

PHYSICAL STRUCTURE OF GEOGRAPHICAL ENVIRONMENT—INTEGRITY AND DISPARITY, GENERALITY AND INDIVIDUALITY

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ABSTRACT: Integrity and disparity are two of the basic characteristics implied in the scientific connotation of the physical environment as a material system. From a dialectical materialistic point of view the physical character of geographical environment of the earth surface is the unity in diversity. It is on such grounds that the two basic characteristics were put forth by the author in his monograph "Physical Structure of South American Geographical Environment" as the underlying theme. This holds true for the hierarchy of physical regions. For instance, the physical environment of the earth surface in unity behaves as a huge whole, yet, in differentiation into continents, it displays disparity; each continent differs from others and becomes an integrity in its own right. The same is true of regions of lower levels. In the case of generality and individuality of regional types and their constituent distributive areas in different continents, the same relationship exists among them. Owing to similar origin each type and its distributive areas in different continents bear the general character in common. On the other hand, each area expresses its own peculiarities, resulting from the interactions of the specific conditions of the continent in which lies the area concerned. In addition, the South American tropical west-coast desert exemplifies an observable dynamic changes of the physical structure of geographical environment from arid to humid and vice versa with the wax and wane of El Nino.

KEY WORDS: physical structure of geographical environment, integrity, disparity, generality, individuality

Geography is a science concerning with geographical environment which represents a huge system of close man-nature relationship.^[1] It comprises physical and man-nature environments as well as the physical portion reshaped by man. Whatever the environment might be, it behaves and develops itself in accordance with natural law. In this sense, it is

ascribed to physical environment. In this article it refers to physical environment, i.e. the physical geographical environment.

As a branch of regional geography (or a branch of comprehensive physical geography), the regional physical geography concerns mainly with the characteristics, physical structure and the formation as well as developmental changes of the regional physical geographical environment, resulting from interactions of the constituent elements. This article attaches its importance to the physical structure of geographical environment, i.e. its integrity and disparity, generality and individuality. In connection with our national economic and cultural developments, the study of geographical environment is not to be ignored of its theoretical as well as practical significance. On the one hand, for the development of a region we must first of all comprehend the integrity of the region concerned so as to enable us to view the region as a whole in considering and planning its overall development. On the other hand, we must think highly of the internal areal disparity of a region with a view to let the measures to be taken suit local conditions, enhancing and bringing its advantages into full play in developments.

The cognition of the physical structure of geographical environment is in close association with its being as a material system. To get to such a cognition has undergone a slow process. The environmental determinists hold that geographical environment is the determinant on human activities and the development of societies, whereas the historical materialists regard it as a specified portion of the earth surface which is, at a definite stage of natural development and being reshaped by man, the sum total of the interaction of landform, climate, soil, mineral ore, flora and fauna.⁽²⁾ This definition touches, in some degree, upon the substantive connotation. Nevertheless, this is not adequate to define its basic qualities as a material system, for as an object of a branch of natural science it must be a material system with its own scientific connotation. In this respect it is an entity consisting of interacting and interwoven parts of atmosphere, lithosphere, hydrosphere and biosphere, which are combined into a system and develop as a whole continually and by stages. It is a system of motion of matter with interacting, extremely complicated and diversified forms, corresponding to the physical geographical system, a natural whole formed by the interacting (material flow, energy flow and information flow) constituent physical geographical elements, with a definite structure and achieving a definite function.⁽³⁾

As the connotation implies, physical geographical environment is a material system. Then we may further define what is the physical structure of geographical environment and how it manifests itself. It denotes the nature of interrelations and interactions among the constituent elements (also the processes). To be brief, it manifests itself as a natural complex⁽⁴⁾, which is an integrative physical whole formed by the combination of the interact-

ing constituent elements. Consequently, some assert that regional physical geography is a science concerning with natural complex. Also, a physical region is a natural complex. As a consequence, integrity is one of the basic characteristics of geographical environment.

As mentioned above, integrity designates the inner connections among the constituent elements which are combined into a physical whole. The whole affects its integral parts, and vice versa; with one element changing, the others would be affected with relevant changes. For instance, as climate became warm, the pleistocene glacier retreated. This led to the rise of world sea level and thereby causing the shoreline features into a new phase of development. On land it sets off great changes in mode of weathering, soil formation, the processes of external agents, and the poleward migration of plants and animals.⁽⁵⁾

On the other hand, integrity can not be equated with uniformity. Because of the fact that the earth is a spheroid, and in revolution around the sun its axis at an angle of 66.5° with the orbital surface, solar energy over the surface varies with latitudes. Also, in consequence of varying substance composed, different relief features, varying locations with respect to land and sea, and different historical development in various parts of the earth surface, the nature of mutual connections, interactions and so the combinations of constituent elements vary over different parts, which gives rise to areal differentiation. This is disparity, the other basic characteristic of physical structure of geographical environment. It displays zonal and azonal differences which differentiate from each other and interweave into different physical regions, each of which of the same level can be subdivided into those of lower level. This holds good for the whole physical environment, so also is the case for the physical environment of a continent.

These two basic characteristics of the physical structure of geographical environment conforms to the physical character of the physical environment as a material system. Also, from a dialectical materialistic point of view, the physical character of the physical environment is the unity in diversity. It is on such grounds that the two basic characteristics were put forth by the author in his monograph "Physical Structure of South American Geographical Environment" as the underlying theme and central idea. In studying a district either a continent or a region, emphasis should be laid on spatial relations omnipresent among the constituent elements. The overall characteristics virtually specify regional synthesis. It is to be noted that the whole physical environment of the earth surface in unity behaves as a huge integrity, whereas in differentiation into physical regions of different levels such as continents etc., it displays disparity. Likewise, each continent with its distinctive overall characteristics resulting from interactions of the constituent elements distinguishes itself from other continents, becomes an integrity in its own right. The same is true of regions of lower levels, each of which is an integrity, while its internal differences stand for

disparity. This shows that integrity of a region at a lower level would embody disparity at a higher level. It warrants that integrity and disparity are the outcome of the spatial structure of geographical environment and bear a dialectical materialist relationship. ⁽⁶⁾

As mentioned above, the cognition of the two basic characteristics of the physical structure of geographical environment—integrity and disparity—embodies the dialectical materialist thought that the physical geographical environment is an unity in diversity. Also, these two characteristics are conformable to the two basic disciplinary attributes of geography—synthesis and regionality. The two attributes are closely related. With geography as a discipline of geoscience, synthesis must base itself upon space or area, otherwise, it is not synthesis of geography. On the other hand, regionality is not to be separated from synthesis, for without synthesis regionality would become inconceivable. Regional synthesis is to view the regional as a whole. The conceptual combinations of synthesis and regionality warrant our emphasis on spatial relations in modern geography. As a consequence, the study of integrity and disparity and their dialectical relationship in regional geography is, in turn, mutually beneficial to that of synthesis and regionality of geography in general.

The study of integrity and disparity and their dialectical relationship makes it plain that to deal with integrity of a region should not neglect disparity, and vice versa. For this, two examples are cited. The author in his monograph "Physical Structure of North American Geographical Environment" emphasizes two points in regard to climatic differentiation of that continent: one on differentiation and connection of climatic types and the other about the overall differentiation pattern of the whole continent. ⁽⁷⁾ The former not only serves as a summing-up of the chapter on differentiation of climatic types, but more important is that it opens up a path for thought-provoking and broadening out comprehensive understanding of the dialectical relationship between differentiation and connection. For this the relevant types are cited, particularly the dual nature of the two types lying opposite each other on the east and west flanks of the continent respectively. Both the low-latitude dry west coast and the subtropical humid east coast are under the influence of subtropical high-pressure system. Yet, the former lies under the left (eastern) wing while the latter under the right (western) wing of the high-pressure, besides the influences of different ocean currents. It is mainly due to different locations in relation to the high-pressure system that differentiates into two different types. Evidently, they are opposites in a contradiction while lie under the same pressure system, both differ from and connect with each other. On the basis of their mutual connection, we would have a better understanding and a good grasp of the differences and the cause of differentiation between them. By this way it would foster us to form the concept of unity of opposites. As to the other point, after the description of all the individual climatic types, the author comes to reveal the overall pattern of climatic differentiation of North America as a conclusion for the

chapter. By contrasting the regularity of zonal differentiation in the eastern part with the azonal differentiation in the western part, we get a whole picture of climatic differentiation pattern of the continent, i.e. pattern of the unity of opposites.

Another example is illustrated in the network of North American rivers. Also, under the guidance of the theory of unity of opposites, in order to break with the outmoded and obsolete notion innovation is attempted. For instance, the old-fashioned one by one description of rivers is replaced by regional contrasts of the four main and typical ones of radial pattern of continental dimension. In terms of size, hydrographical features, stage of development of river system, etc. the striking contrasts of these rivers in a large measure reflect the physical character of the drainage basins concerned, and so the disparity pattern of the main river systems of the continent. This makes it plain that the combination of integrity and disparity in revelation of spatial pattern of physical-structure is significant.

Generality and individuality, as exhibited in distributive areas of regional types in relevant continents, also specify the characteristics of physical structure of geographical environment. Attention has been drawing to the study of this subject recently. As everyone knows that, the generality of a regional type represents the integrity of the type in question. It is generalized from the individualities of the distributive areas of the same type distributing in different continents as the common comprehensive characteristics of the type which differs from those of other types. On the other hand, the distributive areas of the same type, in addition to their common comprehensive characteristics as a result of the interactions of similar forming factors, manifest respectively their own peculiarities. Their respective own peculiarities which are closely related with the specified conditions of the relevant continents signify disparity of the type concerned. For instance, the climate of Mediterranean type bears the chief common characteristics of dry summer and rainy cool season (with winter or autumn as rainy season) which are generalized from the distributive areas of different continents. Nevertheless, besides the common features, each of the distributive areas expresses its own attributes. The one in South America distinguishes itself as a single subtype of cool dry summer and rainy winter, whereas in North America there are two sub-types—coastal cool summer and inland hot summer (e.g. Great Valley of California); also, among the distributive areas throughout the world the North American Mediterranean climate has the slightest rainfall in summer, generally less than 2–3% of the annual amount. Along the coast from San Francisco to Los Angeles the percentage is even below 1%, least of all. Another instance may be furnished by the low-latitude west coast of Peru and northern Chile. Under the influence of the powerful cold Humboldt current and the upswelling cold water from depth, it is, for tropical desert, remarkably cool in summer, the mean for the hottest month does not far exceeds 20°C, and that of the coldest month is about 16°C with an annual range in the neighborhood of 5°C. Rainfall is scanty, but the mean relative humidity is

high, along the coast it is generally 70%, at some localities it may exceed 80%. In all respects except rainfall the climate is of marine character. Moreover, due to blocking effects of the lofty Andes Mountains, the warm humid equatorial air mass from the east is cut off to west coast, the desert extends lengthiest in latitudinal extent lying nearest to equator of all the low-latitude west-coast deserts in the world.⁽⁹⁾ While demonstrating the common features as a west-coast desert it displays its own peculiarities, reflecting the distinctive attributes of the relevant continent in which it is located. Also, here the coastline runs from south to north and then turns towards northwest. This trend enforces the Humboldt cold current heading northwestward directly to the Galapagos Islands. It is by this reason that the said islands become desert climate in spite of their location at equator. This is rarely seen in the world. It explains that on the basis of generality the South American west-coast desert manifests distinctive individuality, which, in addition to the subtropical high-pressure as a direct dynamical factor, is related with the Humboldt cold current and the upswelling water from depth, the north-south lofty Andes Mountains near the coast, and the trend of coastline, etc. It reflects that the individuality of South American distributive area of the low-latitude west coast desert is in close connection with the powerful influences of the specified conditions of South America. It is, therefore, to be noted that the dialectical relationship between generality and individuality enables us to deepen the cognition of the distinctive character of a region.

The concept of dialectical relationship of integrity and disparity, generality and individuality of geographical environment as mentioned above, can be further understood and deepened by the analysis of a dynamic example. In normal years along the west coast of South America between 3° S-30° S under the influences of descending air stream of subtropical high-pressure, the Humboldt cold current, the upswelling water from depth and in some sections, the off-shore winds or winds in parallel with the coast, desert climate prevails. The annual rainfall generally amounts to less than 100 mm, at many places it is under 30 mm, some even no rain at all for several successive years. Except the irrigated oases along the coast, the land is barren and desolate, flora and fauna are scarce, except some short-lived flowering plants and grasses relying on winter fog and dense cloud on western slope of coastal ranges for a little supply of moisture. In contrast to inland scene, the inshore is full of life. The up-welling water from depth carry upward a large quantity of nutritious substances such as nitrates, phosphates as well as dissolved oxygen. Consequently, surface waters are very rich in plankton and so teem with small fish, particularly anchovies which attract millions of sea birds. On this account on off-shore islands and peninsulas there has accumulated deep guano which under desert climate attained at one time to 45 meters thick. For this reason Peru was renowned for guano-producing country in the world. However, in some years when El Nino takes place, from the neighborhood of equator flow southward warm water as far south as northern Chilean off-shore waters

with the result that a chain of changes are to be evoked to take place. Firstly, it gives rise to changes in temperature of surface waters and in air humidity. The bottom layer of the descending air stream becomes warm and moist when it comes into contact with the warm waters, thereby tending to be unstable. In addition, the forces ascending effect of the coast ranges further enhances the ascending tendency of the air stream. As a result, the precipitation increases greatly. At some places the normal rainfall averages less than 30 mm a year, now it may be as much as 300 mm a month.⁽¹⁰⁾ The inland surface features take on a new look. Stream valleys are now filled with water, which normally remain dry as wadis, some even inundates the neighboring land with flood waters. Flora flourish and fauna such as insects and other small animals thrive. On the contrary, the off-shore areas are rather depressing and glooming. Along near shore as the upswelling water is covered with warm current, the reproduction of plankton is greatly checked and, thus, anchovies in quantities evade to neighboring waters or slip into deep layers. As a result, other fishes use anchovies as food to migrate elsewhere. Sea birds which rely on anchovies as food die in quantities. As El Nino disappear, warm current retreats, all restore to normal.⁽¹¹⁾ Such changes have occurred many times, especially during the past two decades. This example demonstrates vividly that the geographical environment is undergoing constant changes. Obviously, the changes mentioned above take place with the wax and wane of El Nino as turning point, which firstly leads to the change of ocean current along the coast, thereby setting off a serial relevant changes of other elements and, eventually, giving rise to comprehensive changes, from arid to humid or vice versa. This exemplifies under the changes of external conditions of the dynamism and variability of the geographical environment. Also, it indicates that through transformations of processes and exchange of matter and energy, the nature of mutual interactions and combinations conforms to regularity.

To seek for the physical structure of geographical environment of a continent—its integrity and disparity, one may proceed from the study of the continent as a whole in terms of its overall characteristics resulting from the interactions of the constituent elements so as to specify the integrity of the continent concerned. Then, in accordance with the regularity of differentiation, one may regionalize it into physical regions. Such region is studied by vertical analysis to physical regions. Such region is studied by vertical analysis to reveal its overall characteristics as well as its internal differences. In addition, by horizontal analysis and comparison, the regional individuality and inter-regional differences as well as causal connections among the neighboring regions, would be further disclosed so as to enable us to have a better understanding. If the mediterranean climate is viewed as an intermediate type region between the mid-latitude west-coast marine climate in the north and subtropical tropical desert in the south, the causal connections with them is clear at a glance. Moreover, by comparison of the contrasting inter-regional variation trends between the eastern and western parts of South America an extraordinary pattern of the unity

of opposites in spatial structure for the continent as a whole is striking and unique among the world continents. For this, the author in his monograph "Physical Structure of South American Geographical Environment" strung together all the regions for the east and west of the Andes respectively. With equator or its neighborhood as axis, in the direction either toward north or south, in respects of climate, hydrology, soil groups, vegetation types and fauna the trend tends to become arid. On the other hand, in the west of the Andes, also with equator or its neighborhood as axis, either toward north or south, and in accordance with the inter-regional variation in all the respects mentioned above, it tends to be humid. The contrast of inter-regional variation trends between eastern and western parts of South America is very striking.⁽¹²⁾ Although the continent of North America displays similar pattern in unity of opposites between eastern and western parts, yet in North America these two parts are well-matched, whereas in South America they are asymmetrical lopsided, the eastern part far exceeds the western one in breadth.

In brief, as far as regional physical geography is concerned, the study of integrity and disparity, generality and individuality and their dialectical relationships of the physical structure of geographical environment in revelation of the internal relations of constituent elements, regional overall characteristics, areal differentiation and inter-regional relations is of great importance to regional development. The world regional geography provides ample scope for pursuit of these studies.

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