geography (geography of landscape) which aims to study the structure of epigosphere and its naturally limited parts — geocomplexes.

Thus two distinct streams can be distinguished in the studies of physical geography: analytical and synthetic—this division does not correspond precisely to the former division. There are numerous examples of works of clearly synthetic character in which one element of nature is studied against the background of other elements in terms of their interrelations. It is also possible to mention more narrow studies conducted by complex physical geography which for instance concern circulation of certain elements in nature or some aspects of distinguished geocomplexes. Both streams develop parallel and their presence in physical geography seems to be permanent, both in the past and in the future.

It seems impossible to determine precise limits of physical geography. Physico-geographic disciplines and other sciences that are not included in geography overlap and intermingle. Instead of limits there are transitional zones in which interdisciplinary team studies can be conducted. The position of physical geography in the system of natural sciences results from its historical development. Physical geography, as conceived today, began with Bernard Varenius (1622—1650) who argued that the earth surface covering lands, waters and the atmosphere is the subject of geography. According to Immanuel Kant, geography constituted a general outline of nature, and Alexander Humbold wrote that nature was a unity within a diversity of phenomena.

In the second half of the 19th century the holistic approach was abandoned in favour of specialized studies although obviously it is im-

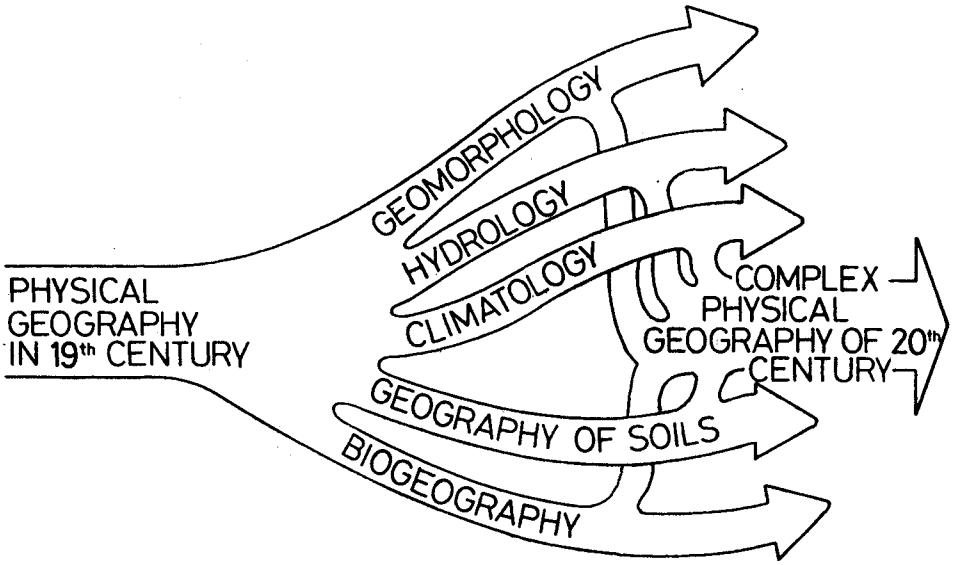

Fig. 1. Development of physical geography in the 19th and 20th centuries

possible to disregard the influence of that phase in geography development on all natural science studies.

The 20th century brought about a further disintegration of physical geography and deeper studies on the particular elements of the natural environment, but simultaneously there appeared a new discipline, i.e. geography of landscape (complex physical geography) which attempts to treat jointly all elements of nature in their mutual relations. A general outline of development of physical geography is presented in Fig. 1. In connection with diagram, there asises a guestion as to the future of physical geography as a group of sciences. There are various possibilities in this respect. The first, probable, is an assumption that the present situation will not undergo any substantial changes and that the particular physico-geographical sciences will maintain contact with physical geography. The second possibility is that in a natural trend towards making the studies more detailed there will continuously appear new directions „gemmating" from physical geography, which with time will become independent disciplines; and the third possibility is that in the process of advancing specialization, particular disciplines will become isolated from geography and complex (general) physical geography will remain its synonym. The first and second possibility are thus equivalent to the concept of permanent existence of an analytical and synthetic approach in physical geography.

The range of physical geography is different in various parts of the

world. This results from tradition and the way to organize research institutions. The particular physico-geographical disciplines are included among various branches of sciences, and their degree of independence is varied.

Geomorphology is the most developed physico-geographical science. It has the largest research potential and in many places in the world it is, or at least was until recently, identified with physical geography. An intermediate position is occupied by hydrology, climatology and complex physical geography. Slower development is visible in geography of soils and plant geography. When discussing achievements of the particular disciplines, however, it is necessary to account for potential and research results of specialized services, branch research institutes and other institutions not recognized as geography in the strict sense of the word. It is very difficult to distinguish between geographical and non-geographical trend in studies of soil or plants. A similar situation exists in climatology and hydrology. Geographical sciences are practised under various names and not only by geographers.

The concept of nature's unity assumes fundamental significance in studies of physical geography. The assumption of the overall relation of phenomena and processes in nature results in the necessity to treat all the studied elements against the background and with reference to other components of nature. This notion, as a thesis about geographical continuum was formulated in 1967 by E. Neef. He assumes that all geographical phenomena exist within a global connection and can be studied only through the connection. Also W.S. Preobrazhensky placed the principle of unity, continuity and discontinuity of the geographical mantle among the five fundamental principles concerning the studies of the natural environment and formulated in 1969.

Thus the unity of nature realized through exchange of matter and energy constitutes the basis for theory of physical geography. Also the concept of changeability of nature in time is an important element of the theory. This concept under natural conditions is equivalent to evolutional development. However, so far attemtps at constructing of the general theory of physical geography have not produced satisfactory results. The existing concepts have a narrower range and are significant for the particular disciplines.

High hopes have been attributed in recent years to mathematization of studies on natural conditions. However, the method did not produce the expected results. There was no qualitative progress in studies in natural sciences. Undoubtedly this is influenced by mostly qualitative character of elements taken into account in physico-geographical studies. In order to express them quantitatively, a very far-reaching generaliza-

tion is necessary which often leads to oversimplification of the complex reality. Simultaneously, the number of dependences that should be taken into account is so large that it often exceeds technical possibilities of the instruments used for analysing. The above statement is not contradicted by the fact that quantitative approaches constitute the basis for hydrology and climatology and also in other physico-geographical disciplines applications of mathematics have brought concrete results.

Likewise, it does not seem that the system approach will revolutionize physical geography, although many phenomena in nature are studied in system categories.

At present, justified hopes are attached to progress in collecting of information on the natural environment. It results mainly from utilization of aerial photographs and satellite images. This resulted in a distinct increase of physico-geographical studies (including thematical maps) concerning areas which had not been well known. There are real possibilities for grasping the dynamics of changes in nature as well as studies in the entire epigosphere.

Another feature of contemporary physical geography is a trend towards team and interdisciplinary studies. In Western Europe and in North America, for a long time there has been close cooperation between geographers and ecologists with biological education. Similar initiatives have recently appeared in Eastern Europe. Since 1982 the International Association for Landscape Ecology has been operating. It groups natural scientists of various disciplines. There are numerous examples of cooperation of physical geographers with mathematicians, computer scientists, economists or specialists in medical sciences.

Among directions of studies in physical geography it is usually possible to distinguish a trend to study differentiation of the particular elements of nature and environment as a whole, a trend of studies on dynamics of changes in the environment and a trend of applied studies. In terms of the particular disciplines proportions of the above-mentioned trends vary. Climatology and hydrology for obvious reasons have the most developed stream of studies on time changeability of phenomena, geomorphology and bio-geography are more directed to registering and classification of the existing state. Classification of geocomplexes also constitutes one of the basic tasks of complex physical geography. However, it is necessary to stress the fact that recently in all fields of physical geography a growing interest has been observed in dynamic approaches.

Also the relation of physicogeographical sciences to practically oriented studies is different. Complex physical geography is the one that is most connected with practice but in all the other disciplines the stream

is also observed and presently there is a clearly visible intensification of studies aiming at solving practical tasks.

The view that the study on interaction „man-environment" was the main task of geography, integrating all its branches, was widely accepted in the 1960s. Contrary to expectations, physical geography did not start respective studies on a wider scale. Other sciences substituted it. Reasons for such a situation are complex. The problem exceeds the framework of geography and requires interdisciplinary studies although it is geographers who are best equipped to co-ordinate similar undertakings. Physical geography is traditionally interested in general reviewing studies with some neglect for detailed studies, conducted in accordance with strictly defined standards. An analysis of man's influence on the environment and the influence of nature on man's activity requires, in the field of physical geography, detailed and formalized studies, equivalent to technical and economic studies. It is also important that the system for collecting and processing of information on the natural environment is imperfect. Finally, one should note that apart from the discussed problem geography is faced by other, equally important tasks.

The development of physical geography to a large extent depends on the expansion of the network of field stations. The growth of the number of stations has been recently visible. However, there has been no co-ordinated programme of observations, which hinders comparative works. Stationary studies permit to grasp the dynamics of the functioning of nature. Undoubtedly, this direction will be developed in the future.

At present, in connection with the growing crisis of natural resources physical geography faces a new extremely important task. It is to define quantitatively natural barriers in socio-economic development. Among the barriers to development there are water resources, soil resources, plant production and animal production as well as resources of some minerals. Thus, it is the task of respective physico-geographical sciences to precisely define the existing resources and determine the permissible level of their exploitation as well as to prepare detailed forecasts of natural conditions with various assumptions.

The future of physico-geographical sciences depends to a large extent on their usefulness and readiness to serve. Geographers should not avoid undertaking present tasks that are economically significant.

Also international cooperation has a decisive impact on the development of physical geography. A growth of number and expansion of activity of international organizations is being observed. In the field of hydrology the activities within the framework of the International Hy-

drological Programme produced a clear progress in organization of the research network and permitted a fuller determination of water resources. The World Meteorological Organization is involved in coordination and unification of methods of measurements and meteorological observations. Cooperation in the field of geography of soils is supervised by the International Soil Society.

Cooperation of all physico-geographical sciences is also conducted within the International Geographical Union. The cooperation depends on the activity of commissions and working groups; nevertheless International Geographical Congresses always give a good opportunity for exchange of experience. However, in the list of the International Geographical Union there are no respective units for some branches of physical geography. Neither are there attempts at co-ordinating physico-geographical studies on a larger scale.

Development of physical geography, similarly to other sciences, proceeds cyclically. After periods of intensive activities there are usually periods of slower activities necessary to prepare another step forward. The cycles are different in the particular physico-geographical sciences. They have different frequencies and amplitudes. The state of physical geography, treated as a whole, is their resultant. A view that the resultant has a growing character seems to be justified.