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NIŞCOV BASIN BOUNDARIES

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Nişcov Basin boundaries

Adriana Bogdan

Limitele bazinului hidrografic Nişcov. Primul pas în analiza organizării spaţiului unui bazin hidrografic îl constituie stabilirea limitelor prezente ale acestuia şi, eventual, evoluţia lui spaţială. Componenta de bază a sistemului în funcţie de care se realizează delimitarea acestuia este cadrul orografic, cumpăna de ape desfăşurându-se mai întâi pe aliniamentul marilor altitudini pe ansamblul spaţiului deluros din nord (Dl. Ciolanu) şi sud (Dl. Istriţa). Doar în vest şi în est se delimitează două structuri joase; în prima situaţie la nivelul unei vechi înşeuări şi respectiv în cea de-a doua în culoarul de vale al Buzăului, unde sunt străpunse terase inferioare şi lunca acestuia. Ele sunt legate de evoluţia regiunii de la finele pleistocenului şi din holocen.

Cuvinte cheie: limite, bazinul Nişcov, cumpănă de ape, organizarea spaţiului, dezvoltare durabilă.

Nişcov Basin boundaries. The first step in analyzing the spatial organization of a river basin is to establish its present boundaries and possible developments of space. The most important component of the system, by which it is achieved, is the orographic delimitation; the watershed is carried out first on the alignment of high altitudes on the whole northern (Ciolanu Hill) and southern (Istriţa Hill) hilly area. Only in the west and east are distinguished two deep areas: an old saddle (Poiana lui Roman) and respectively, the lane of Buzau valley, where are the terraces and lower valley. They are related to the evolution of the region started with the end of the Pleistocene and continued in Holocene period.

Keywords: boundaries, Nişcov Basin, watershed, spatial organization, sustainable development.

1. INTRODUCTION

My thesis refers to the natural organization of space in Nişcov River basin and in which way the human activities are modifying the landscape. The Nişcov River basin has a complex organization: a natural one, until the 16th and 17th centuries, determined by the relation between its components, and an antropic one, starting with 18th century, when the society development was obvious through settlements, infrastructure and irigation systems building (Morilor Channel, near Verneşti), exploitation of natural resources (gravel and sand at Verneşti, lime from Istriţa Hill, petroleum at Tisău and Bărbunceşti, the forest, the land for vineyard (Photo 5), orchard, the grazing and grass lands, phreatic waters and the landscape for tourism etc.). At the same time, the localization of the Nişcov area in Curvature Subcharpatians, near Buzău city, indicates a high anthropic pressure because of the presence of DN 10 Road (Buzău- Verneşti- Cândeşti), DJ 100 H Road (Verneşti- Jugureni) and DJ 203 G Road (Sărata Monteoru- Leiculeşti- Izvoru-Haleş- Pârscov). The most exposed subunits are Nişcov Depression and Buzău-Nişcov alluvial Cone because they make the connection between Muntenia, Transilvania and Moldova Provinces [1].

So, to establish the boundaries is very important for local authorities because they can easily monitore the area, find the dysfunctions that would create unbalances and repair this for a short term. The natural characteristics of Nişcov region and the natural resources diversity offer multiple possibilities for organizing the space. Here, the human activities are divers and they could modify the natural landscape of the basin and their boundaries. The deforestations (for room heating and wood industry) forced the erosion processes and determined landslides (Photo 1, Photo 3). The National Research and Development Institute for Pedology, Agrochemistry and Environmental Protection (ICPA) Bucharest made a *Human- induced soil degradation* map (Figure 1), where The Curvature Subcarpathians and also the Nişcov River basin are afected by landslides and gullies (Photo 4). Another exemple of degradation is the soil pollution (especially luvosoils) with petroleum residue in Tisău and Bărbunceşti localities (PETROM *Bărbunceşti*, *Parc 1, Parc 2, Parc 3 Bărbunceşti* and *Batal Tisău*). The identification of these contaminated areas was realised by The National Agency for Environmental Protection [2]. The most degraded areas are the Nişcov Depression and Buzău-Nişcov alluvial cone because of the agriculture (Photo 6), grazing, sand and gravel exploitation (Verneşti, Photo 2).

All this information is necessary for minifying the unbalances and sustainable development of Nişcov region.

Photo 1. Deforestations in Fântânii Hill

(Bogdan Adriana, August 2011)

Photo 2. Gravel and sand Pit-SĂTUC Verneşti
(Bogdan Adriana, June 2012)

Photo 3. Landslides and scrubs areas
(Bogdan Adriana, September 2011)

Photo 4. Landslides and gullies in Cerbului Hill
(Bogdan Adriana, June 2012)

Photo 5. Vineyard in Buzău-Nişcov alluvial Cone (Bogdan Adriana, August 2011)

Photo 6. Agriculture (corn field) in Nişcov Depression (Bogdan Adriana, June 2012)

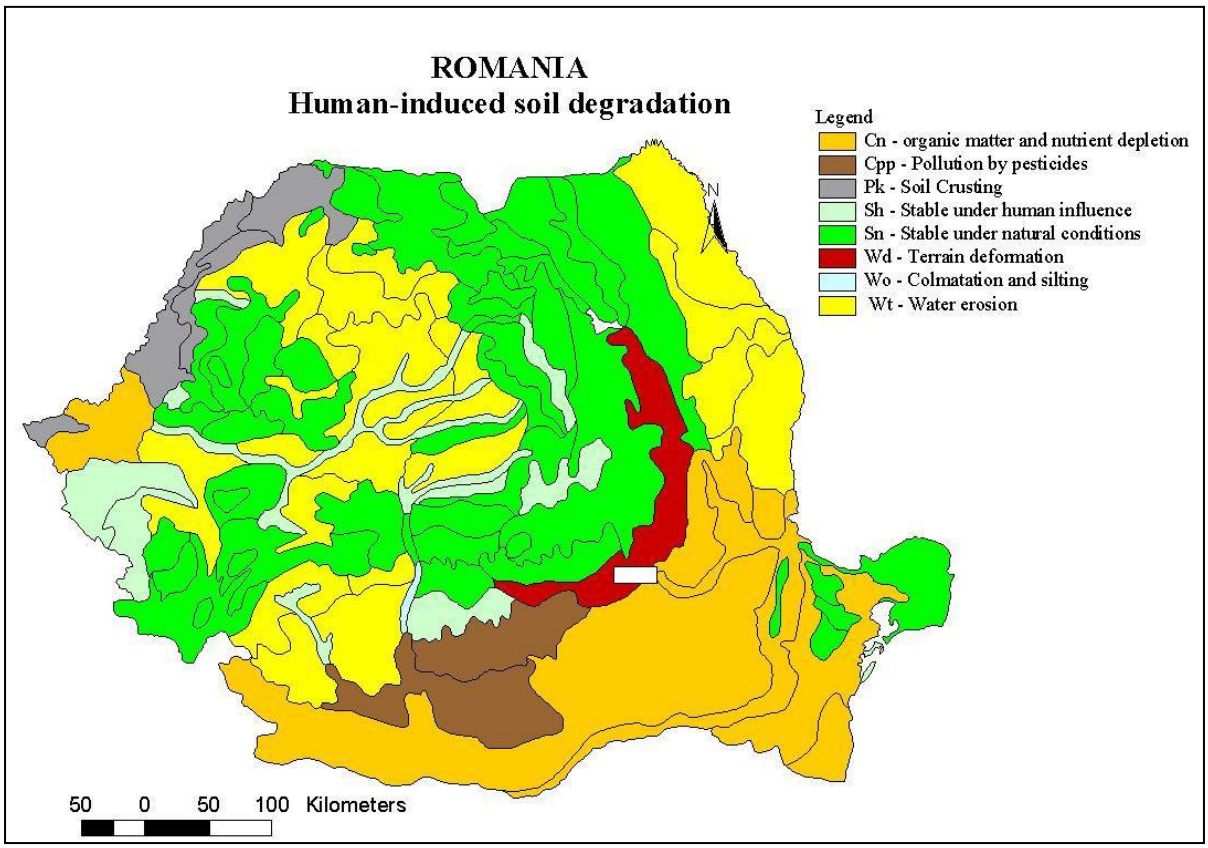

Figure 1. Human-induced soil degradation (Source: ICPA)

So, the first step in analyzing the spatial organization of a river basin is to establish its present *boundaries* and *possible developments of space*. "Without a rigorous delimitation of a study object„ any introspection… floats within relativity" [3]. The most important component of the system, by which it is achieved, is the orographic delimitation; the watershed is carried out first on the alignment of high altitudes on the whole northern (Ciolanu Hill) and southern (Istriţa Hill) hilly area. Only in the west and east are distinguished two deep areas: an old saddle (Poiana lui Roman) and respectively, the lane of Buzau valley, where are the terraces and lower valley. They are related to the evolution of the region started with the end of the Pleistocene and continued in Holocene period [4].

The *Nişcov River Basin* is located in the south-eastern part of Romania, namely in Buzău Subcarpathians [5]. The Nişcov basin is a complex region who has several subunits: Lapoş- Ciolanu Hill in northern (Fântâna Hoţilor Peak - 753,4 meters), Nişcov Depression in the center of the basin and Istriţa Hill in southern (Istriţa Peak - 750 meters) [6]. The geographical position of the Nişcov basin it is geographically defined through the following coordinates: in north, 45°14′59″ lat. N, in south, 45°05′59″ lat. N, in west, 26°40′54″ long. E, in east, 26°25′54″ long. E. It is located on the territory of two counties: Buzau and Prahova (only the western extremity of the basin).

2. THE CONCEPT OF „BOUNDARY". MEANINGS AND PATTERNS WITH DIRRECT APPLICATION IN SHAPING THE BASIN

In case of a hydrographic basin, the concept of „boundary" is an object of interdisciplinary study, being approached by geographic and etymologic elements, which have different meanings. The clue is offered by a few definitions that lead to understanding this concept.

According to the Dictionary of geomorphology [7], the boundary is "*the edge of a system from which it comes into contact with others, the extreme value towards a process development or a characteristic manifestation tends*". In case of Nişcov system, its edge is the watershed located on the highest heights of Ciolanu and Istriţa Hills. Beyond this boundary, the system comes in contact with the others of the same and different rank, such as: in the North with Buzău basin, between Cislău and Unguriu localities and in the North-East with the same basin between Sătuc and Verneşti localities, in south with Sărata basin, in South-East with Călmăţui basin and in the west with Cricovul Sărat basin. The watershed of Nişcov is determined both by the boundary of the Nişcov tributaries (who have different orders) and the Nişcov river mouth. The boundary also represents the extreme value to which tends the development of a process. Beyond it, new process properties appear.

The boundary represents "*an extreme point, edge of a surface, end; ... line demarcating territory of a region*" [8].

The basin delimitation occurred in time, first by the evolution of the natural elements. According to P. Cocean [3], the landscape is "*a customary criterion in any attempt to delimit the geographical region*". The Nişcov basin landscape is unique, being determined by its components, which establishes relations and interrelates. The geological component in this basin is represented by Miocene and Pliocene rocks (Photo 7), such as: marls, clays, sands, gravels, loess, lime stones and sandstones [9].

Photo 7. Different types of rocks in Haleş Valley

Photo 8. Lateral erosion in Haleş Valley

(Bogdan Adriana, June 2012)

This kind of rocks determines few types of soils, such as: preluvisols and luvisols, rendzinas, phaeozems and fluvisols. Depending on the rock and soil types, the biogeography component develops (the oak forest, Figure 2). And still, the most important factor of this territorial complex is the geomorphologic one, because the evolution of the other components depending on it (altitudes of 111 to 753,4 m). The climate component is conditioned by relief, too. The Nişcov basin climate is temperate-continental, with annual average temperatures of 8-10°C, torrential precipitations (600-700 mm) and dominant winds- the "crivăţ" and the föhn.

The both relief and climate have determined the dynamic of the Nişcov basin stream system (Figure 4). All these attributes have created a favorable framework for stocking and developing human activities (exploitation of natural resources and land in Nişcov Depression, Nişcov Holm and Buzău-Nişcov alluvial Cone; building houses; infrastructure modernization; marketing, transport and turism activities - Ciolanu Monastery, Măgura Sculpture Camp, Cârlomăneşti Archeological Site, Poiana Pinului Camp, etc.).

The initial boundaries (after shaping land at the end of the Pliocene) did not remain fixed but varied subsequently. There has been a transgression in the mid-upper Pleistocene [10], the lake from Romanian Plane filed in the Nişcov space, separating the two hilly structures, but passed to the west (in the Cricov space) and in Buzău corridor. Emersions and neotectonic lifting at the late of Pleistocene led to a new orographic set, consisting of two hilly alignments and a lower sector that descended through the stream system. From this moment, the boundary placed on the two hilly heights and suffered changes in the east and west (advancement or withdrawal, Figure 3 [11]).

The second moment is related to the evolution of the last centuries, the development of settlements led to deforestation (first for agriculture and than for oil drill), followed by development of the last generation of torrential valleys. Through regressive erosion (Photo 8), these have led to local interbasins changes, including basin boundaries (particularly in the area of interference Cricov tributaries). The changes are produced directly in other natural components, causing adaptation in time for some of its elements, reflected in landscape changes. Thus, the boundaries become increasingly dependent on the natural elements relations and human pressure. Because of that, the boundaries have functional character.

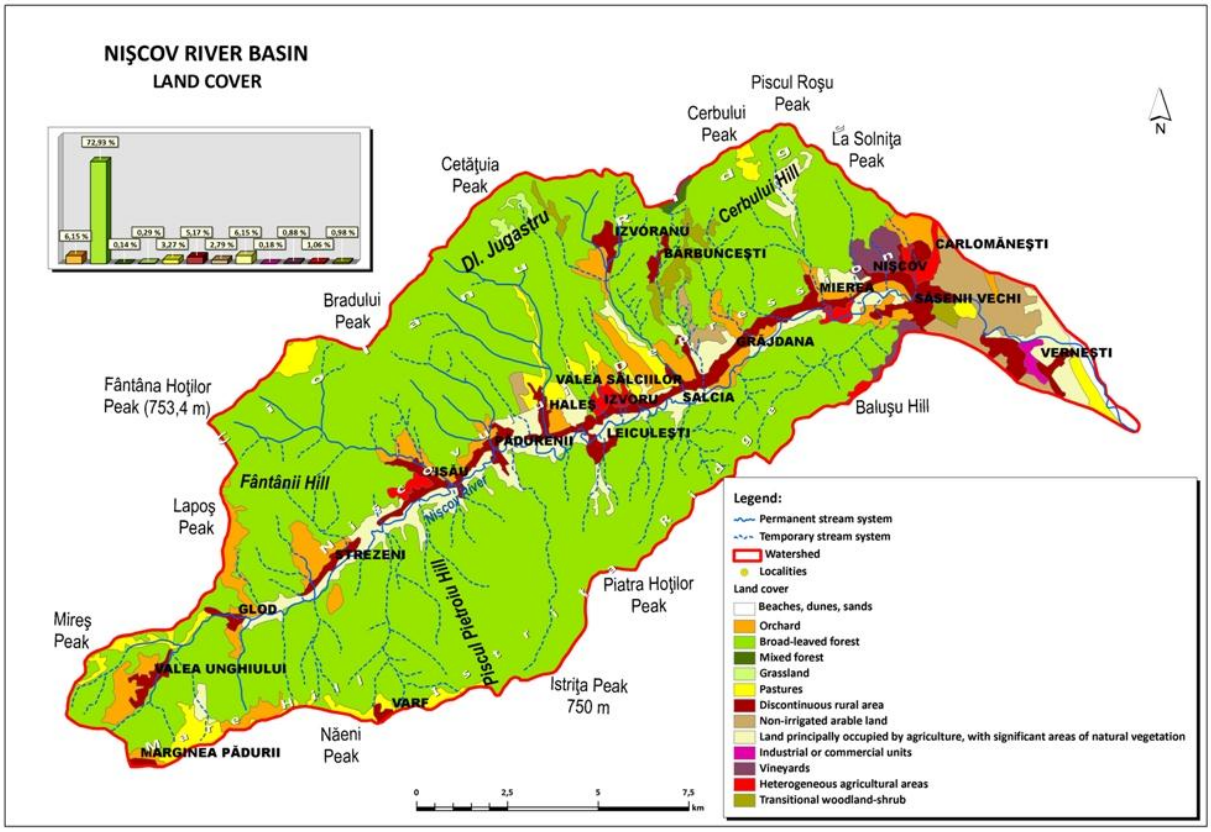

Figure 2. Land cover in Nişcov River Basin (Source: Corrine Land Cover, 2000)

So, a region becomes more functional if it includes diverse and varied landscapes [3]. The Nişcov basin can be considered functional system because it includes various subsystems (Lapoş-Ciolanu Hill, Istriţa Hill and Nişcov Depression), where the soils are mosaic (clayey faeozioms especially in Ciolanu Hill, cambisoils-eutricambosoil and rendzinas in Istrita Hill, luvosoils in Niscov Depression, erodisoils on slopes with geomorphologic processes, Figure 5), the vegetation is diverse (durmast forest at 500-600 m, Mediterranean species (Photo 9) like manna [12], sumac and brotherwort, secondary grasslands and arable lands in Niscov Depression, transition areas with scrubs, in Bărbunceşti area and at Mierea Valley Spring), the density distribution across space is different (the highest population density is in Niscov Depression and in the lower course of Niscov River and the lowest population density is on the upper slopes).

The Nişcov system function depends on the cooperation of its components, but also depends on its relations with other systems. This kind of relations are possible through energy and material exchanges.

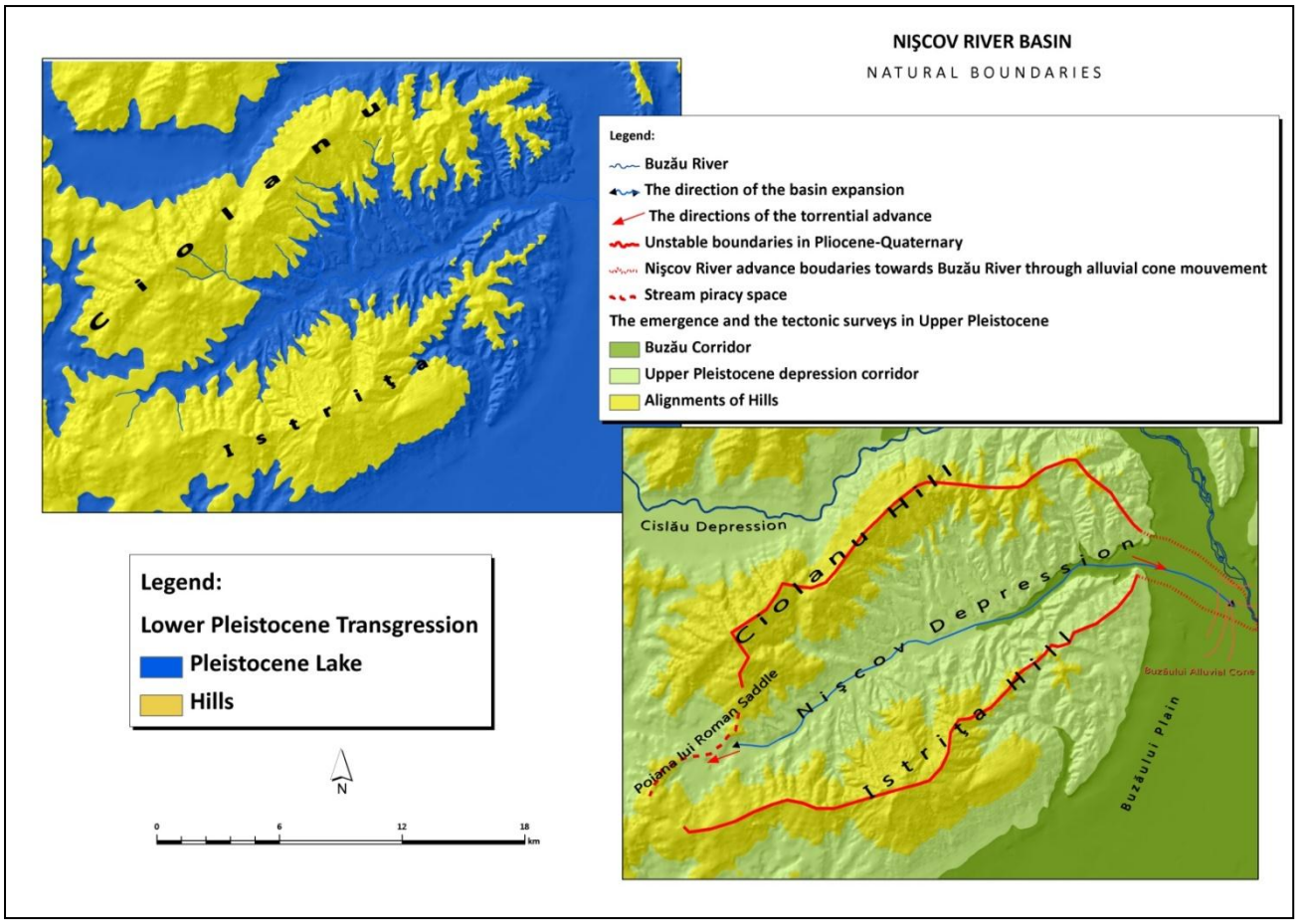

Figure 3. The natural boundaries of Niscov Basin (Source: Topographic Map, 1997)

3. THE HYDROGRAPHIC BASIN OF NISCOV RIVER – BOUDARIES AND GEOGRAPHICAL LOCATION

It is a complex region, made up of several relief structures which are different by: geological substrate, geomorphologic characteristics, of climate, hydrological, and biopedological factors. It separates in: Lapoş-Ciolanu Hill (Cetăţuia Peak - 631,8 m, Fântâna Hoţilor Peak - 753,4 m, Cerbului Peak - 539,6 m), Dealul Mare- Istriţa (Istriţa Peak - 749,4 m, Năeni Peak - 604,8 m) and Nişcov Depression. Overall, the main features of the system are:

- *Morphological*, Nişcov Basin overlaps on four dominant landforms: Lapoş-Ciolanu Hills on the north side, Nişcov Depression in the central part, Istriţei Hills on the south side and Buzău-Nişcov alluvial Cone, in Buzăului Plaine;

- *Geologically*, the basin belongs to the folded outdoor unit of Subcarpathians (Mio-Pliocene-Quaternary [13]);

- *Climatically*, it has a moderate continental climate, with annual average temperatures ranging from 8-10°C, precipitation of 600-700 mm and winds represented by the foehn wind (in spring) and Crivăţ (in winter). The crivăţ "*is a north-easterly wind*

that blows in the winter… creating blizzard conditions" [14] and the föhn "*is a type of dry, warm, down-slope wind that occurs in the downwind side of a mountain range… in the spring season*" [14]. The first one blows from North-East in the winter, from Romanian Plain to Nişcov Corridor; it is characteristic in Buzău-Nişcov alluvial Cone and in hills with short altitudes (Piscul Corbului Hill, Plaiul Măceşului, Curăturii Hill) and the second one, in Nişcov Depression [15]. In the winter, there are temperature inversions in Nişcov Depression and Nişcov Corridor.

- It is located in *nemoral floor*, where can be differentiated: the durmast-oak forest sublevel and the beech sublevel (on peaks);

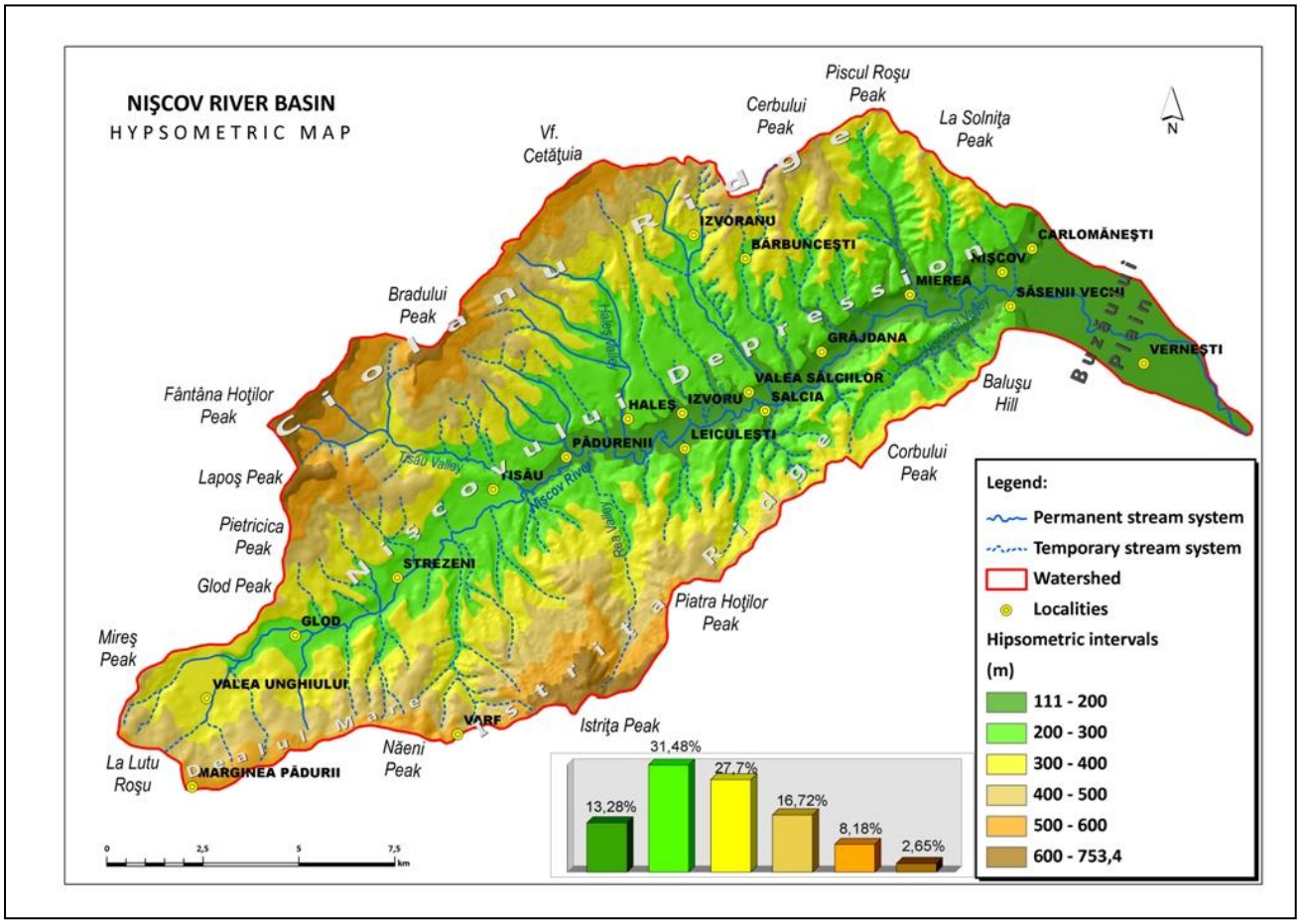

Figure 4. Hypsometric Map of Nişcov River Basin (Source: Topographic Map, 1997)

Photo 9. Mediteraneean plants in Nişcov Corridor (Sumac and Brotherwort)
(Bogdan Adriana, June 2012)

- *The soils* are typical for this hilly area (outside Subcarpathians): luvisols class (preluvosol and luvisoil), Chernozems class (chernozem, faeoziom and rendzina) and Cambisoils class (eutricambosoil) [16];

- Nişcov River stems from the Buzău Subcarpathians through Unghiului Brook [17], under Jugurenilor Peak (western ridge of the subcarpathic massive Dealul Mare-Istriţa), from a height of 524,7 m, located near the Poiana lui Roman Saddle. It flows into the Buzău River at the edge of Buzău Subcarpathians, in the northwest of Buzău Plain, downstream of Verneşti locality. In west it is separated from Cricovului Sărat Basin (belongs to Prahova River) by a low saddle of 330 m (Poiana lui Roman). The two major peaks delimit the depression and dominate it with 300-350 m through well forested mountainsides. The basin is slightly asymmetric, this feature is given by developing stronger on the left side its affluent [4].

From the largest areas of Europe climate, the basin is located on „eastern edge of Central Europe sector" [18], at the contact with the pronounced continental climate of Eastern Europe. This position has consequences as regards greater aridity to the east of the basin and the flow rates variation.

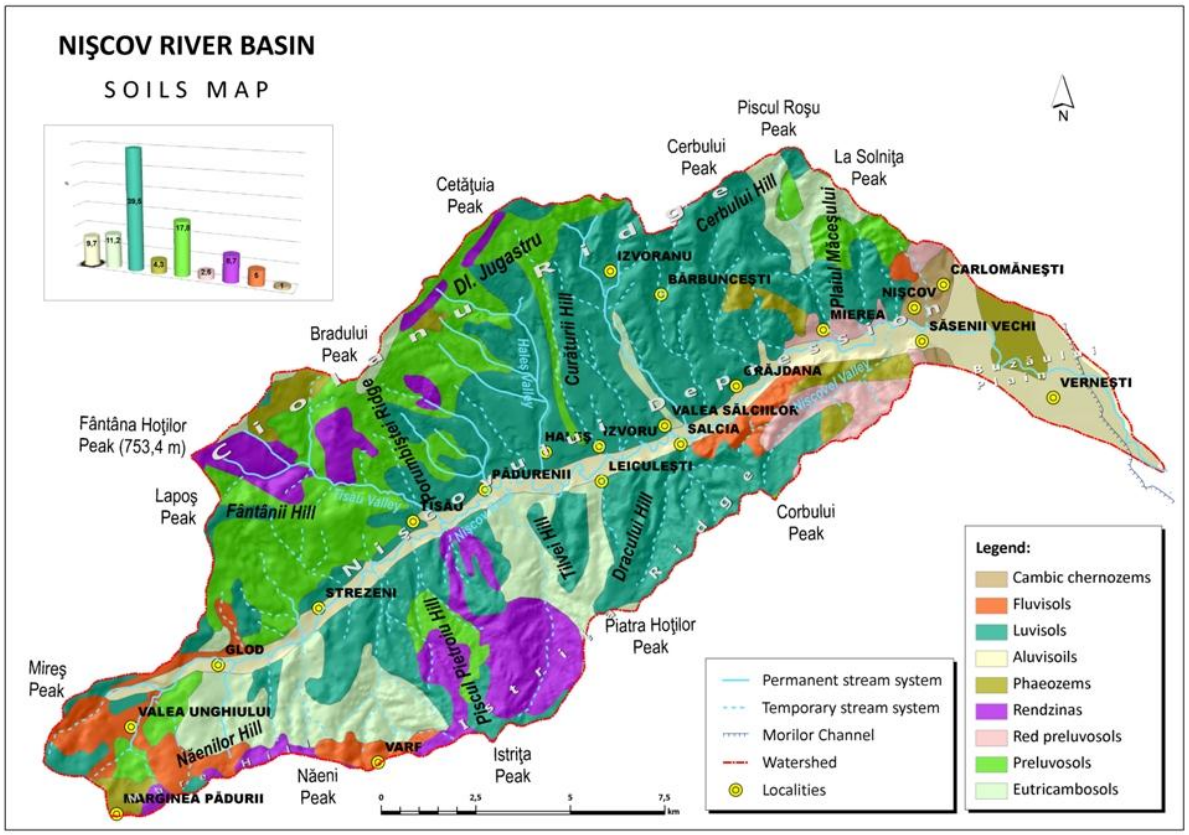

Figure 5. Types of soils in Nişcov River Basin (Source: FAO Taxonomy)

Using the cartographical materials 1:25 000 [19], I set *the basin boundaries* (Figure 6 [11]):

- *northwestern boundary, northern and north-eastern* is laid on the highest peaks of Lapoş-Ciolanu Hill, such as: Mireş Peak (441,7 m), Fântâna Hoţilor Peak (753,4 m), Piscul Dracului Peak (669 m), Cetăţuia Peak (631,8 m), Cerbului Peak (539,6 m) and Piscul Roşu Peak (426,8 m) etc.;

- *south-western boundary, southern, south-eastern* is represented by Dealul Mare-Istriţa and go through peaks: Jugureni (595,6 m), Năeni (604,8 m), Istriţa (749,4 m), La Piatra Hoţilor (534,7 m), Corbului (375,1 m) and Baluşu Hill (325,8 m);

- *eastern boundary* takes place in the corridor of Buzău valley, before its confluence with Niscov.

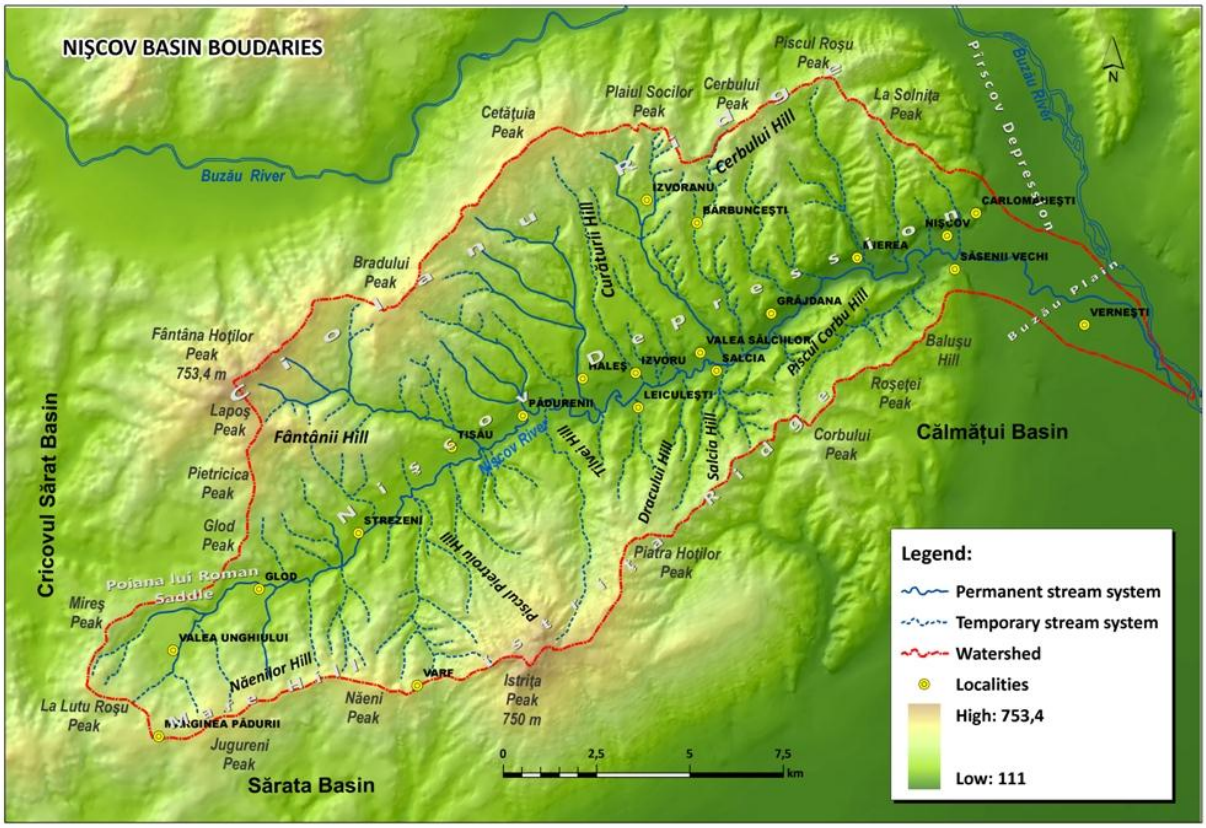

Figure 6. Niscov Basin Boundaries (Topographic Map, 1979)

The watershed (Figure 7, Figure 8) total length is 99,2 km. Starting with Istriţa Peak (750 m), located in the southern basin, *the watershed* turns down to west until Odaia Călugărului Peak (594 m), passes through Poiana lui Roman Saddle and reaches to 427,9 m in Glodul Peak. From the altitude of 652 m (Lapoş Peak), is the pass to Cetăţuia Massive. To the east, the watershed passes through Piatra Hoţilor Peak, of 753,4 m, through Bradului Peak (644 m) and Cetăţuia Peak (631,8 m).

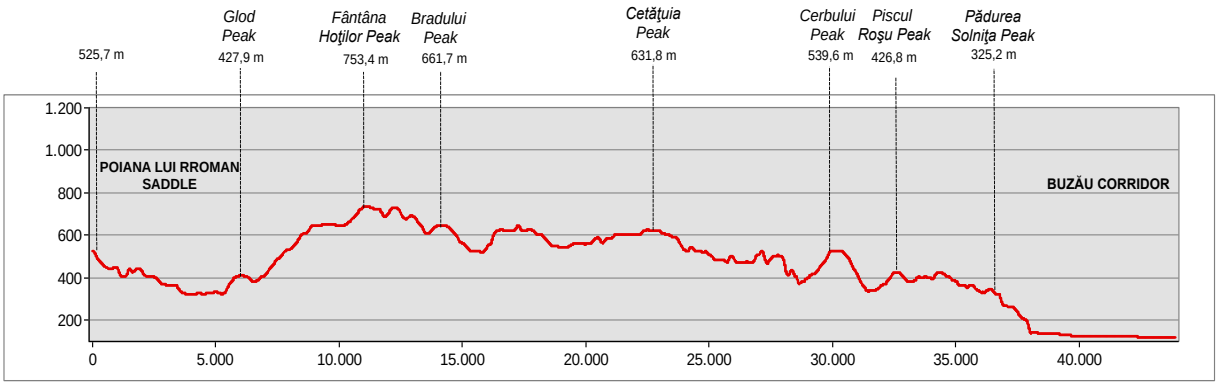

Figure 7. North watershed (Source: Topographic Map, 1997)

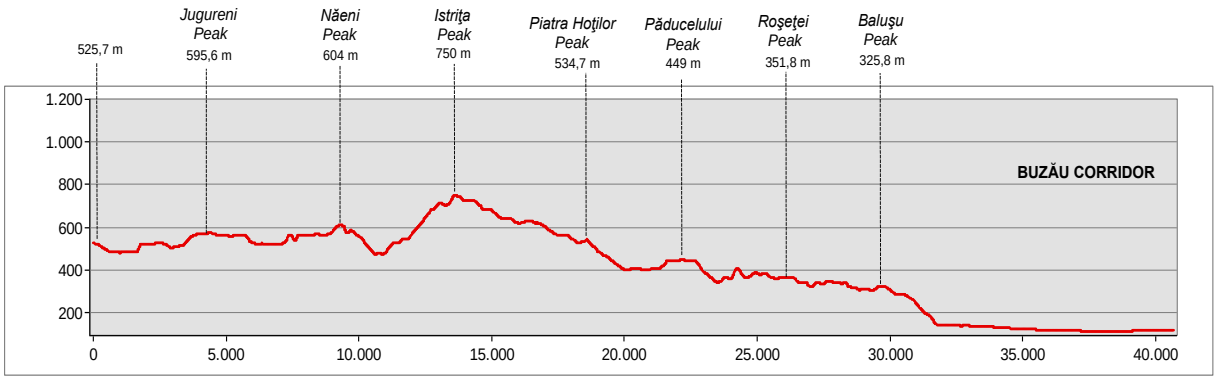

Figure 8. South watershed (Source: Topographic Map, 1997)

From the Haleşului Valley, the watershed leaves the great altitudes, passing through Plaiul Socilor (500 m), Cerbului Peak (539,6 m) and Piscul Roşu (426,8 m). Last peak which connects the bottom of Nişcov is La Solniţa (375,9 m).

4. CONCLUSIONS

The differentiation of the Nişcov Basin boundaries has been achieved based on natural criteria (hydrological criteria- maximum extending of hydrographic network, biogeographically criteria – nemoral forest), as well as the functional ones (the exospheres interrelating inside the system which gives special characteristics that distinguishes the Nişcov Basin from neighboring systems). The basin boundaries are not fixed character; they have ranged in time and space. The geomorphologic, hydrological and epirogenetic processes are different over time, changing especially the western and eastern sides of the basin. These boundaries were drawn on the highest altitudes of the Ciolanu and Istriţa Hills, from which gravitates the whole set of evolutionary directions of the system;

Being a transit region, situated near Buzău city, between the three Romanian provinces (Muntenia, Moldova and Transilvania), the Nişcov River Basin has real possibilities for developing the environment because of the natural resources, geographical location and modern infrastructure. The Environmental Protection Agency Buzău checked the Environmental Action Plan (PLAM) whose purposes are solving the environmental problems and ensuring sustainable development [20] through: selective collection of garbage (there is a sorting installation at Cislău) [21], sanitation service will be performed by specialized companies, pollution taxes, a new system for monitoring the environmental expenditure etc. The Nişcov Basin System passes from an agrarian economy to an agrarian-industrial- touristic one, where the population protects the environment [22].

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