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USE OF LAND LOCATED WITHIN EŞELNIŢA DRAINAGE BASIN

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Use of land located within Eşelniţa drainage basin

Daniela Vlad

Use of land located within Eşelniţa drainage basin. Developed on the south-eastern side of Almãjului Mountains, Eşelniţa drainage basin neighbours upon the following basins: upon S – SV with Mala, upon SV - V with Mraconia, upon V - NV with Berzasca, upon NV - NNE with Nera and on the NNE – SE direction with Cerna. The basin has a surface of 77 km^2 and present a 5th degree hydrographic network according to Horton-Strahler ranking system, tributary to Danube by means of Eşelniţa main collector. Among surfaces belonging to various categories of use of land located within Eselnita drainage basin, there may be noticed the high share of forest and secondary grazing lands, although the latter have a smaller surface in comparison to the first ones. Therefore, the types of use of land located within the drainage basin are distinguished by the high share of surfaces of forests to the detriment of predominant agricultural land proven by using of some quantitative indexes defining the character of the Eselnita drainage basin as belonging to forestry type. Also the impact of human activities and number of inhabitants do not have a very damaging influence on the land corresponding to the basin, therefore it has a naturality index indicating an ecological equilibrium closed to the natural one.

Key words: Eşelniţa, utilization, quantitative indicators, artificial, human pressure

Utilizarea terenurilor in bazinul hidrografic Eşelniţa. Bazinul Eşelniţa se desfaşoară în cuprinsul versantului sud-estic al Munţilor Almăjului, fiind încadrat de următoarele bazine: la S – SV de Mala, la SV - V de Mraconia, la V - NV de Berzasca, la V - NNE de Nera şi pe direcţia NNE – SE de Cerna. Bazinul Eşelniţa îşi adună apele de pe o suprafaţă de recepţie de 77 km^2 prin colectorul principal omonim care izvorăşte din Munţii Almăjului, de sub vârful Svinecea Mare, la o altitudine de 1080 m. Conform sistemului de ierarhizare Horton – Strahler, ordinul bazinului Eşelniţa este de 5, prezentând o reţea hidrografică tributară Dunării prin colectorul principal cu acelaşi nume. Dintre suprafeţele aparţinând diverselor categorii de utilizare a terenurilor din bazinul Eşelniţa, se remarcă ponderea mare deţinută de păduri şi de păşunile secundare cu toate că acestea din urmă prezintă o suprafaţa mult mai redusă comparativ cu primele, se impun ca desfaşurare faţa de celelalte suprafeţe. Astfel, tipurile de utilizare a terenurilor din bazin se disting prin ponderea mare a suprafeţelor ocupate de pădure în detrimentul celor predominant agricole, fapt demonstrat prin aplicarea unor indici cantitativi care definesc caracterul bazinului Eşelniţa ca fiind de tip forestier. De asemenea, impactul activităţilor antropice sau numărul de locuitori nu prezintă o influenţa foarte dăunătoare asupra teritoriului aferent bazinului, drept pentru care acesta prezintă un indice de naturalitate cu un echilibru ecologic apropiat de cel natural.

Cuvinte cheie : Eşelniţa, utilizarea terenurilor, indicatori cantitativi, presiune umană

1. GENERAL ASPECTS

Eşelniţa drainage basin (Figure 1) collects its water from a reception area of 77 square km by means of omonymous main collector arising from Almãjului Mountains, below Svinecea Mare peak, at an altitude of 1080 m. After the length of a main water course of 26 km, within the inferior segment, at the confluence of Eşelniţa river with Danube, there is a gulf where in accumulation processes act as a result of increasing of basis level. The change of the initial basis level has occurred as a result of forming the Iron Gates storage lakes, so that the altitude of the river mouth of Eşelniţa river is 64 m, in accordance with the normal level of lake's retention.

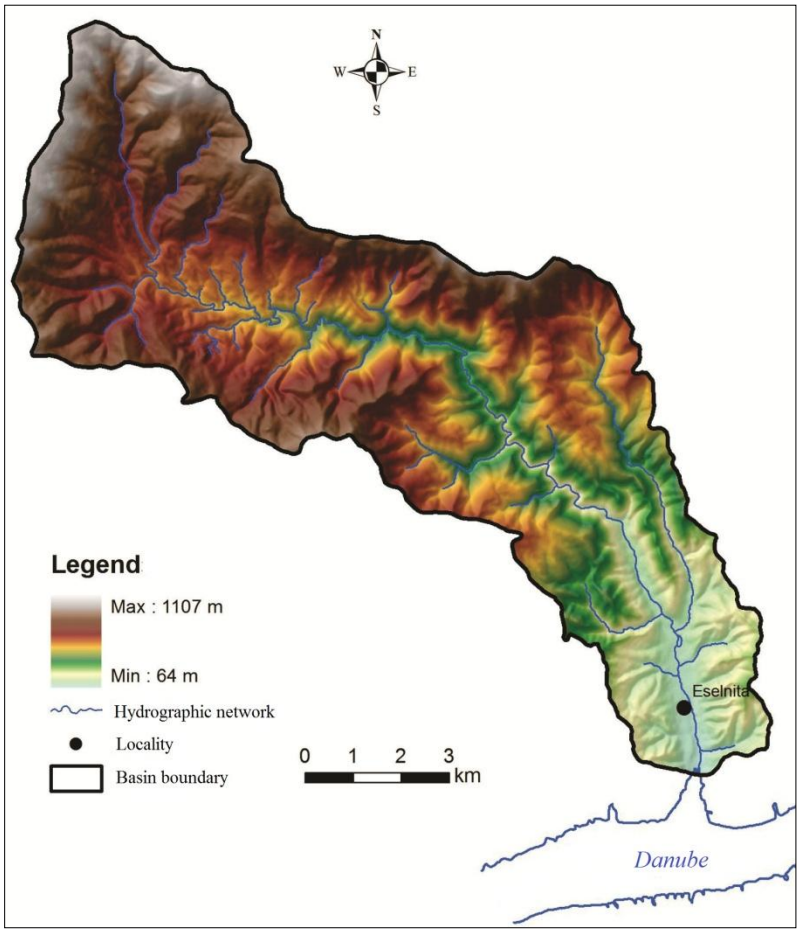


Figure 1. Eşelniţa hydrographic basin

As a result of mechanical treatment of water within hydro-electric plant, the altitude from the river mouth of Eşelniţa river, may vary, although in general is lies between 63 – 68 m. The basin present a 5th degree hydrographic network according to Horton-Strahler ranking system, tributary to Danube by means of Eşelniţa main collector. Developed under a mountain relief, the basin presents a multistage arrangement between the maximum altitude of 1107 m and the minimal altitude of 64

m, at the confluence with Danube, therefore having a level difference of 1043 m. The value of the level difference between the spring, located at 1080 m and the river mouth located at 64 m, is 1016 m. The geological components within Eşelniţa basin belong to *Danube Field,* having a crystalline bed consisting in crystalline schist represented by crystalline of Poiana Mraconiei, crystalline of Neamţu and crystalline of Corbu, eruptive rocks represented by two granitoidic massifs with intrusive character, inferior Paleozoic age: granite body of Cherbelezu having a northern development within the basin and granite body of Ogradena [1]. The sedimentation formations arranged on the crystalline bed do not cover a major surface, as in the north-western area of the basin there may be found formations belonging to inferior Jurassic (conglomerates, sandstones, argillaceous schist and coals) and in southern area of the basin there are major sedimentary deposits belonging to Neogene (marl, gravel, organogene limestone) and Quaternary (gravel and sands).

2. DATA AND METHODS

The identification of various categories of use of land located within Eşelniţa drainage basin has been made on the basis of data collected from European Environment Agency by accessing Corine Land Cover representing a set of reference European data for the way of covering the land. Therefore, there have been used data collected from Corine Land Cover, upon the level of year 2006, as they are the most recent data accessible to public. In this way, there was possible the identification of surfaces differently used, the comparison of the taken over data with the field collected data and the evaluation of the human impact or human pressure on the natural territory within the drainage basin by using some quantitative indexes.

3. LAND USE

The categories of using the land located within Eşelniţa drainage basin (Figure 2) are characterized by high share of surfaces of forests to the detriment of predominant agricultural land (Figure 3). Therefore, within Eşelniţa drainage basin, the surface of forestry land is 6975.69 hectares, a major part being covered by deciduous forests (lime, chestnut, oak, hornbeam, beech) and sporadically it may be covered by coniferous forests (spruce, fir) only at altitudes starting from 600 m up to 1107 m, the maximum altitude within the drainage basin and in case of surfaces belonging to predominant agricultural land with natural vegetation, their surface is only 158.81 hectares.

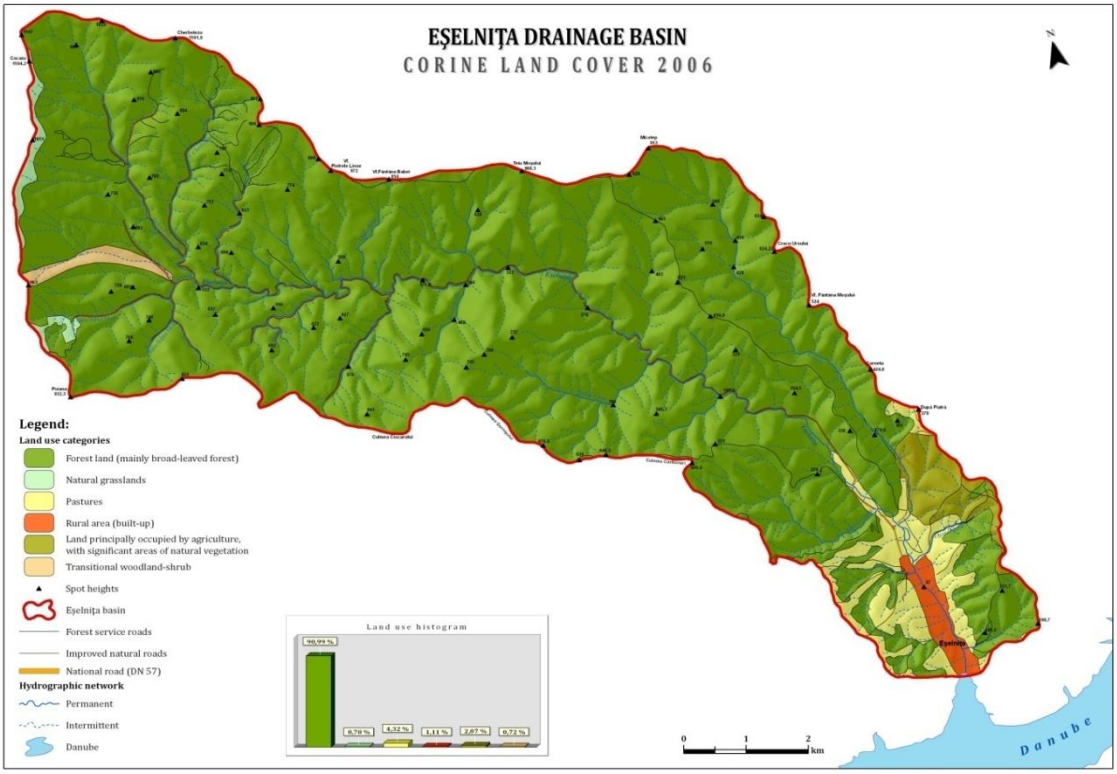
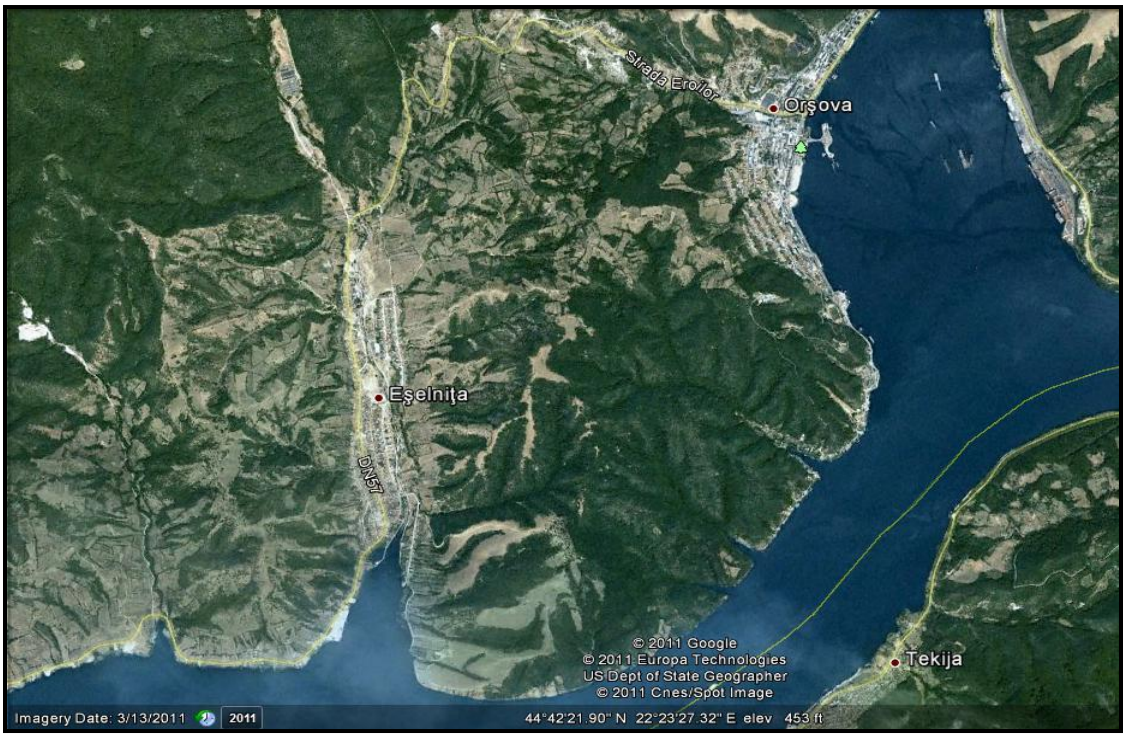


Figure 2. Use of land located within Eşelniţa drainage basin (after [2])

Figure 3. The agricultural land use in the lower course of the Eşelniţa basin (Source: Google Earth [3])



(Source: Google Earth, 2011)

The share of the two surfaces as well as of the other categories of use of land located within Eşelniţa drainage basin may be seen in Table 1:

Table 1. Use of land located within Eşelniţa basin

Land use categories	Surface (hectares)	The share of (%)
Forest land (mainly broad - leaved forest)	6975.69	90.99 %
Pastures	331.41	4.32 %
Land principally occupied by agriculture, with significant areas of natural vegetation	158.81	2.07 %
Natural grasslands	60.04	0.78 %
Transitional woodland - shrub	55.25	0.72 %
Rural area (built - up)	85.36	1.11 %

Source: after Corine Land Cover, the year 2006

Because of human pressure, the evaluation of land artificialization degree within Eşelniţa drainage basin may be made only by suing some formulas with quantitative indexes using data regarding the use of land and the population located within analyzed area. One of these indexes is the *Naturality index In = Sp / St*, representing the ratio between the surface covered by forests (Sp) and the total surface (St) of analyzed space.

In case of Eşelniţa drainage basin, upon the level of year 2006, the naturality index for establishing the share of land covered by forests within analyzed territory results from using the formula: *In = Sp/St* = 6975.69 hectares / 77 sq. km = 69.75 sq. km / 77 sq. km = 0.9 kmp. So, the value is 0.9 sq. km providing the basin with the character *of landscape with ecological equilibrium closed to the natural one* (Table 2).

Table 2. The values and significance of naturality index

The index value of naturality	Type of landscape
>0.6	With ecological equilibrium close to the natural one
0.45 – 0.6	With relatively stable ecological equilibrium
0.3 – 0.45	With weak ecological equilibrium damaged
0.3 – 0. 2	Landscape at the threshold of ecological equilibrium
0.2 – 0.1	With strong ecological equilibrium damaged
<0.1	With very strong ecological equilibrium affected

The value resulted from using this formula is confirmed by predominant large surface covered with forests within the basin, with the approximately partial exception of inferior sector having predominantly agricultural surfaces identified closed to Eşelniţa locality.

Another index proving the intensity of human impact on an analyzed surfaces is the *Human pressure (P)* which may be established by using the following formula: *P = S/N* [4], representing the ratio between the surface of the respective mode of using the land *(S)* and the number of inhabitants living within analyzed surface *(P).*

The use of this formula for establishing the human impact on the forest land indicates a small value of 2.7 hectares / inhabitants, therefore a human pressure without major changes on territory located within Eşelniţa drainage basin: P = S/N = 6975.69 hectares / 3069 inhabitants = 2.27 hectares / inhabitants (for woodlands). The evaluation of human pressure on predominantly agricultural land located within Eselnita drainage basin may be also established using the same formula: P = S/N = 158.81 hectares / 3069 inhabitants = 0.05 hectares / inhabitants (land predominantly agricultural). The comparative situation regarding the share of predominantly agricultural land located within the southern part of basin and forest land indicates the dominating forest character of Eşelniţa drainage basin. For evaluating the environment transformation degree of the land located within the basin, there is used the *Environmental transformation index* [5], resulting from the ratio between the total surface covered by forest land together with natural grazing lands and the built in surface, in this case being rural (built in) space of Eşelniţa locality. According to the calculation formula of this index *I tr.e. = S (Woodland + meadows) / S (built area)* which in case of Eşelniţa basin is applied as follows: *I tr. e. = 7035.73 / 85.36 = 82.42 hectares.* The obtained value indicates the high share of land covered by forests and natural grazing lands in relation with the built in surface of the singular locality located within the basin and implicitly a reduced transformation of the territory within Eşelniţa basin.

4. CONCLUSIONS

Within Eşelniţa basin having surfaces with various categories of use of land, there is noticed the high share of forest land with predominant deciduous forests in relation with the surface of the basin or with the surface held by rural (built in) space of the singular locality located within the basin, establishes a reduced impact on natural environment. Also in case of the other calculated indexes regarding the impact of inhabitants of environmental transformation on the geographic environment

within the basin, there are not established any major and damaging interventions. Under these conditions, there may be asserted that Eşelniţa basin has a predominant forest character.

5. ACKNOULEDGEMENTS

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