

CONSIDERATIONS UPON THE NOTION OF PEDOREGION

GHEORGHE IANOȘ♦

ABSTRACT - In soil studies the idea of regionalisation was introduced for the proper use of agricultural and forest territory. Initially, pedoregions were considered to be groups of areas adequate for various land uses or advantageous for various agricultural crops. As part of these territorial units, the dominant or the associated soils had the some origins, features, and productivity.

Key words: Pedoregion, pedoregioning, soil, erosion.

The geographical region is a concept that has been analysed interpreted, promoted or contested by many foreign or Romanian geographers. In the Romanian geographical literature there are many studies in this field. Some authors developed the theory of regions: Mihăilescu (1964, 1968), Coteț (1976), Donisă (1977), Posea (1991), Badea (1992), Florea (2002), Cocean (2002), Ion Ianoș (2003), while others examined the geography of region's division: Florea (1960. 1963. 1968), Velcea and Badea (1983), Barbu (1987), etc.

One of the first theories regarding the importance and the essence of the concept of "region" belongs to George Vâlsan (1931). He considers "regional geography to be a field of landscape science. He emphasises the landscape individuality through its genetic-causal explanation. Later on, the definitions of both region and geographical divisions have also been improved by Romanian physical and human geographers' theoretical contributions.

From a conceptual point of view, the geographical region division is a generalization, a mental concept applied to an area which is marked accordingly. However, a complex geographical region's division has to correspond to a certain region that is unanimously recognized and where researches on different geographical components of the environment must come to terms with the object and the place of such study. Mihăilescu (1968) suggested that landscape should be considered the real way to study a complex region. Landscape must be divided from different points of view (physical, economic, demographic, cultural, etc), depending on the situation. In most cases, the spatial delimitation of a region begins by establishing its physical elements. That is why, in geography, the geo-morphological aspect is the first step in outlining such areas. According to the purpose (scientific, economic, social, cultural, political, etc), the area under scrutiny can undergo further changes, but small ones.

Cocean (2002) thinks that regional geography was left behind, because of certain leaders who had monopolised the geo-informational field. The same situation can be found in pedogeographical studies where the same leaders exaggerated the importance of their fields and almost totally neglected some aspects of geography (for e.g. pedogeography). Consequently, they did a lot of harm to the young generation, firstly because this is a generation which has to overcome an obstacle because they begin with a distorted idea about the complexity and unity of geographical factors in the management of geosystems.

THE PEDOGEOGRAPHICAL REGION AND THE REGION'S DIVISION

In soil studies, as well, the idea to study large areas, where generalizations are necessary, required a classification of the pedogenetic elements in pedogeographical areas of various dimensions, according to requirements or the work scale.

Practically, a pedoregion is a multitude of system ground units in a profitable frame where natural elements prevail and there is also a visible implication of the anthropic factor.

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A short history of the pedoregional area, as a notion. In the studies of the first half of the 20th century the pedoregion and the pedoregion's division were perceived differently. In 1936 Milne (quoted by Wilding et al. 1983) considered that the pedoregion represented a series of pedogenetic entities arranged in a certain landscape, conditioned by rock formations and differentiated according to drainage conditions. These entities were called "chains" by the author. In German literature, the "chains" are soil sequences of approximately the same age, formed on the same parental matter, in similar climatic conditions, but with various characteristics due to microgeomorphological or draining differences (Conea et al., 1971). In such an area, soils vary according to erosion, clogging, and hydromorphic levels.

According to the American pedogeographical concepts (1951, 1975), soil is mixed up with landscape; it belongs to it. Florea (2000) accepts the ideas from "Soil Survey" (1975) to certain extent, but he also says that landscape coexists in a complex of systemic relations with all the internal and the external components. Landscape is able to transfer specific features of the pedogeographical assembly to that particular area. These features are morphological, physical, chemical, hydro-physical and they also relate to quality, such as adaptability, opportunity, and vulnerability.

In Romania, bibliographical references to the pedogeographical region division were sporadic and short until the middle of the 20th century. Most of the Romanian pedogeographers described the pedoregion's division as the final aim in the complex description of a territory.

Applied soil studies, especially ameliorative pedology, and, further on, the taxonomy and the mapping of the soil cover developed. At the same time, conceptual and applied Romanian pedogeographical research was also encouraged. Pedologic practice led to detailed studies or generalizations, the latter using systemic methods typical of or common to geomorphic subjects.

It is known that science develops when it is permanently stimulated to grasp novelties, when precepts keep improving by means of new ideas, when delimitations are perfected and researchers are in a continuous and fair competition. Answering these questions, one can say that soil studies have gone through permanent and major renewals at the national and international level these last fifteen years. The initiator of conceptual studies in Romanian regional pedogeography is Nicolae Florea. His predecessors were somehow close to the idea of pedoregion, without trying to explain it or openly discuss about it, or without publishing studies on the intimate processes and phenomena that occur inside the area under scrutiny. The first attempts to divide regions according to their soil cover were the studies by Cernescu (1958), Florea (1960, 1963, 1968), Buza (1983), Barbu (1987). As a result of an exhaustive analysis of the pedoregion concept, Florea (2003) comes to the conclusion that these first attempts were only presentations of some pedolandscape units classified according to climate, relief, rocks, soil. All these are seen in interaction and interconnection.

In the *Geographical Monograph of Romania* (1960, p. 530), Florea says that the zone's division or the pedogeographical region's division is meant to realise a synthesis of the territorial pedogeographical conditions by generalising the data about the soils of that territory and the neighbouring ones. He divides the Romanian territory into provinces, sub-provinces, zones or levels, sub-zones, sectors, districts. Later on, Barbu (1987) defined the pedoregion as a soil cover division into territorial units of different taxonomical ranks arranged in a hierarchical system according to dimensional or general criteria. Florea (1997) said that the pedoregion included all the soils (soils' cover) belonging to the natural and the administrative regions of the Earth or to other given areas. He considers the systemic organised level a component of the applied and the conceptual region's division. In 2001 Florea and Piciu improved the theoretical conceptualisation, used in Romania, with regard to the region's division of European soils, scale 1:5.000.000 (Bridges et al -1989, Deckers et al -1998). They resumed the definition of the soil region as an area with a unitary geologic / paleo-geographic development characterized by an association of dominant soils, restricted by a certain climate, and a specific association of parental matters.

Unlike other geomorphological sciences, soil science has permanently adapted its methodology and concepts. Nowadays, but for its laboratories and technical equipment, which are poor, soil science in Romania is entirely in tune with the world evolutions in the field. This is due, first of all, to certain complex researches. Ana Conea (geographer), Nicolae Florea (chemist), Ioan Munteanu (pedologist), Dumitru Teaci (agronomist), Zeno Borlan (agro-chemist), Radu Lăcătușu (geo-chemist), even if they do not have an exclusively geographical background, still got enough knowledge about environment and soil as a natural structural element in order to successfully include it in the field of geographical factors.

Besides this, there was a permanent exchange of ideas through trainings, methodologies, check-ups, debates, and field applications with the small group of experts that worked in territorial institutions. These

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methods bore excellent fruits. In Romania there appeared a group of well-trained experts in soil science. Many of them have Ph.D. degrees. Unfortunately, the transition affected Romanian science as well as soil research. Some of the forerunners disappeared, other retired. Disciples had to leave the universities where they were taught and, therefore, other universities gained experts already trained. But the future is still uncertain. Specialized institutions face the same difficulties if they want to train a pedogeographer, a pedobotanist or a geo-chemist. A lot of field work, laboratory expertise, office or library work is needed. And no one is willing to do all that work without being paid, at least, decently.

Research in soil studies, especially in applied territorial pedoregioning has created and improved a specific methodology which measures and quantifies both the natural systemic component and the anthropic one. For precise data computation, the selected parameters have been tested for long periods of time in all natural conditions of Romania. Also, for each pedoregion outlined with a certain lucrative purpose, typical unitary research methodologies (general evaluation of soil resources, estimated quality of agricultural soils, projects for territorial planning of fruit-tree and vine plantations, the management of pastures and woods, projects to prevent humidity excess or erosion or pollution) have been devised. All these findings were gathered in a thematic collection for internal use (ICPA, 1987).

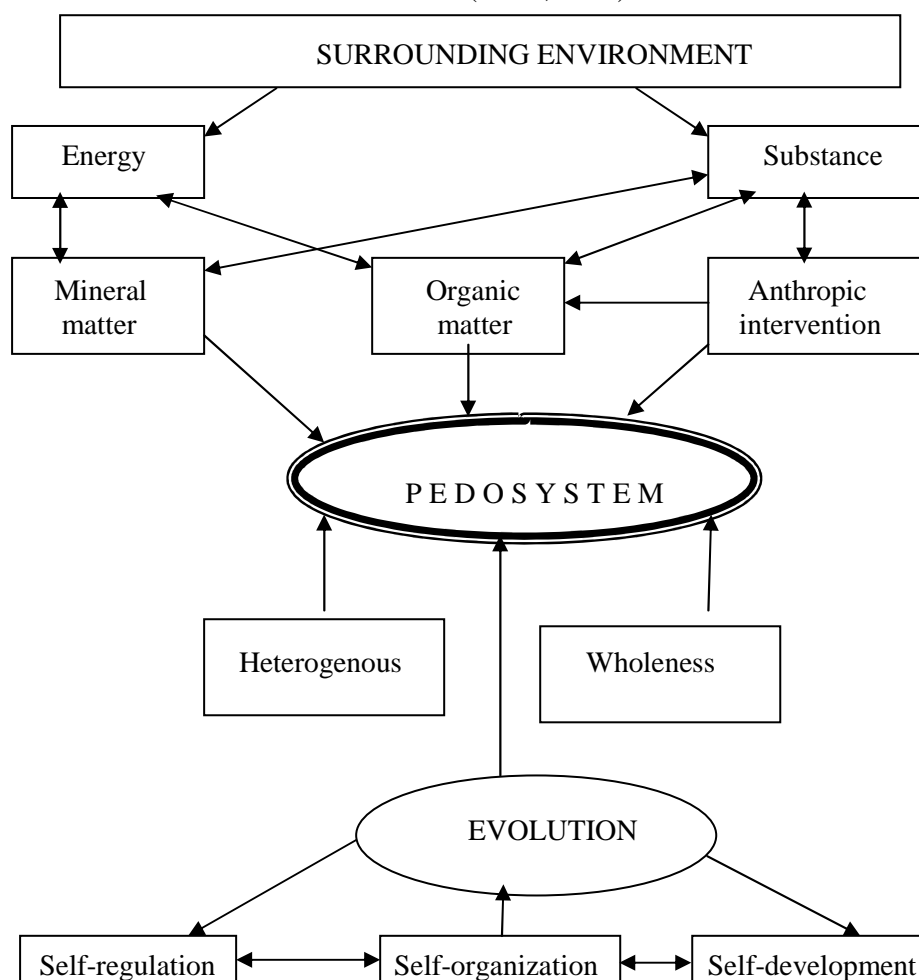


Fig. 1. The influence of environmental conditions on land use patterns of certain territorial pedosystems (pedoregions).

The concept of pedoregion and pedoregioning. In soil studies the idea of regionalisation was introduced for the proper use of agricultural and forest territory. Initially, pedoregions were considered to be groups of areas adequate for various land uses or advantageous for various agricultural crops. As part of these territorial units, the dominant or the associated soils had the some origins, features, and productivity. Later on these classifications have been reconsidered on the basis of certain systemic realities, with profoundly visible historical and progressive characteristics obvious in the state of the soil cover (self-organization, self-development, self-reproduction, wholeness, complexity, homogeneity, heterogeneity,

vitality) and possible means of classification at more complex levels (Fig.1). The functionality of pedoregions is closely connected to the evolution of the neighbouring systems, from which they always receive, on the basis of specific programs (Fig. 2), substance and energy. They are quite often disturbed by excessive or diminished contribution. In soil making, a lot of agents contribute to changing the percentage of their participation. In the initial stages the internal agents prevail, while in the mature stages the external factors are more and more influential in defining taxonomic categories up to the end.

In pedogeographical research, the basic element is the pedon, the soil profile or the place where a soil type is researched. This represents the three-dimensional unity with the smallest surface which can be described in pedology. The area, defined as the totality of the same kind of adjacent pedons, is called the polipedon or the soil unit. This represents the surface of land in which the soil is in an obvious interaction and balance with the soil forming agents (natural and anthropic). This is similar to the soil unit (US) or, at least, as far as its definition is concerned, this is the land unity, According to Teaci (1980), this is the unitary ecologic land.

The two terms, pedon and polipedon, were introduced into the literature of this area in 1963 by Johnson. Later on, the notion of pedon and polipedon were also used as a territorial elementary unit of pedolandscape by Dijkermann (1974) in soil geography. Afterwards there was an attempt to introduce other terms in order to specify the pedoareas characterized by proper forms and features: the genon (Boulaine, 1980), the pedotope (homogenous unity), the pedochora and the pedoregion (a heterogeneous unit) (Lieberoth, 1982).

The following hierarchical categories or those which classify lands according to the characteristics of the soil cover are constructed with well specified aims and they also depend a lot on the work scale: pedo-associations (studies on the local cover of soils) and the pediom (territorial units at different levels of generalization, with a unitary pedogeographic evolution). In this case the map drawing details are removed and some of the physical-chemical features of the solic components are generalized. As a matter of fact, the pediomal areas would represent the essential element in dividing pedological regions according to a practical thematics devised by Cernescu et al. (1958), Florea (1960), Buza and Florea (1983), or by Barbu (1987) for the Romanian soil cover. In the complex studies on areas with different relief, biotope, hydrography or climate conditions, details are compulsory, while the information is little. These areas have been called "peditory" by Florea (1987). They can be analysed both according to the interrelation among different geographical components and they can anticipate some of the progressive features in the lower altitudinal sectors.

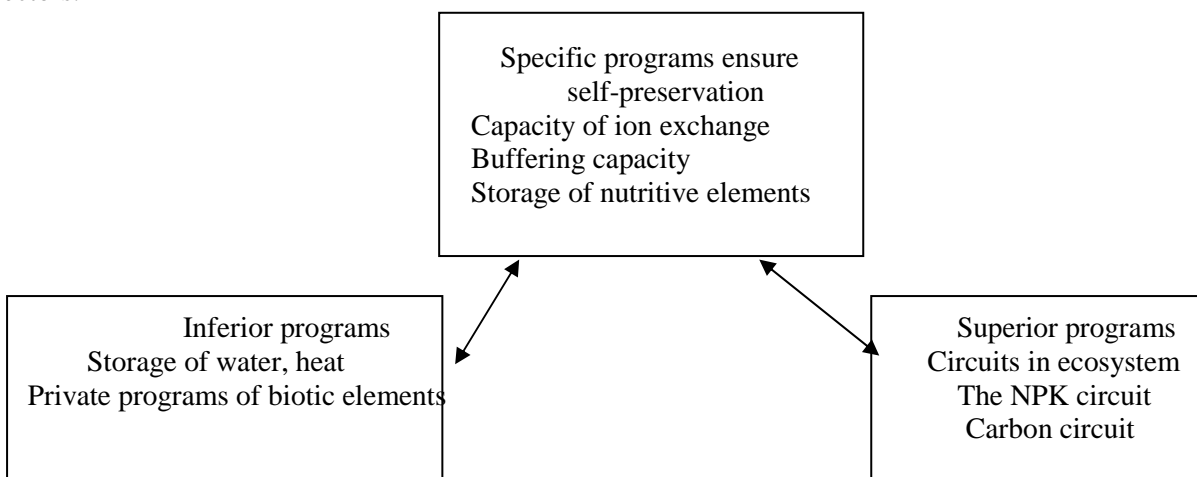


Fig. 2. The self-organization scheme of a pedosystem.

The pedogeographical region corresponds to a complex spatial organizational level by associating polipedons, pedosocios, pedioms (Florea, 1997). It consists of an arrangement of various dimensions, functions and features, which are classified by Fridland (1972) and Florea (1989) according to their size, position in relief, content, limits, participation and component arrangement, complexity contrast, dissimilarity, contiguity, etc. Each constitutive entity is in a permanent relationship with the environmental agents, fulfilling all the conditions of a systemic unit. The energy and substance exchanges within the

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subsystems of a pedoregion occur through specific mechanisms. The results of each organizational level are included into the subsystems characteristic of the next higher levels.

Unlike the geographical region, seen strictly from the point of view of the relief, the pedoregion is a special environmental element characterized by a continuous self-organization through proper programs (adsorbing capacity with ion exchange, buffering capacity) (Fig.2). It also uses the programs belonging to some environmental components with which it interacts. Florea (1983) names these programs “inferior” when exchanges are made with similar constituents or with inferior components. They are named “superior” programs when the exchange of substance, energy, and information are meant to strengthen the stability of the entire environment. The self-organization and the self-regulation of the solic element, as part of a certain territory, rely on the negative retroaction (feed-back). This maintains the heterogeneous constituents and the actions from the soil in a dynamic and visible stability.

Hence, the pedogeographical region is a territorial unit which has a specific way of organizing both the soil cover and the environmental conditions (e.g.: the pedogeographical area of the mollisols: isohumice soils – temperate continental climate – flat relief forms – carbonated parental matter, loess – steppe vegetation). The pedogeographical region has a specific aspect, a specific potential of productivity, and relatively uniform land use, etc. Sometimes inclusions can appear.

POSSIBILITIES OF APPROACHING PEDOREGIONALISATION

Pedological research is reduced to a permanent quest for measurable natural, anthropic elements and events, their placement in space (mapping, maps, cartograms) and, maybe, their placement in time (evolution). This means not only a profound understanding of landscape territory but also a thorough characterization of its constituents’ quality, which encourages organizational and use practices.

From the beginning we must specify the difference between the activity of the territorial region’s division, as a whole, and the activity of the region’s division of the territory. In the former, units are separated in complex natural subunits. The latter has a certain purpose: the delimitation of areas with specific features that will undergo various (ameliorative, agricultural, organizational, etc.) interventions. The most frequent activities of applied pedoregional division have focused and usually still do on a political-administrative regional space of various dimensions, according to purpose or demand. They rarely focus on a provincial, mental, or ethnographic space.

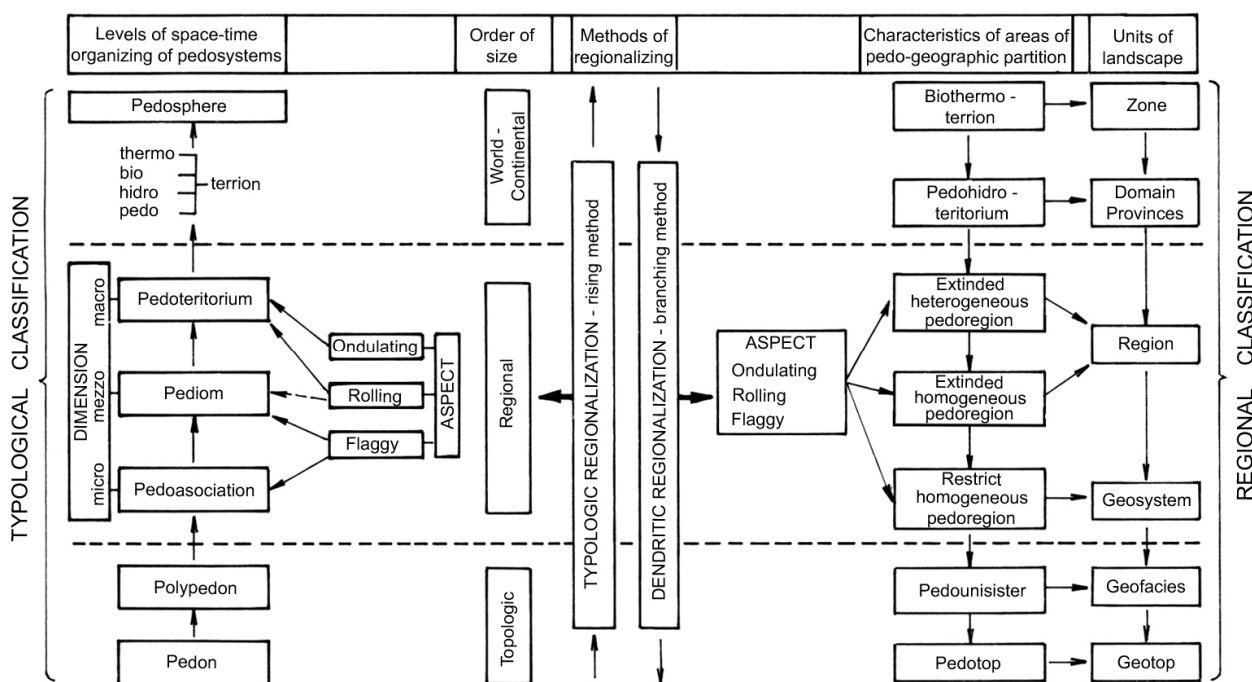


Fig. 3 Some matches between territorial (conceptual, non-dimensional, regionalization) pedoregioning and the (applicative, pedotechnical, typological) pedoregioning of the territory.

The conceptual or non-dimensional territorial pedoregion is a generalization referring to the soil cover of a certain zone. This activity is tackled from a scientific point of view and it means that space exists, it is more or less covered with soils and their features are set. In this case, pedoregions are only taxonomic concepts which should be compared and synchronized with the results of territorial regionalisation in order to be understood. In this regionalisation activity, the position as well as the characteristics of the area are specified (e.g.: Barbu's pedogeographical regionalisation in 1987); regional differentiations, soil types and subtypes are established. Territorial regionalisation is easier to approach from the bigger to the smaller structures. In this case, the relation between the constitutive systems are seen as elements of different organization levels.

In order to understand and define the whole, the general, it is necessary to know the particular in depth. In soil studies this is done through the applied orpedotechnical pedoregionalisation of the territory, i.e. including the peds into the landscape, from the smaller structures to the bigger ones (Fig.3).

The technical understanding of regionalisation or the detailed description of a geographical region, in general, or of a particular pedogeographical region requires a high level of knowledge for each area, which is difficult for one single researcher. That is why teamwork with different specialists is required. In technologically advanced countries, this has already been done for a long time.

In pedoregionalisation, similar work methods will be applied at the same (local, regional or planetary) organization levels. They are both typological and horizontal. In this case, the environmental factors implied in soil formation are classified according to a similar pattern (aspect, size), these factors have a specific genetic evolution (plain soils, hill, soils).

The outlined pedoregions are unitary both from the bioclimatic and the geomorphologic point of view. They are characterized by small differences regarding the place of parental matters, chemical, internal, or lateral drainage, or the features of phreatic waters.

In pedoregionalisation some areas extend on many relief units and are genetically differentiated from the evolutionary, altitudinal, morphologic, bioclimatic (etc.) points of view. In this case, the vertical pedogeographical division method based on collecting some sequences from the high level systemic groups will be used.

CONCLUDING REMARKS

1. The systemic relations between the soil and the environment in a well-defined space-time frame determine a better understanding of quality evolution processes. When studying certain areas in order to evaluate their productivity, quality and output are to be considered. Also, the concept of pedosystem and its integration into a regional arrangement gives the possibility to make proper evolution prognoses.

2. In all cases, applied pedoregionalisation uses the results from genomic studies (geology, geomorphology, climatology, all the approaches regarding rivers, the vegetation and even the fauna) in order to explain the creation and the features of the soil cover. But applied pedoregionalisation also uses the results of economic-geographical studies in order to explain the impact of the soil upon the economic situation, life quality, social conditions, etc.

3. The idea of pedoregionalisation is much closer to the notion and the spirit, and the conceptualisation of geographical regionalisation. Although without methodological thoroughness, most geographical concepts are found in applied pedoregionalisation (pedo-amelioration, sustainability, opportunity, vulnerability).

4. According to its purpose, pedoregionalisation can be territorial or conceptual. Only taxonomic notions are specific. But applied pedoregionalisation can be pedotechnical by delimiting some regions modified by anthropic, ameliorative, productive interventions, etc.

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