

**CHANGES IN THE BILAG HILL LAND USE (MUREȘ COULOIR) AFTER 1990**

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**Abstract****Changes in the Bilag Hill land use (Mureș Couloir) after 1990**

The Bilag Hill, with a surface of around 1290ha, belongs to the Mures Couloir, and lies between the Oiejdea-Sard Couloir in the north, the Mures floodplain in the east, and the Ighiu and Ampoi valleys in the south-east. From the administrative point of view, it is located at around 3km away from the central area of Alba-Iulia in the north, and at around 500m from the Bărăbanț neighborhood.

We have presented the physical-geographical factors, which are, in general, favorable to land use, but also some restrictive factors, such as: some dry periods, identified with the help of the Walter-Lieth climogram for the 1985-1996 period, the extreme climatic occurrences and some present day modeling processes (splash erosion and sheet erosion of arable terrains, gullying, shallow landslides, more frequent on the Pannonian clays and shaley clays from the Sântimbrului Hill.

We have also presented some socio-economical factors, which have contributed to the land use change in the Bilag Hill after 1990.

Using our research as well as the data already published, we have presented the changes that have taken place after 1990 in the general structure of the terrains. Thus, we found out that the arable terrains have reduced with around 50%, the surfaces occupied by grasslands and pastures have grown with 348ha, the areas occupied by vineyards have half of the initial surface, the orchards have been cut down to use the wood and then, abandoned, and the areas with forests have reduced from 19% in 1990 to 17% in 2006 and there is a slight growth of the areas with other destinations.

**Key words:** Bilag Hill, land use, changes

**Rezumat****Modificări în utilizarea terenurilor din Dealul Bilag (Culoarul Mureșului) după anul 1990**

Dealul Bilag, cu o suprafață de circa 1290 ha, se încadrează în Culoarul Mureșului, între Culoarul Oiejdea-Șard, la nord, lunca Mureșului, la est și văile Ighiu și Ampoi, la sud-est.

Sunt prezentați factorii fizico-geografici, în general favorabili utilizării terenurilor, dar și unii factori limitativi cum sunt unele perioade de uscăciune, determinate cu ajutorul climogramei Walter- Lieth pentru intervalul 1985-1996, manifestările climatice extreme și unele procese de modelare actuală (pluviodenudare și eroziune în suprafață pe terenurile arabile, ravenare și torențialitate, alunecări de teren superficiale, mai numeroase pe argile și argile marnoase panoniene din Dealul Sântimbrului).

De asemenea sunt abordați și factorii socio-economici, ce au contribuit la modificarea utilizării terenurilor din Dealul Bilag după 1990.

Pe baza cercetărilor proprii coroborate cu datele publicate anterior sunt prezentate modificările ce au avut loc după 1990 în structura generală a terenurilor. Astfel, se constată că terenurile arabile au înregistrat o scădere cu circa 50%, suprafețele ocupate cu pășuni și fânețe au crescut cu 348 ha, terenurile cultivate cu viță-de - vie s-au înjumătățit, livezile au fost tăiate și abandonate în scopul utilizării lemnului, iar terenurile acoperite cu păduri s-au redus de la 19% în 1990 la 17% în anul 2006 și o ușoară creștere a terenurilor cu alte destinații.

**Cuvinte cheie:** Dealul Bilag, Culoarul Mureșului, utilizarea terenurilor

## INTRODUCTION

The Bilag Hill, with a surface of around 1290 ha, belongs to the Mures Couloir, and lies between the Oiejdea-Sard Corridor in the north, the Mureș floodplain in the East, and the Ighiu and Ampoi valleys in the South-East. It is 3 km away from the central area of Alba Iulia and 500 m away from Bărăbanț neighborhood, a former village.

### I. FAVORABLE FACTORS TO LAND USE

**A. Physical-geographical factors.** The unit consists mainly of cemented or uncemented sedimentary rocks, with different degrees of resistance to modeling factors and with distinct characteristics in the pedological processes: conglomerates, sandstones and clays belonging to Lower Cretaceous; Eocene shales, clays, limestones and sandstones; Oligocene sandstones, stripped and purple shaley clays; Burdigalian grey shales; Badenien conglomerates, gypsums and sandstones; Pannonian sands, clays, shaley clays and gravels (Fig. 1).

As compared to the geological structure undertaken by us from the Geological Map, 1:200.000, Turda, 1967, in the specialized literature there are other opinions – (ILIE 1959; CODREA & DICA 2005) etc.-on which we are not going to insist.

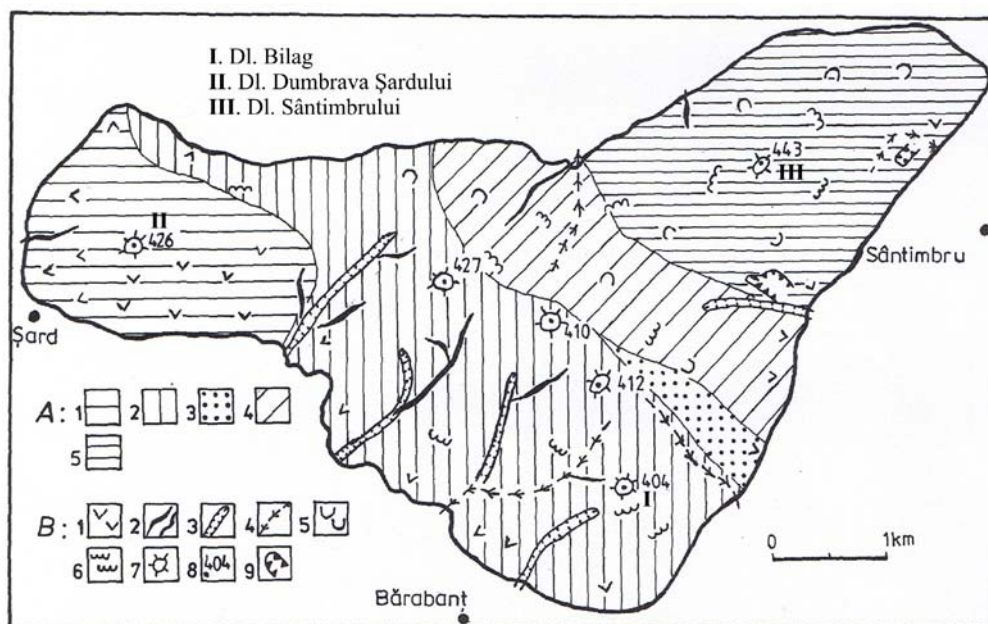


Fig. 1 - Bilag Hill - geological and geomorphological schetch

A: 1-Lower Cretaceous; 2- Paleogene (Eocene and Oligocene); 3-Burdigalian ; 4-Badenian; 5- Pannonian (according to Geological Map, scale 1:200.000, Turda, Romania, 1967).

B: 1- splash erosion and sheet erosion; 2-rill, ravine; 3- gully; 4-gullying; 5-landslide; 6-shallow landslide and solifluction; 7-eroded remnant; 8-altitude; 9-quarry

I. Bilag Hill II. Dumbrava Șardului Hill III. Sântimbrului Hill

As a whole, the analyzed hilly unit has a triangular shape, consisting of three subunits: the Bilag Hill (412 m), in the south (the one that gives the name to the whole unit), the Dumbrava Șardului Hill (426 m) in the north-west and the Sântimbrului Hill (443 m) in the North-East- connected through round interfluves. The highest altitude is 443m in the Sântimbrului Hill, and the slopes have over 8-10°.

The sectors with slopes over 15° are the most affected by present modeling processes, such as: splash erosion and sheet erosion on arable terrains, gully erosion and debris flow, shallow landslides on the Pannonian clays and shaley clays from the Sântimbrului Hill.

Through its position in the south-west of the Transylvania Depression, the climate offers good conditions for practicing agriculture, especially vine cultivation. Here the multiannual average temperature is around 9°C (9.4°C at Alba Iulia), and the January and July temperatures of around -3.5°C (3.4°C at Alba Iulia), respectively 20°C (20.4°C at Alba Iulia). The first frost is on 15 October, and the last on 15 April. The annual average precipitation is around 540 mm (523.3mm at Alba Iulia), with a maximum of 65-75mm in July (67.6mm at Alba Iulia).

The white frost occurs around 35 days/year, affecting mainly the crops situated on the lower areas, and the fog produces 80 days/year, favoring mildew.

At Alba Iulia the most frequent winds blow on the south-western direction (19.8%) - along the Mures Corridor, and on a north-eastern direction (9.7%) and get to average speeds of 3.5-4.0m/s (CĂTĂLINA MĂRCULEȚ & MĂRCULEȚ 1999). The winds with speeds higher than 11m/s have negative effects on crops. In the warm period of the year, the wind uproots the plants or just tears their parts, and in the drought periods speeds the plants fading. In the cold season, in the absence of the protective snow layer, or, when it is accompanied by negative temperatures, the wind triggers the degradation of the cereals, affects the gems of the vine and of the fruit trees. In the Bilag Hill area, the climate is, in general, favorable to land use, the drought phenomena having a slight influence (Fig. 2). However, after analyzing the annual Walter-Lieth climograms, for the 1985-1996 period, we have reached the conclusion that in Alba Iulia there were 21 periods of dryness (on average 1.7 periods/year) and 14 periods of drought (1.1 periods/year), and the number of the months with periods of dryness rose to 55 (38.1%) and of those with drought to 37 (25%).

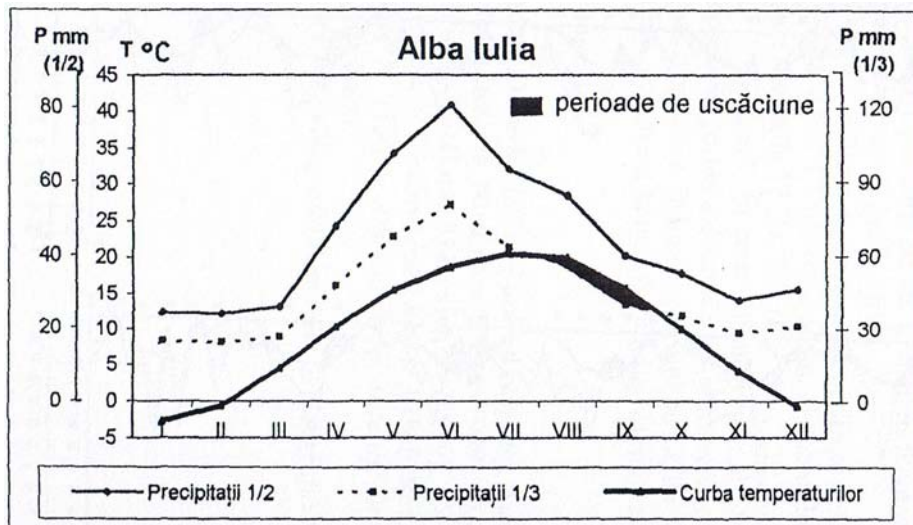


Fig. 2. Walter-Lieth climogram for Alba Iulia meteorological station (1985-1996)

The climatic extreme phenomena are the main factors that trigger natural hazards in this area. Only between 2002-2006, the Bilag Hill area was faced with at least six periods of heavy rain, which for short periods of time (5-10 minutes) reached even 2l/min and speeded the splash and sheet erosion, accompanied by wind intensifications and hail which affected the natural vegetation and the crops: 16-18 June 2003, 13-14 April 2004,

23 July 2004, 26-27 May 2005 and 2-10 June 2006 (CĂTĂLINA MARCULEȚ & MARCULEȚ 2008).

The natural vegetation in the study area consists of broad-leaved forests and heathlands, used for grazing. The dominant species that form the broad-leaved forests are the associations of oak (*Quercus robur*) and the evergreen oak (*Quercus petraea*), in combination with other species, such as: hornbeam (*Carpinus betulus*), maple (*Acer campestre*) and crab apple tree (*Malus silvestris*). They are inhabited by wild boars (*Sus scrofa*), deer (*Capreolus capreolus*), foxes (*Vulpes vulpes*), hares (*Lepus europaeus*), pheasants (*Phasianus colchicus*) etc.

The moors and heathlands (Fig. 3) with hair grass (*Festuca sulcata*, *F. valesiaca*), feather grass (*Stipa stenophylla*, *S. pulcherrima*, *S. joannis*), smooth meadow-grass (*Poa pratensis*, *P. bulbosa*), barn grass (*Andropogon ischaemum*), yellow oatgrass (*Trisetum flavescens*), bird's-foot trefoil (*Lotus corniculatus*), couch grass (*Agropyron crestatum*), garden cress (*Cardaria draba*), milfoil (*Achillea millefolium*), hop medick (*Medicago lupulina*), Our Lady's bedstraw (*Galium verum*) etc. with bushes of blackthorn (*Prunus spinosa*), hedgethorn (*Crataegus monogyna*) and hip tree (*Rosa canina*) - resulted from deforestation and are mostly used as pastures and grasslands. Until 1990, the arable terrains (including pastures and grasslands) from this area bore a density of 40-60 caws/100ha and 100-120 sheep/100ha.

The bushes of blackthorn, hedgethorn and hip tree can be found along the road sides, at the margins of the vineyards, etc.

Among the types of soils from the slopes of the Bilag Hill dominant are the typical, albic, luvisols, shaley phaeozems and erodisols. Because these soils have a medium and low fertility, the lands used for crops need natural and chemical fertilizers.

**B. Socio-economical factors.** From 1962, when the agricultural farms were created until 1990, the period in which the arable lands of the Bilag Hill have been in the state's possession, important anthropic interventions consisted in: a) the upturning of the terrains with low slopes situated in the inferior third part of the slopes and their transformation into arable lands; b) the terracing of the slopes and planting vine on the lands belonging to Sard, Bărăbanț and Sântimbru; c) creating small orchards, in which the plum trees predominated, on the eastern and south-eastern slopes on the Sântimbrului Hill; d) planning the torrential streams to diminish soil erosion;

As a result of these activities aimed to change the landscape, in 1990, the landed property of the Bilag Hill (1.290ha) consisted of: 24% arable lands, 21% vine, 3% pastures and grasslands, 19% woods and 2% terrains with other destinations (Fig. 4).

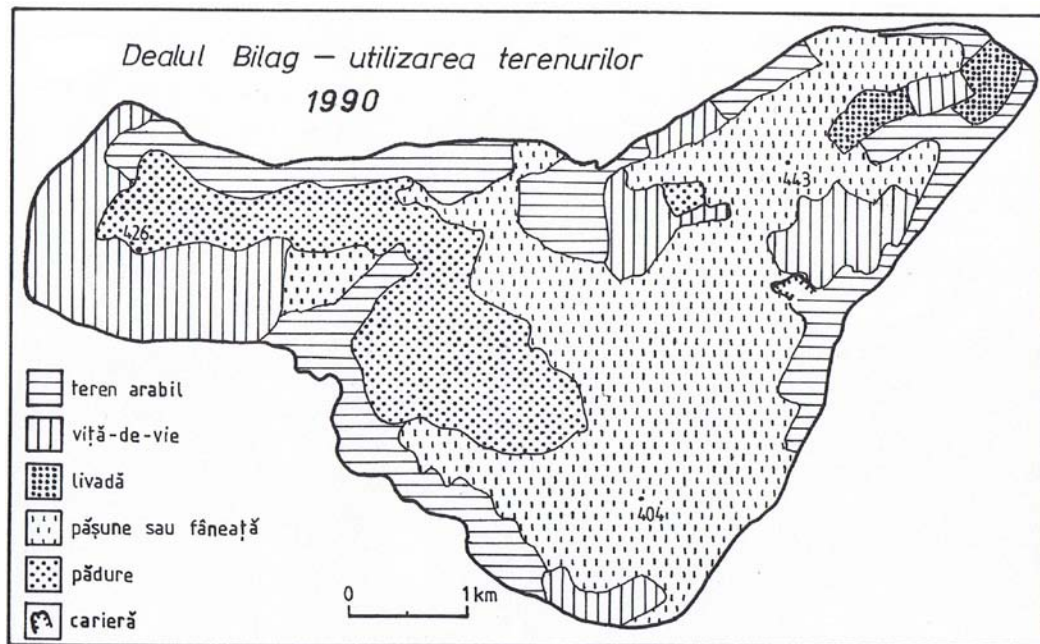


Fig. 4. Bilag Hill – The use of lands in 1990

The arable lands were cultivated mainly with cereal-corn (*Fundulea 270 and 315, Pionier, Turda 200 and 210*) and wheat (*Potaissa, Transilvania, Ariesan, Fundulea Ottonel, Traminer pink, Neuburger* etc.), which were part of the Alba vineyard (COTEA et al. 2000; TEODORESCU (1946, in *Alba Iulia Vineyard* book (Wine Land)) shows that this dates back in too old times for history to elucidate its beginnings.

The pastures, more extended on the slopes with moderate slopes, used to be mowed yearly, the hay productions being relatively low, between 1.500 and 1.800 kg/ha.

Among the territories with other destinations at that time, a clay quarry was, at the base of the southern slope of the Santimbrului Hill, used to supply raw materials to the factories from Alba Iulia for building materials.

## II. CHANGES IN LAND USE BETWEEN 1990- 2006

Between 1990- 2006, the arable terrains under private property until 1962 passed back to the formers owners or to their descendents. The plots with forest remained under the control of the Alba Iulia Forest District, and a part of the commune pastures have remained as commune local possessions, used for grazing.



Due to the material and financial losses the owners had to face, but also the lack of interest of some of them, the landed property of the Bilag Hill has been modified through: a) degradation of the viticulture terrains due to the poor maintenance (Fig. 5) (some viticulture plots, due to the poor maintenance are so degraded that the profit is 0); b) abandoning some arable terrains situated on the slopes with high gradients and their transformation into pastures; c) abandoning and cutting the orchards;

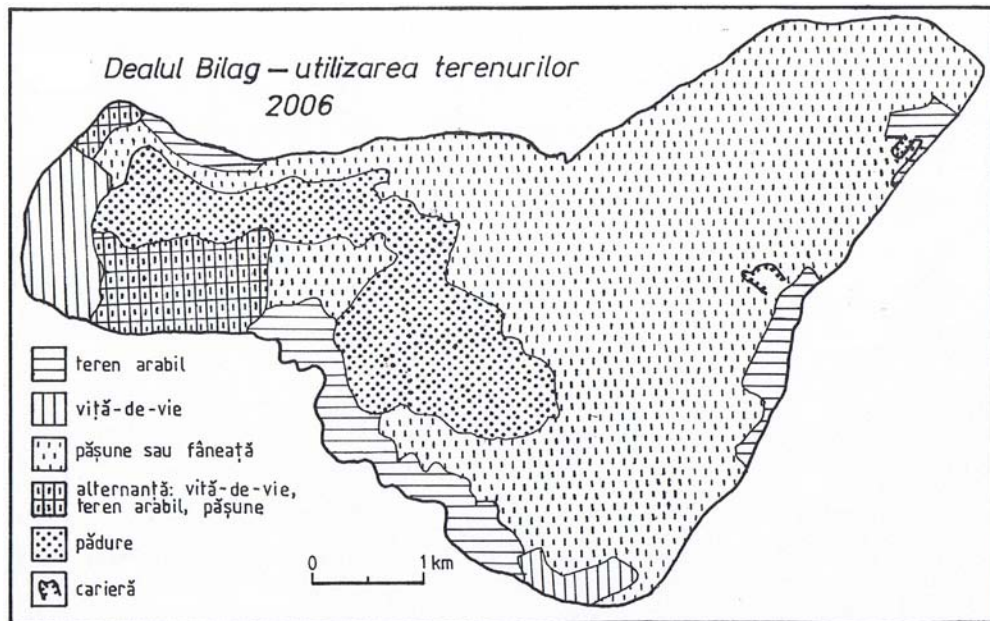


Fig. 5. Bilag Hill- the use of the lands in 2006

Nowadays, the crops on the arable terrains are poorly maintained, the productions obtained are very low, and the plots with vine, compact in the past, are divided now by arable terrains and fallow grounds. The pastures and grasslands are mainly unused, being degraded by horse thistle (*Cirsium arvense*), mainly those resulted from abandoning the arable terrains-, thistles (*Centura calcitrapa*), carline thistle (*Carlina acaulis*), musk thistle (*Carduus nutans*) etc.

Until 2006, the only positive anthropic action in the Bilag Hill was the opening of a new clay quarry on the south-eastern slope of the Sântimbrului Hill (Fig. 6).

As a result of the changes already mentioned, in 2006 the structure of the land use in the studied area consisted of 12% arable terrains, 10% vine, 58% pastures and grasslands, 17% forest and 3% terrains with other uses (Fig. 7).

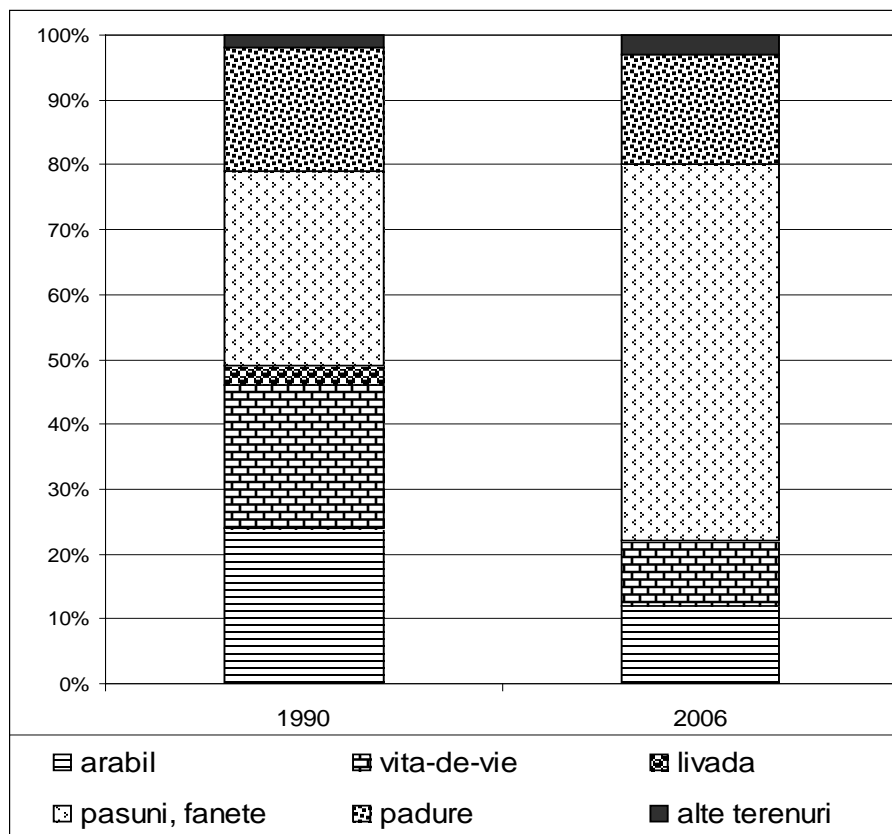


Fig.7. Land use structure in 1990 and 2006

## CONCLUSIONS

In conclusion, by comparing the structure of the land use of the Bilag Hill in 1990 and 2006, we have reached the following conclusions:

1. The change of the arable surface is not significant (from around 79% in 1990 to almost 80% in 2006), but it records high changes in its structure, such as:

a) the arable terrains have been reduced with around 50%, from 310ha in 1990 to 155ha in 2006;

b) the pastures and grasslands have grown with 348ha, reaching 748ha in 2006;

c) the terrains with vine have reduced from 21%, in 1990 to 10% in 2006;

d) the orchards, which occupied around 3% in 1990, have been abandoned and cut by the local people to use the wood;

2. Slight reduction of the surfaces occupied by forests, from 19% in 1990 to 17% in 2006.

3. The growth with around 1% of the terrains with other destinations.



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Fig. 3. Bilag Hill - Grasslands



Fig.6. The new clay quarry on the south-eastern slope of the Sântimbrului Hill