BABEŞ-BOLYAI UNIVERSITY
FACULTY OF GEOGRAPHY
DEPARTMENT OF PHYSICAL GEOGRAPHY AND TECHNICAL

THE ŞIEU RIVER BASIN.
APPLIED GEOMORPHOLOGY STUDY

PhD thesis
Summary

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SUMMARY

Keywords: methodology, morphogenetic factors, morphometry, morphology, geomorphology, the Şieu river.

Chapter I. Introduction

Geographical settlement and limits

The present study is limited to the space situated between the Somesului valley in the North and North – West, representing the limit towards the Somesan Platform through the Nasaudului Hills, The Bargaului Mountyains in the North – East and the Calimani Mountains in the West, the Dipsa Valley in the South – West, the Matei – Corvinesti Hills, the Figa Peak in the West, the southern part being subscribed to the Viaua – Orosfaia – Baita Hills (figure 1).

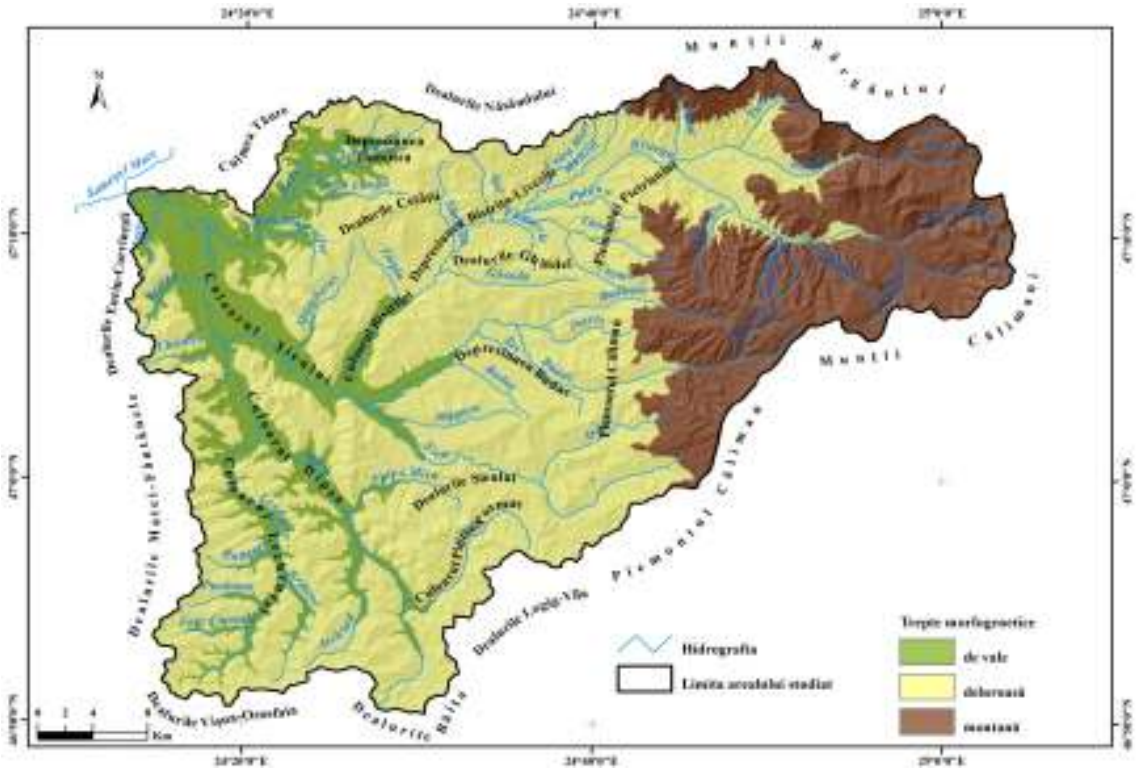


Fig.1. The study area`s position.

The Sieu River Basin`s water shed, separates it of three main Transylvanian Basins: the Somesul Mare Basin in the North, the Muresului Basin in the South and the Melesului Basin in the West. Altutdinally, the differences, spread the falling area studied is 1699 m.

The Şieu River`s spring is located in northwestern Călimani Mountains, below the Poiana Tomii Peak. The course is on a northeast - southwest direction for about 15 km, and then, in the perimeter of the village, it suddenly changes flow direction Şieuț of to the Northwest. Şieul drains the depression and Depression Budacu Şieuț, depression bounded to the North by Small Hills. Culmea Şieului and Lechinței Hills are the southwestern limit of the Şieu River basin. The River drains the area of 1817 km^2, Şieul, is one of the tributaries of the River Someşul Mare left.

The purpose of the study

The Şieu river basin - applied geomorphology study - is the result of research carried out in the period 2008-2011, aimed at analyzing the current morfodinanicii. The present work aims to understand the main physico - geographical characteristics of the area studied, main types and forms of relief and morfometrice peculiarities, morphografics and morphology of the Şieu River basin in the land use in the bazinal area.

Working methodology

The working methodology was primarily based on the collection and compilation of the database (existing in the archives of mayoralties, S.G.A Bistrița), both from previous studies (monographs, regional studies, hydrological studies), on the basis of the information collected on the ground (interviews, questionnaires, PUZ, PATZ) by collecting samples (analysis of field and laboratory), analyze information and synthesizing them into thematic maps, GIS maps and places.

In the design limits on topographic maps 1: 25,000 were used and given loads-aerofotogramele, using ArcGis 9.2 software and analysis for DEM - morfogenetic potential of the basin.

Activities carried out in fulfilment of the proposed obietivelor can be classified into three categories: business, information and documentation activities in the field and data interpretation tasks and analysis of results.

Activities of the information and documentation as part of this phase the demarcation was carried out in accordance with the methodology of the research of hydrology, water by marking, identification cumpenei subbazinelor morfohidrografics and their ranking. In relation to setting the limit have been assessed and spatial relationships of neighbouring basin with morfohidrografice units.

Field activities were held during three years (2008-2011) and consisted in repeated sorties on the ground, which were noticed and geomorphological peculiarities, cartat main biopedologice and local land use. Equally surprising was pursued growth processes, geomorphological, ravenarea: torentiality, landslides as well as demarcation of the places affected by such processes.

Activities for the interpretation of data and analyzing the results. All data collected have been reorganized, processed through the statistical and mathematical methods (Microsoft Excel) and GIS analysis, with thematic maps and cartographic data. The area of study, the method also demonstrates that the usefulness of GIS technique in applications related to geomorphological aspects, in particular morfometrie, offer speed and accuracy in handling a large volume of data.

Chapter II.

THE ŞIEULUI-GENERAL CONSIDERATIONS ON THE GENESIS AND EVOLUTION OF RELIEF

Şieu is part of the landscape, through the main types and forms of relief, Small Hills, which encompass a wide range of features, but especially common with major drive to which it relates. From the multitude of actions favored by the relations established between physico-geographical factors have shaped this area been subject already carried out over time, and between the western transylvanian Oriental Carphatians. The result was the generation of a relief piemontan, colinar and depresional passage, characterised by asymmetry of the valleys and culmilor interfluviale, with a general orientation Is common with the Transylvanian orography.

Hydrographic network in Small Hills known an evolution interesting in view of the fact that the upper Mureş, pliocenul, Eruptive pimples after coming out of the chain, from the initial direction to Indulge Someşul Mare, the Şieului valley, then using the Small *(D. Ciupagea, M. F., Pauca, 1970)*. The courses of these two valleys, according to the same sources, were part of the network's primary water basin of Transylvania, being advantaged by the existence of anticlinale structure with the direction Northwest-Southeast.

Lithological and tectonics

Sedimentary deposits belonging to the series includes: the Miocene, Pliocenului and Cuaternarului.

Inferior Miocene (the Miocene Tuff of Dej) consists in general of the marne, less grey intercalations. At the top of this formation is complex with salt, consisting of marne, salt and salt clay mass.

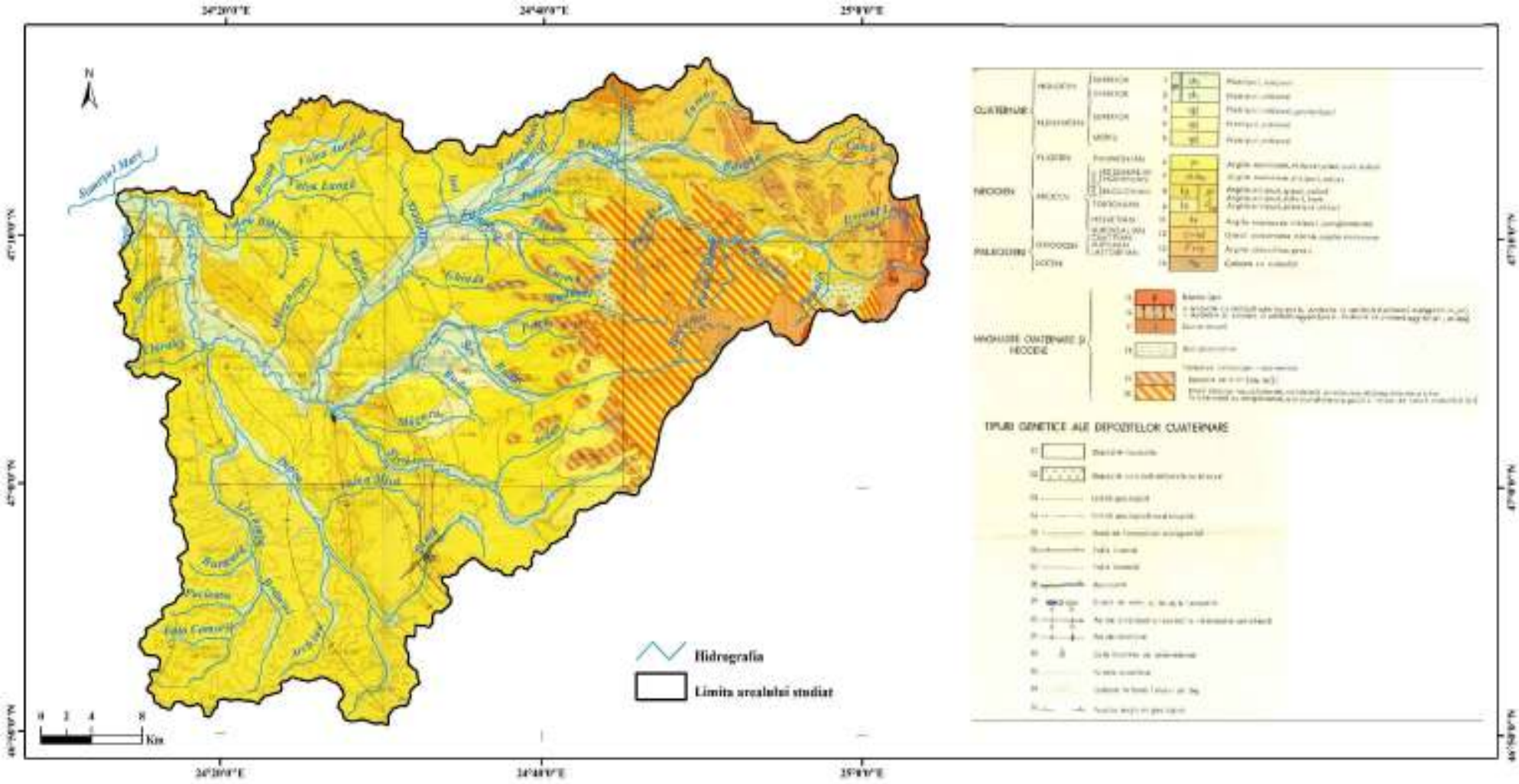
Pliocenul has a thickness of about 1000 m and is constituted by marne, tar and gravel. Pliocene boundary between Sarmațian and is relatively easy to put. In marnele and sandy marnele on top of Sarmațianului (the last 100 m) where there are fossils sarmațiene falls gresii, whitish-grey limestones in thin plaques (1-2 cm) at distances ranging between 0,10-50 m. These give a characteristic aspect of this area.

Cuaternarul is represented by terraces and alluvial lands. The lower terraces are made up almost exclusively of gravel, the medium presents some intercalații of loess and the upper part is washed by leaving only richer components, pietrișurile.

Tectonics is represented by Crystal Ridge that rose to the surface during the motion, and Wallachian rhodanic attic, which has led to the appearance of fracture with the North-South direction.

A specific element of the Transylvanian Basin, and salt, is encountered in the context of the present study, hence the toponymy of suitable for a series of springs salted: Sărățel, in the area of the confluence of the Valley with Valley, Bistrița Șieului Domnești, Pinticu, Sărata, Danubian, in Dumitra Slătinița. Warehouses belonging to the Badenianului (HBS) appear in the perimeter anticlinalului Brâncovenești – diapir Jabenița-Monariu-Sărata-Șieu diapir Sheath anticlinalul and Sfântu-Albeștii-Nețeni-Sărățel (see annex: geological sheet Map, Bistrița, where Kohut and Peltz, 1967).

Fig.2. Salty spring near the Sieu River (at Sărățel)



Annex: Geological map of the Sieu River Basin (after *Marinescu* and *Peltz, 1967*)

The lithological Badenian deposits provide basic dacitic tuff horizons, beyond which, in a sequence appear: clays and siralis with intercations of tar, tuffs and gravel; carbonatic clays and conglomerates.

Physico - geographical factors and their role in shaping the current relief

Climatic factor

In terms of climate, the Şieului falls in the moderate continental with some maritime polar and temperate influences. Winds blowing in the eastern sector, and had an average speed of 3 m/s. Average yearly temperature reaching below 0 ° C in mountainous regions, at over 1900 m and rises to over 8.5 ° C in the Southwest (of hill and plain) of the County. Changes in air temperature is typically continental, with maximum and minimum in July in January. Peak temperatures recorded over the years was 37.6 ° C in 1962, and the lowest temperature is -33 ° C, was recorded in the winter of 1954. The average quantity of rainfall, 650-700 mm/m², depending on the season, generally exceeds the average country.

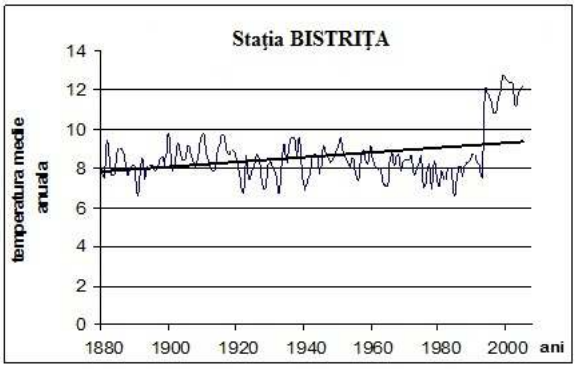


Fig.3. Medium annual temperature evolution (1880-2005), after Apele Române- S.G.A Bistrița Apele

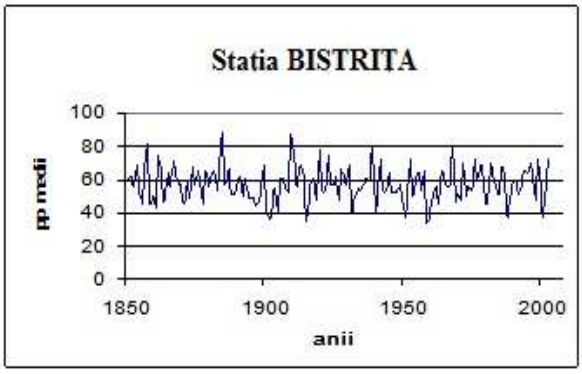


Fig.4. Medium rainfall evolution at Bistrița pluviometric station (1853-2005), sursa Române- S.G.A Bistrița.

The hydrological factor

The Şieului broadly to encompass the territory of Small Hills. Gradual changes that differ from the South-Western mountainous area. So in Dipşei including subbazinul and part of Şieului Hills, due to the high average annual runoff evaporației is minimum (approximately 100 mm),

and a relatively low average annual (1,27 m3/s at Chiraleş). The maximum flow recorded in March, the leakage was temporarily. Values differ depending on the average elevations increase to the East, so that average is between 200 and 400 mm up to 600 mm in the Căliman (Piedmont).

The Şieu River and tributaries, eight levels can be distinguished from the terrace, the most well developed being the terraces IV and the meadow.

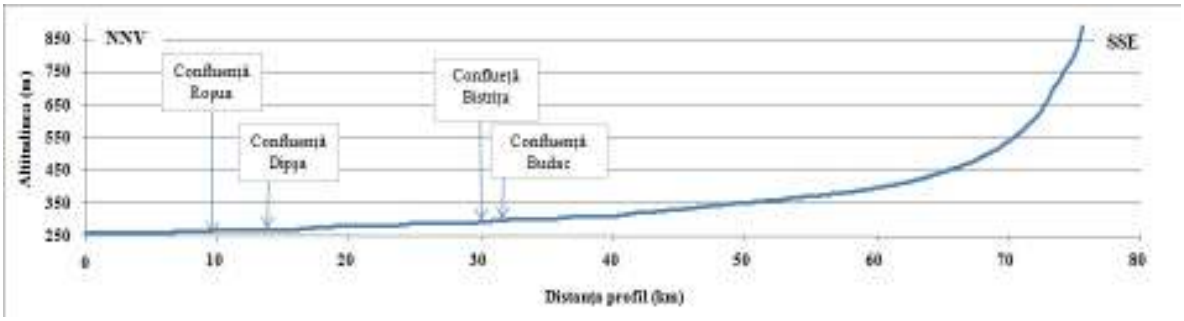


Fig. 5. Longitudinal profile of the Şieu River in Romania.

The confluence of the Small Şieul takes place at the Sărățel amidst a wrinkled areas, sector salifere where Şieul crosses the centerline crease diapire. The Valley is much restricted section of inclined hillsides and wooded mountains and looking Gorge. The confluence of Dipşei with Şieul Chintelnic, takes place at the bottom of the basin Şieu, a trajectory SE-NW river network density is one typical of the hills. Relevant territory, are installed Şieu basin new meteorological stations and hidrometrice, their position in the light of several criteria (average altitude of the station and adjacent land observation period), which shows the representativeness of stations and possibilities of establishing hydrological syntheses.

The biotic factor

In contrast to the vegetation, topography, which is a factor of accelerated erosion, as a factor of braking of this process by acting as a buffer between the blanket-morfogenetici domestic and foreign agencies. It plays a very important role in accelerating the process on disagregation - aggregation. It can create conditions favourable factors denudational. The coating plant of the Şieu consists in particular of the characteristic species of deciduous forests and silvo steppe.

Nemoral forest area, corresponding to the vertical etajării, lies at over 750 m altitude and comprises two subareas, gorun and blend with other oak species.

Forest-steppe zone is spread on the main valleys and retire in the highest water peaks.

In floodplains of rivers develops specific vegetation adapted to the excess moisture with species such as: reeds (Phragmites communis), rush (Typha latifolia). In meadows, on areas increasingly appear smaller clumps of poplar (Populus alba), willow (Salix fragilis), Black Alder (alnus glutinosa).

The geographical configuration of the pool offers another important natural resource that is being put up fauna, worth the game.

It should be noted that in the area is the largest concentration of brown bears in Europe, 27 hunting zone Budac Black Hill. At the same time, the basin holds the world record at Şieu trophy Brown bear harvested in 1994 amid Colibița 26 fighter.

In regards to the harvesting by the Act of hunting in recent years has developed valuing especially big game hunters foreigners.

The pedogeografic factor

Depending on the altitude, climate and vegetation, in the drainage basin a zoning Şieu remark to the main soil types.

The rules of management can lead to an advanced degree of soils tasare, arising from the rich clay content, the specific characteristic of this area.

Cernisolurile, occupying areas collapsed (the South side of the basin), with generally a high capacity water retention, especially in the warm season. In the cuestelor have been highlighted even soils silvostepice with thin molice horizons (figure 6).

Azonale of soils commonly found are hidrisolurile formed under the influence of excess moisture. They are present in the floodplain of the Lechința, Archiudului with a character of the island but also in the floodplain of the rivers Roşua, Bistrița, and Cuşma Budac.

Luvisolurile is represented by clays, oak forest area, occupying the last Căliman until low Şieului hills, much of the basin.

Cambisolurile are present in the mountain climate and transition, and Călimanului, appear Bârgăului at altitudes of 800-1300 m, climbing up to 1500 m on the hillsides more inclined and

descends to 500 m on hillsides may still have Şieului (arable land and fruit they have podzolite Brown soils).

Salsodisolurile extend especially around ivirilor of salt, the salt sediments (lunca Roşua River at Blăjenii and on the bottom near the Sărățel Şieu).

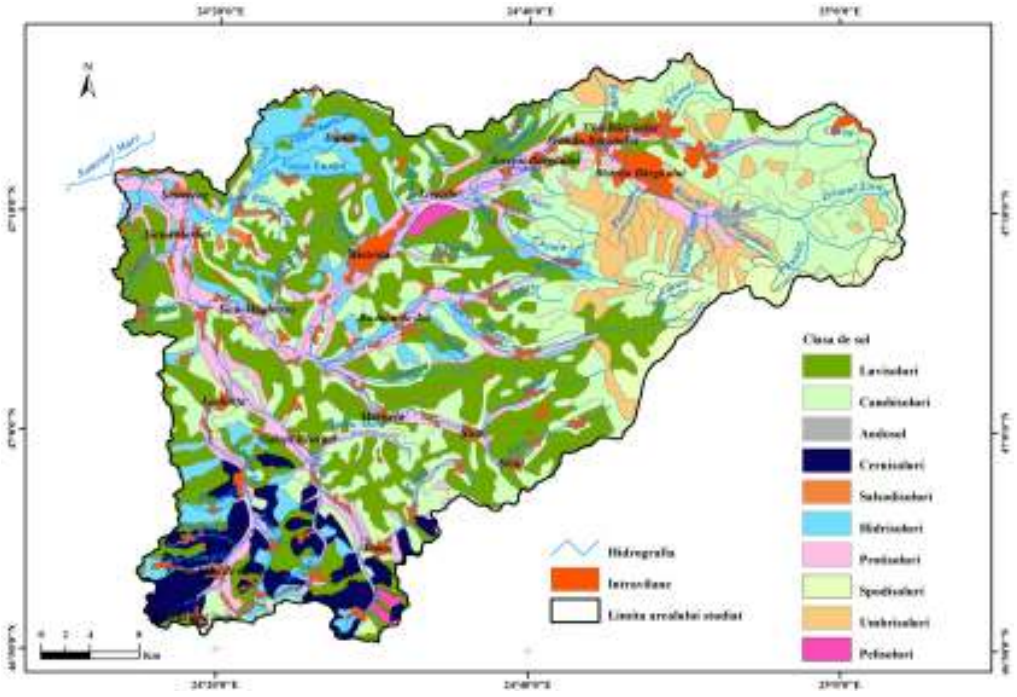


Fig. 6. Soil map of the Şieu catchment area

Protisoils appear on most of the main tributaries of the basin.

Spodisoils and umbrisolurile are located in the climate of the mountain, on the small areas at altitudes up to medium and large, with conifers and gumming subapline. Pelisolul appears fuzzy, especially North of Ocnita and Orchards in the vicinity of joining.

The anthropic factor

The man can affect and to the same extent protect the surrounding nature. Most requested and most affected component basis within the basin are forth Şieu ground and support it. As a result of intensive processes of forest clearing in recent years and extending the agricultural areas, processes erozionale came forward area more intensively and more.

The first step of the mechanism of acceleration is due to inadequate exploitation of agricultural land: fragmentation of land parcels and the small, the layout, and the road construction on the land, on the highest incline, which leads to the concentration of the liquid spill on hillsides, defaults to rigolelor and ravenelor. Due to the exponential growth of human pressure, especially after 1990, when you install a re-entry phenomenon in urban areas in the countryside, the man was a "stress" increasingly higher on support.

All the positive interventions made during 1970-1990 have been removed almost entirely with the application of the provisions of Law No. 18/1991 and 1/2000. Quite large areas of transformation due to the breakdown of the areas you don't want taken (job inadequate).

The morphology of the Şieu basin

Underlining of geographical character because their existence should make their mark on the landscape, the tone of the potential geographic and his actual recovery (Gârbacea, 1957). Note the layout of the longitudinal direction Northwest-Southeast, and passageways of the hills, the Valley, Piedmont and depresiunilor. In the case of depresiunilor, (Gârbacea, 1957) points out that they are "interpunându-cancels not only geographical continuity, but also the overall relief, becoming rather northeast southwest.

The Şieu River basin, there are the following steps: step morfogenetice and passageways of the Valley, the hilly and mountain gear gear (figure 7).

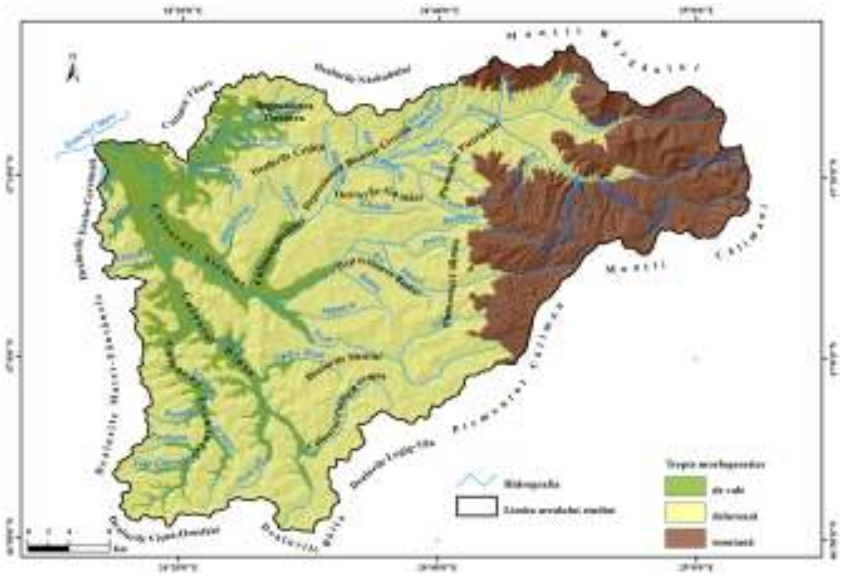


Fig. 7. Morphogenetic levels in the Şieu catchment area.

Chapter III.
THE ŞIEU BASIN`S MORFOMETRICS

The parameter values of the Şieu river, differ from a geomorphological to another (fig. 8), resulting in particular from the structural and tectono - interconditionings morphogenetic.

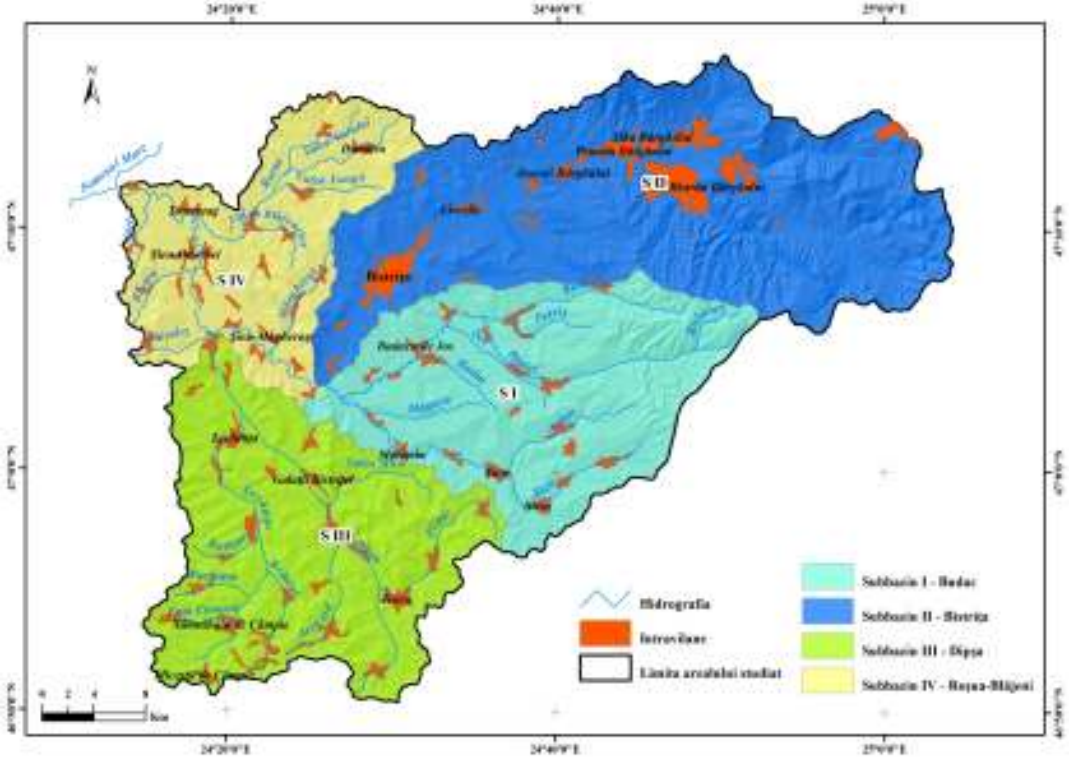


Fig. 8. Sub - basin study.

Further follow-up of the distribution in the territory, their values, and then the first "picture" of the geomorphological aspect of Transylvania, giving this functional sense a personality and individuality of the pelvis to the adjacent units.

The hypsometry

Altitudinală distribution of forms of relief in the catchment area of the Şieului can be played easily by using the map hipsometrice.

Morfometrice provides useful information maps in theoretical and practical forms the starting point in highlighting problems of Genesis and growth of the relief of the territory should be analysed.

We can say that the movements are neotectonice and this network of water body surface. To be able to step on the map represent relief have been highlighted the altitude values (260 m) and maximum (1950 m), considered and analyzed results of the evolution of the territory (fig. 9).

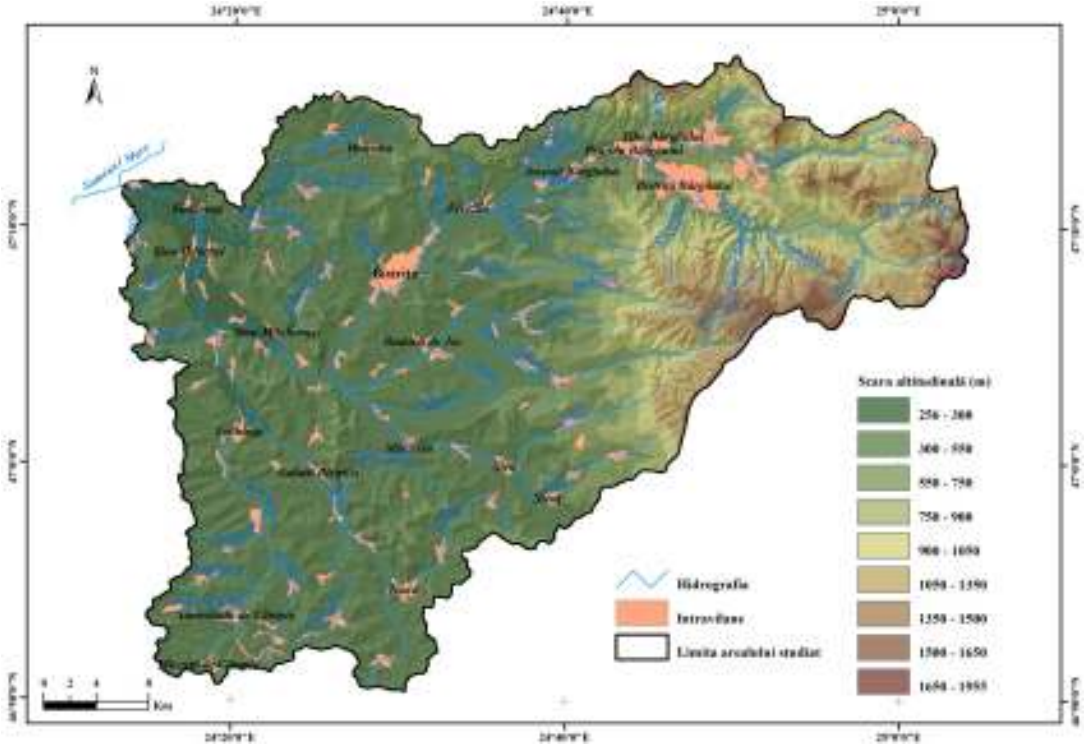


Fig. 9. The hypsometric map of the Șieu catchment area.

Depth fragmentation of the relief

In-depth level up where it penetrated linear erosion (mainly generated by flowing waters) is represented by the depth of the fragmentation of the relief (or energy relief). The result of the use of this parameter is the depth map of fragmentation.

Play one of the depth fragmentarii morfometrice essential features of the landscape, reflecting a degree of its evolution and in close correlation with the intensity of the current processes morfodinamice. The specifics of this parameter takes the weight of the relief expressed a certain peculiarity of Genesis space study.

Depth map has a scale fragmentarii relief containing values from 0 m to over 650 m, maximum values that characterize large areas with slopes that acts very intense erosion (fig. 10).

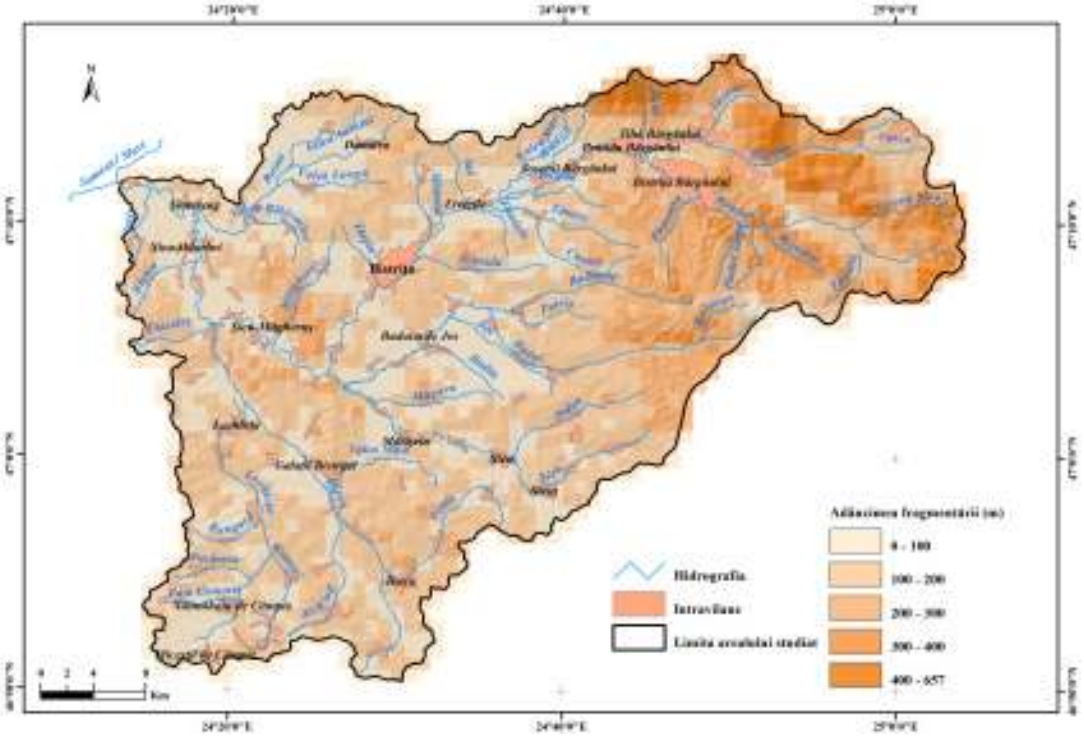


Fig. 10. Depth fragmentation of the relief.

Horizontal fragmentation of the relief

Use of this parameter helps the expression of disecare in the horizontal plane of the surface morphology of the territory, as a result of its modelling and Division reflect external factors by the action.

Landscape fragmentation density is the ratio of the total length of the network of permanent and temporary water, calculated in linear kilometres, and ream (per square kilometre).

Values range from 0-0.5 miles/km ² are specific passageways of the Valley, showing the lower terraces and meadows well-developed (Budac Depression). Values range from 0.5-1 km/km ² are specific to the entire pelvis, which overlaps the low plain of the region, but also the Valley of lanes: Lechința and Dipşei. Unlike with depth values ranging between 1-fragmentation 1,5 km/km ², are specific to sectors of the medium and Small and lower Ghinda (fig. 11).

The highest values (2,1-3 km/km2 and over 3.5 km/km2) of the density fragmentation are places where there are temporary courses more dense generating deep erosion (Prundul Bârgăului and Tiha Bârgăului). Values that sustain a high fragmentation, as demonstrated by numerous înşeuări and bazinete erosion stretched (Irimuş, I., 2006).

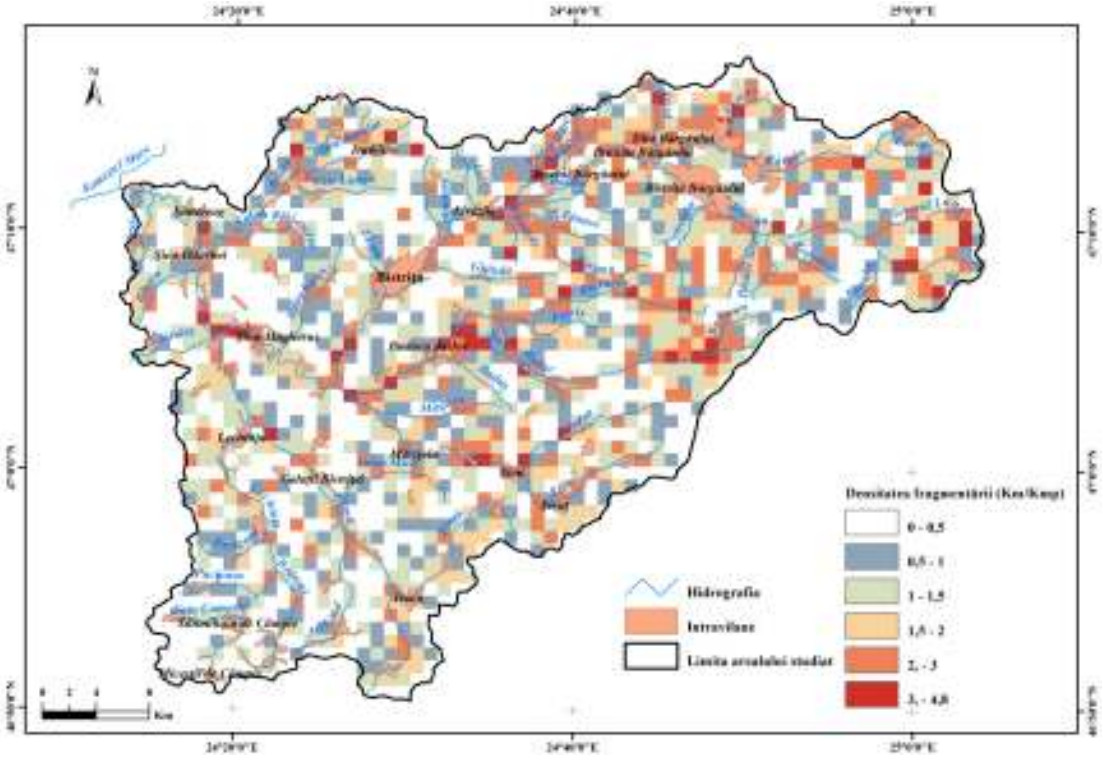


Fig. 11. Map the density fragmentation in the Şieului.

Geodeclivity

The slope is the characteristic morfometrică that express the degree of inclination of the areas included in the forms of relief. The information that a cargo holds, it constitutes a concrete reflection of the specifics and the conditions under which are shaping the landscape. The degree of inclination of a territory with structural characteristics of later petrographic analysis and constitutes one of the most important requirements in geomorphological appraisal of the territory concerned; they make and what kind of intensity and substrate processes molds.

Relative to our range of study, value classes have been established between the slopes of the minimum value of 0 ° and maximum value (above 35 °) and the extension of the area of that range. So, I opted for a total of six classes: 0-2 °; 2.1-5 ° tilt very small hillsides; 5.1-15 ° tilt hillsides; 15.1-25 ° average inclination hillsides; 25.1-35 hillsides with big inclination;
> 35 ° tilt hillsides with very large (fig. 12).

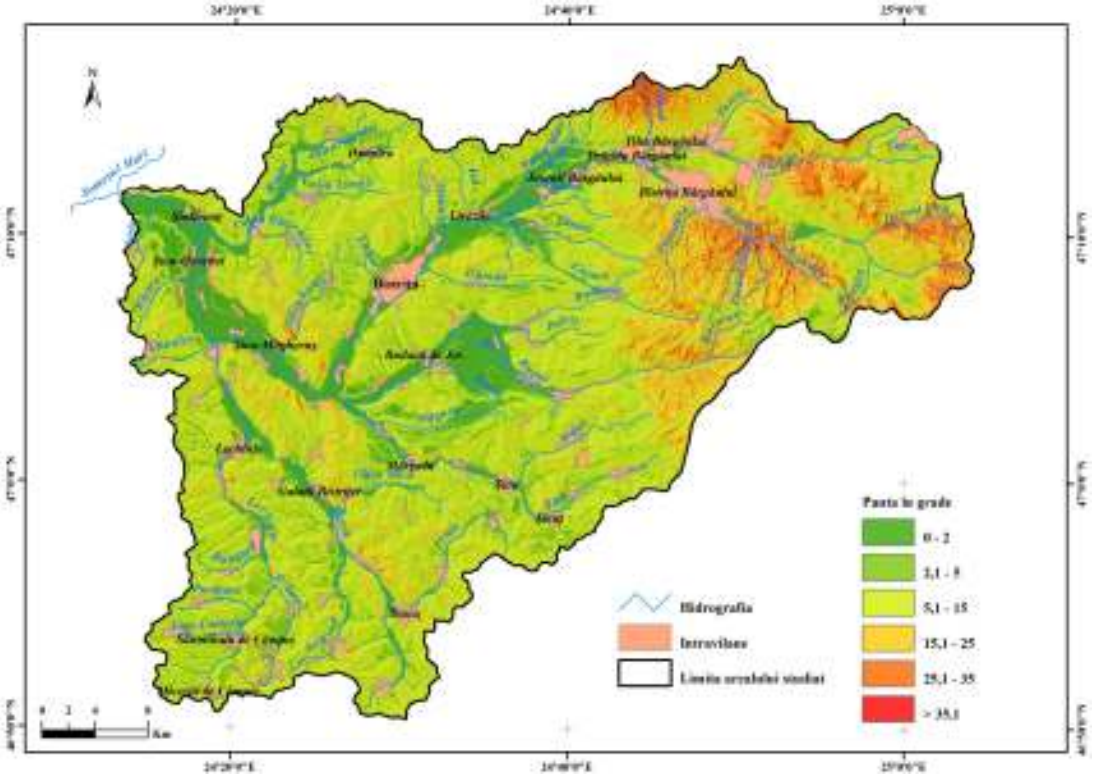


Fig. 12. Slope Map the Şieu river.

Slope orientation

The pitch of the roof is heterogeneous with different orientations, resulting in a "mosaic" of areas with fairly small areas.

Pitch of the roof is still an exhibition parameter that helps to interpret the changes in morphological image appear in the target range (fig. 13).

Orientation of the pitch of the roof solar produces differences of insolației, who together with their diets-caloric slope generates different, which will influence the soil moisture, then inducing comments qualitative and quantitative geomorphological processes and plant mat, etc.

Knowing that the slope is different in kind forms (the concave, convex, mixed), it was found that this factor together with the pitch of the roof slope and exhibition, induce discontinuities in the diurnal amplitude of felt air temperature and substrate, which will have lower values on convex surfaces, compared to the concave.

Taking into account the main directions of the exhibition of the pitch of the roof, were particularly the following types of surfaces (pitched): sunny (S, s), semi sunny (V), semi shadowy (E, NW), shady (N, NE).

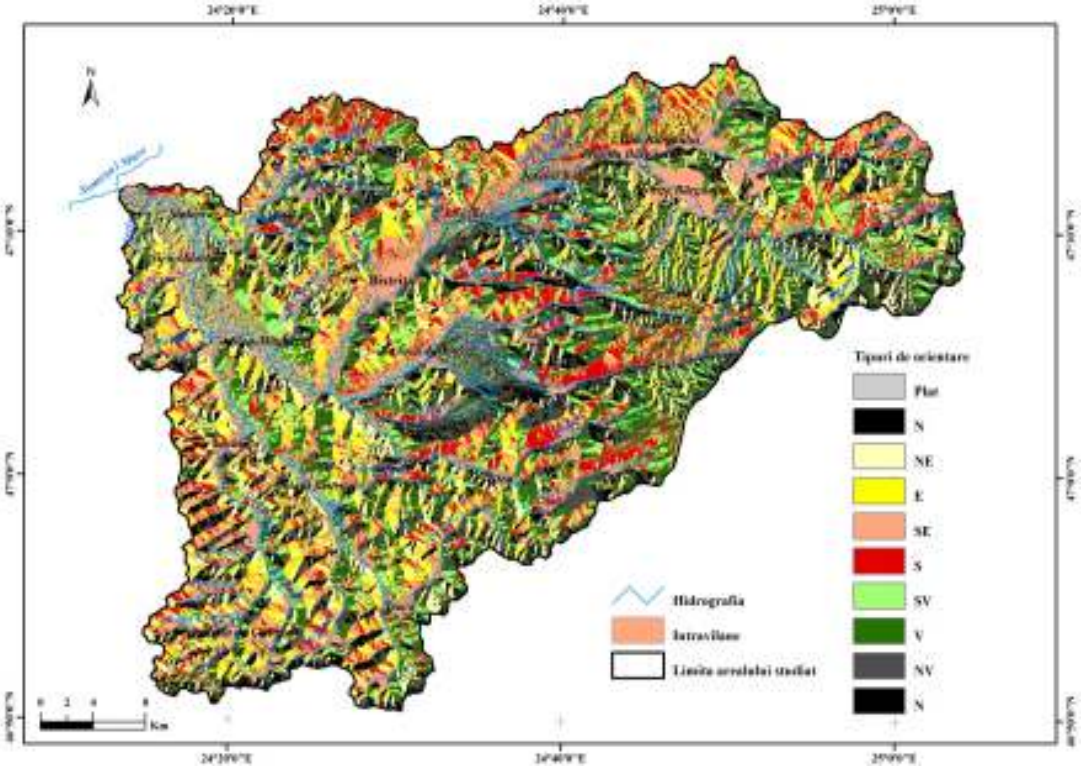


Fig. 13. Slope orientation map of the Şieu catchment area.

Chapter IV.
ŞIEU BASIN MORPHOLOGY

Morfografică characterization of a areal lies in the analysis of the main elements of the relief on the basis of what is visible on the surface, the general appearance overall.

What gives individuality of the Şieu River, but also all of the Transylvanian Basin, are narrow, extend the interfluviale, monoclinale, continue direction northeast-southwest. They have incurred as a result of the action of hydrographic network installed after the withdrawal of

marine waters. They have sought to strike a balance, profile being continuously under the influence of neotectonice movements.

The Şieu fluvial geomorphological system

In the center of Şieului morphology and dynamics, the cross section is individualizes: processes of adjustment in their own right; morphological properties that allow for generalizations and mining sectors of the river bed. It should also be noted that in these four subbazine, hydraulics has a totally exceptional attention over time, while the beds as a whole were and remained predominantly geomorphological interest subject, the stream being the domain of interference between the two areas.

Bed Şieului-Crainimăt sector and sector Chiraleş Cristur-Şieu Şintereag Station is meandrată with a tendință of sinuozitate index (1,55 in 1962, from 1.88 in 2005); prezintă, local, features the sinuous, ostroave sector (downstream of the Şieu Odorhei Arcalia, downstream of Crainimăt). Island are predominantly longitudinal and lateral size relatively low between 10 and 25 m (fig. 14).

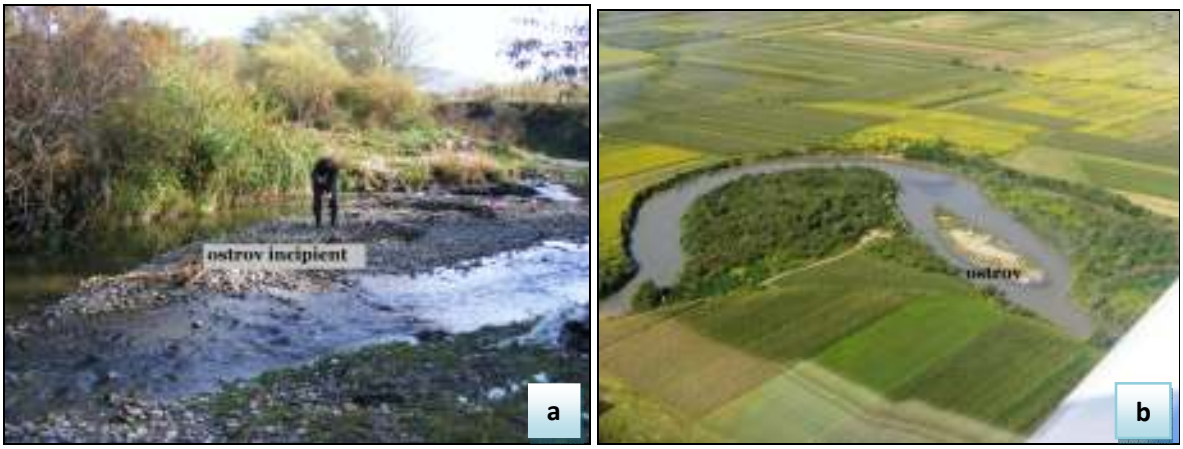


Fig. 14 Forms of accumulation of the bed type islands, a Şieului-Mărişelu (October 2009) and b Şieu Sfântu (august 2011).

Analysis of cartografică and cartările on the ground indică the presence of eight steps of terasă along the Bistrița, Şieului for seven and five to six levels in the case of the tribute.

From this perspective, my references will be limited to those aspects that concern strictly necessary in understanding the evolution of morphology, in relation to the control factors,

namely: the problem of asymmetric Geometry sections along the River, the role of vegetation and deposits.

Morphological characteristics

I investigated the evolutionary peculiarities of morphologically riverbeds minor if: Şieul with courses monitored Măgurii River tributaries Budac, Bistriţa, in turn, with tributaries and Măgheruş Dipşa. Beds are characterized through a series of morfometricii parameters, the values determined for the period 1962-1981-2004-2010. Analysis of the data reveals growing trend items after 1995, as compared with the period 1981-1984, minor damage in riverbeds vertical and horizontal (side-current by erosion).

Cross section of borders constitutes a subsystem in a process of continual adjustment by changing the width-to-depth ratio and erosion-accumulation. In the center of the cross section of the Şieu River found a tendency to warp, which reflected an accentuated process of agradare, causing the erosion of riverbanks and bed supraînălţarea.

Its obvious Budacului is apparent in transverse profiles. It shall forward it to the right basin of the same name, having a more loamy, with tar and gravel (fig. 15).

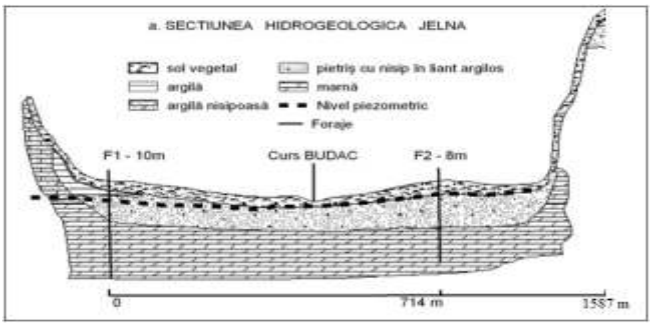


Fig. 15. Cross section on the hydrogeological Budac, according to drafts of Jelna archives Apelor Române, S.G.A Bistriţa.

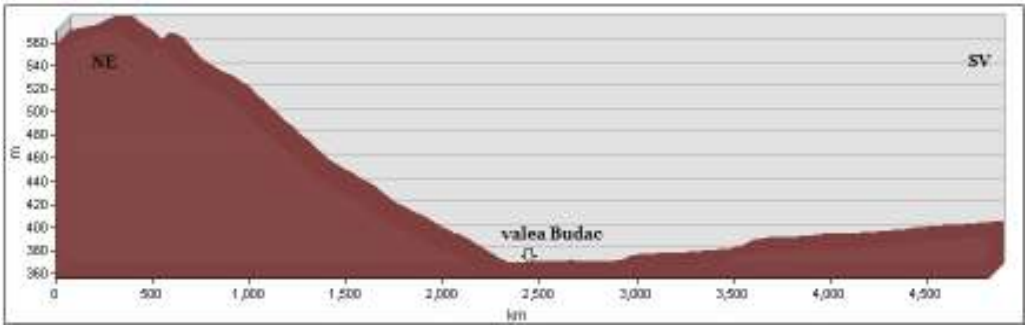


Fig. 16 Asymmetric profile across the Budacului, Jelna.

Simioneşti, upstream of the Budac River erodes the basic terrace III, after forming a series of meanders.

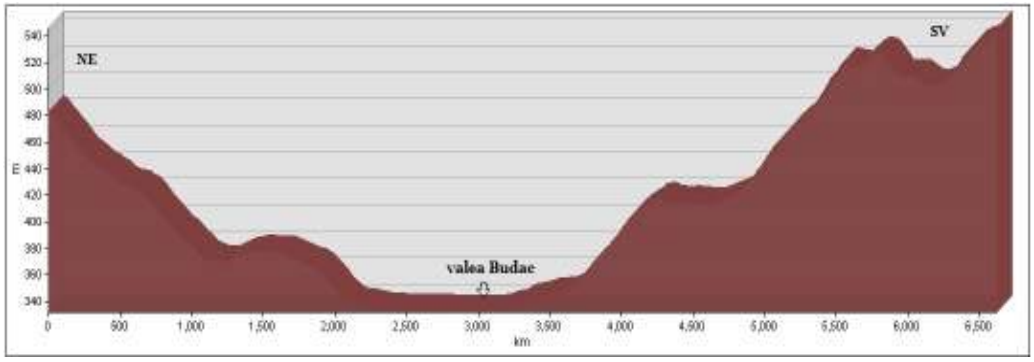


Fig. 17. Asymmetric profile across the Budacului Valley Simioneşti.

Şieu River, upstream of the confluence with the Bistrița, presents an apparent asymmetry in both the banks and the borders

Deposits of perimeter controls the shape of the cross section, which is in direct relation with the kind of solid flow that you pass through Şieul. The presence of a coarse, predominantly in mal reflects a stream with wide and shallow section.

Fig. 18 . Asymmetry in cross-section,
Şieu, before the confluence with the Bistrița.

The asymmetry in the cross section of the Şieu River, continues downstream, where the width and depth of the increase with the increase in flow (receiving the right Bistrița in Romania), the depth increases, and the shape snaps to the center of faciesului change of perimeter deposits (Crainimăt, Sărățel to Fig. 20).

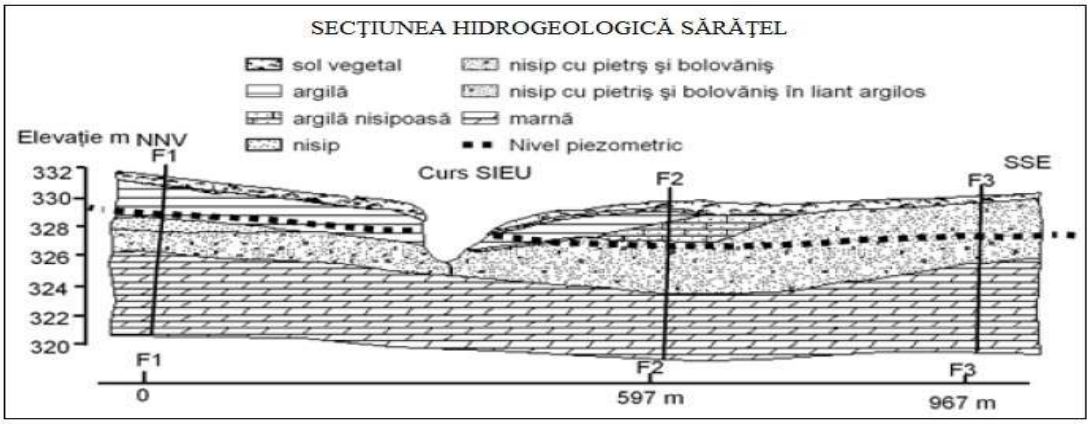


Fig. 19. Hydrogeological cross section according to sketches of the Sărățel archives Apelor Române, S.G.A Bistrița

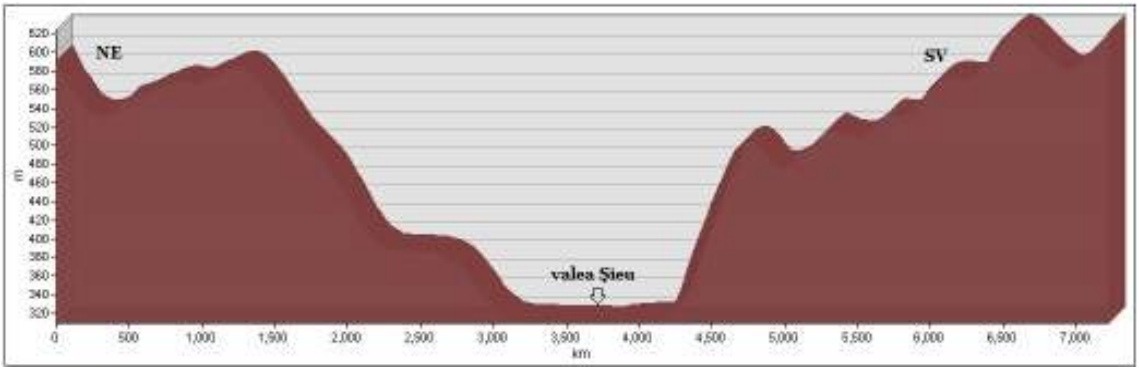


Fig. 20. Asymmetric profile across the Şieu river at Crainimăt.

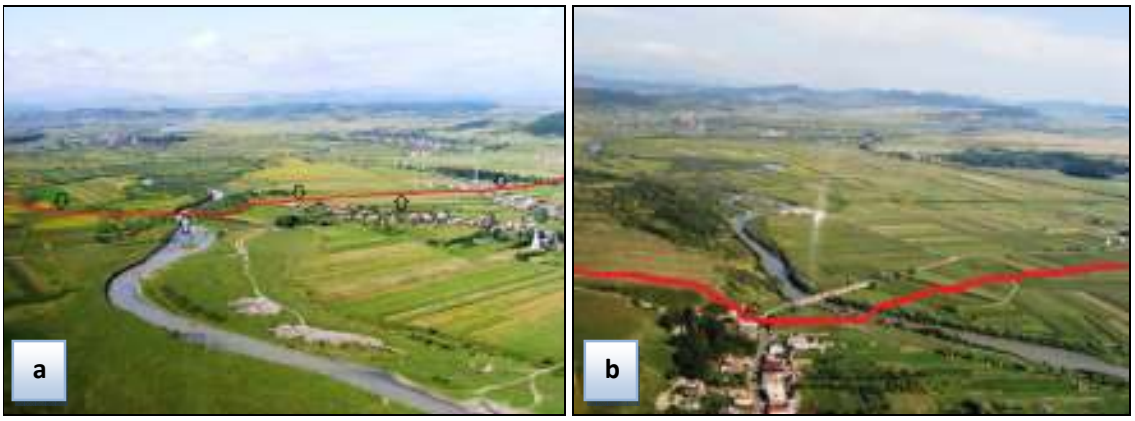


Fig. 21. Cross sections of the Şieu river, a-Şieu Odorhei and b-Cociu.

Erosion Dynamics vary between banks of 1-50 cm and 50-100 cm high, being more in line with increasing the width of the River (Şieu, Bistrița).

The Domneşti, highlights the Şieu river banks have been crumbling over a length of approximately 200 meters (fig. 22) is a possible danger to agricultural crops.

Fig.22. Bank processes in Domneşti locality, between a-2008 and b-2010.

The fact that the beds of the rivers courses are not protected nor, lead to their degradation from year to year, decreasing areas of land and communal pastures.

Exploitation of gravel, deviations of courses construction of engineering structures and dams of defending the shores of protection against floods caused major changes of morphology and dynamics of hydrological characteristics of the River.

The purpose of the case study below, is to monitor and compile inventories of such sectors subject to dynamic processes (erosion riverbanks) in a short period of time. The motivation of the investigations made is based on the premise that the analysis of the erosion of special importance is the riverbanks in investigating the effects of natural and anthropogenic processes of river bed.

Case study: is located in the southwest of subbazinului, between the confluence of the Budac River in Şieu with Bistrița (Sărățel) and up in the neighbourhood of Şieuț. The length of the River is investigated about 27.6 km. Thus, for site-Sărățel Bârla, monitoring is carried out for a period of 16 months (between 20.04.2010 – 1.08.2011), and for the Şieu Bârla-for a period of 8 months (from 22.06.2010-23.02.2011).

Monitoring of the withdrawal of the banks involved the following activities:

-installation of fixed points (the stakes) of steel concrete (65) 8 mm diameter and 1 m length, spaced at different intervals depending on various aspects of Stratigraphic profiles mal;

Fig. 23. Installation of fixed points (the stakes) of steel concrete (downstream Bequests).

- installation of poles was made on number of alignments to have unique directions of measurement (in his Bank and taluzul platform) of the shores of profiles (profiles of repeated measurements of 20 in 20 cm on the basis of fixed points aliniamentelor formats). Perpendicularity measured directions was ensured by attaching a small Rod graduated from cumpene.
- analysis of Stratigraphic profiles for each investigated and their alignment on the representation of land and then sketch in the GIS.

Results from field campaigns have highlighted sectors and eroded areas subject to default otherwise. It was found that the most affected sectors are in the villages Sântioana, Bârla, Mărişelu where lengths exceed 5,000 banks eroded m. eroded riverbanks Percentage is roughly 10% of the entire length of the sector looked-for both sides (approx. 5.13 km). 5.13 miles of eroded banks of 2 miles of eroded banks are bounded by agricultural land bordering with utility demonstrates what stressed the economic impact of this process.

The banks affected by erosion are the average heights of 0.6 m (in the case of presence of the riverbanks noticeably) and up to 4 m and this shows that the process of withdrawal does not act, but according to the height of the Bank.

The process of withdrawal of the banks in the period under review has seen erosion rates (benchmarks) ranging from 0-101 cm (Bequests) and 0-71 cm (Bârla).Maximum levels of erosion, both for the Bequests and Bârla occurred during 4.01-23.02.2011. In the area of the site,

starting with Bequests February withdrawal rates fall sharply, banks up to about 35 cm in February), 20 cm in March and almost non-existent during March - May.

The vast majority of eroziunilor are taking place within the framework of the hills and the River loops concave. There is one exception, namely on the shore opposite the village Mărişelu where erosion occurs in part of the convex meandrului. Although traces of anthropogenic influences have not been seised of the matter, this makes us think of a very human activity which can be changed during normal processes.

Morphology of the terraces

The terrace is the result of succedării while fluviatilă erosion processes (linear and lateral). Breaking equilibrium condition is made on behalf of the three categories of factors: a lowering of the level of basic movements, which affect the drives epirogenetic positive relief in a river basin and the important climate oscillations occurring at intervals of time.

The first terrace of the Small left bank boundary between Prundu Bârgăului and Susenii Bârgăului. Part of the cone of the Secu, dejection which is placed the village Prundu Bârgăului - belongs to the level of the terraces, as well as in the case of localities from upstream, Tiha Bârgăului, Mureşenii Bârgăului and Bistriţa Bârgăului.

Terrace II is well packaged along the pârâul Bârgău (Tiha), in the villages of Tiha Bârgăului Prundu Bârgăului-and where they tăpşanul of 35 metres, finishing interfluviu, of the Strâmba Tiha Bistricioara, prundişuri and so on the left side, pârâul Bârgău and right on the slope of the Bistricioara from under the stone Bridireiului, downstream.

In the Mureşenii and Mijlocenii Bârgăului Bârgăului-Bistricioara-Prund are more developed terraces II and III, less on the left slope, where they were able to form terraces crowded due to the harsh volcanic layers.

The Şieu, before the confluence with Budacul, can be seen on the left side, between the Mărişelul and Bequests, North of the basin Budacului-appears in the form of a suspended terraces of 27-31 m, which then continues on until Simioneşti avale.

On the slope of Şieului, after the confluence with the River Beszterce, is pretty weak keep (t) IV: appears at Crainimăt and in the Şieu Sfântu avale, at the confluence with the Roşua River (valea Sărată) which drains the Basin Dumitrei.

On the left side, terrace IV you can watch uninterrupted over a distance of 22 km from Chiraleş (confluence with Dipşei Valley) and up to the vicinity of the edge of German; It comprises surfaces from becoming wider, ending with a stretched towards the confluence of the fragment of the unit more than 8 km2 (Gârbacea, v., 1957). Maximum cross-sectional width reaches 3-4 miles on this portion of her altitude varies between 32-36 m (above Şieului); dominate all over the Meadow Garden, which has a quite sloping forehead.

On the opposite slope, height of 28 m barely passes, relative altitude, and Şieului Podireiului, Sfântu explained in part by the lack of complete development of horizon fan. Lack of aluviunilor, compared with their thickness on the left side of the Şieului, in part due to low altitude. The terrace size IV, Şieul has had a continuous trend moving towards the right, which was carried out concurrently with a slight deepening. Testimonies of such movements can trace through a series of bends (1 m) which marks the steps of these movements.

Before deepening phase, which gave birth to the forehead terrace size IV, Şieului waters were attached to the side of the law and so the altitude in this part is less. The same phenomenon is found at the confluence of the Şieului and Someşul Mare (above the village Cociu), terrace IV from Beclean is a few metres lower (fig. 24). If we consider this extension and continuity, on the left side of the terraces, it can be concluded that, at the level of the terrace size IV, the entire portion of the Şieu Sfântu and Cociu, Şieul has evolved continuously to the right. This trend is maintained, leading to its pitch of the roof on the said portion Şieului.

Fig. 24. Open terrace IV at Cociu, seen from the base (a), 2011.

Terrace terrace IV and have the largest meadow, terrace II and III appearing only often fragmentary.

The frequency of the lower terraces and development, said so far, 5th terrace size are much more rare and the lower surface. However their relative altitude by constanța, along the Small and Şieului, a connection can be made easily.

Fig. 25. Terrace V under Mr. Bungurului (493 m), and among Podirei, aerofoto Chiraleş - August 2011.

A unit of the terraces at the confluence of the Creek, the Bistrița Tănase can track at the mouth of Budacului in Şieu; Here, beginning with terrace of 50 m; We find all the upper terraces. The confluence of very large fragments include terrace size V, VII (better developed) and VIII.

8th terrace, 130 m, presents the last hints of terrace with alluvium and are presented as ' podireie ' without the cuvertura floodplain, often fragmentary, Prundu Bârgăului-sector.

Slope morphology

Most of the pitch of the roof are the result of collaboration between domestic and foreign agencies morfogenetici. When external agencies are stronger and is expressed in very intense relief, hillsides are tectogenetici; where priority is exogenous modeling hillsides are denudation. Evolution of the Valley and the pitch of the roof is illustrated indirectly by the report which shall be determined between the erosion that occurs on the hillsides and their escape with the help of transport agents.

Classification of the pitch of the roof depending on their position in the framework of the Şieu

In the framework of the Bârgău Mountains, and are the last Căliman, obârşie, specific to the hillsides and in the valleys of the upper classes: Small, Şieului, Dipşa, Bârgău, Poiana, Slătinița, Tănase, Ghinda, Cuşma, Bolovanului, Budacului, Springs and Pietrişul. These hillsides are affected by erosion calculation, process morfogenetic that contribute actively to shape the Şieului Valley.

Hillsides are connecting spur, between the peak Crest line interfluviilor or with different stages of secondary culmilor, but also interfluviale spaces between the smaller tributaries of the River. Hillsides are spur of the side erosion model pursued by the hydrographic network, which consequently reduces their surface. The pitch of the roof above the Valley and with some exceptions are older than them (present in subbazinele Bistrița and Dipşa, Chapter 5).

The process resulted in the development of the landscape of the region (the most expanded) or through a local development imposed by a selective differences determined by modeling the petrographic composition (held by different strength kept thick; are shorts). Their evolution is dependent on the mode of geomorphological processes depending on the characteristics of the climate.

Tectonic and volcanic movements are those that determine the hillsides with specific features. Along the lines of fissure in the removal of blocks resulting hillsides high slope with abrupți or which may gain by the action of other special features agents.

As the volcanic erupțiilor collections to achieve specific device with volcanic hillsides. At regional tectonic movements can be bombări or descent not only accompanied by changes in altitude, but the pitch of the roof and in the configuration of the various units of relief (primarily in the upper part of the basin, in the vicinity of Piedmont Căliman).

Fig. 26 Spur hillsides that make the connection between the water peaks (Prundul, aerofoto-Bârgăului and b-Tiha Bârgăului), August 2011.

Hillsides of the Valley-areas are created by the action of deepening of rivers, torenților. Those who appear in the narrow valleys and recent, immediately above the center of what makes their influence on the evolution of river to be active (base erosion lead to undermining the pitch of the roof, slips, etc.). The valleys with evolving between minor and major bed bed, there are terraces and, therefore, their influence on the dynamics of river is reduced considerably, sometimes total. Hillsides of the Valley are all specific rivers catchment Șieului, being subject to the processes of modelling hillsides active landslides (most often superficial and sometimes stabilized), șiroire and pluviodenudație.

Fig. 27. Hillsides of the Valley (Valea Poenii aerofoto c-and d-Strâjii Valley) in the upper part of the Șieu basin, August 2011.

Water peak morphology

Interfluviile are territorial spaces which divide the two catchment areas (two valleys) on the upper level of the drainage systems. As well as their dimensions are variable length correlates with the length and width of the hydrographic network correlates with the density of the network. Interfluviilor depends on the form of relief in the shape of the falls and the carving.

Fig. 28. Water peak at Domneşti, June 2010.

The interfluviale were formed as a result of the destruction of the original surface by external factors. Hydrographic network modeling of dense favored stub areas of sculptural convex, plateaus themselves being destroyed. They have many ramifications, where hillsides have been incizați by a series of valleys, usually with a downpour.

Elevations decrease gradually culmilor interfluviale from the northeast to the Southwest, but they present a longitudinal profile line easy sinuoasă. Irregularities are encountered in longitudinal profile due to the existence of înşeuări (East of the Țigău-subbazinul Dipşei).

Types of valleys

Şieului Valley is asymmetrical and is characterized by tilting the different pitch of the roof. Causes of asymmetries are geological, climatic, due to erosion of rivers in loops of bend that come into direct contact with the slope (e.g. Simioneşti).

After dealings with the geological structure can distinguish typical valleys and monoclinale structures: consistent, consequential, obsecvente.

Distinction is made between the following types:

-space mountain

-views in the form of piemontan grows, but may appear in the form of domoale or the heights of platform areas smoothed (Small Valley);

-the hills have the appearance of bridges or hills (Şieului);

-in the space of plain appearance is one of the large fields (Dipşei).

The slope geomorphological system

Hillsides are subject to active processes modeling by landslide (their number increasing from year to year more and more due to the impact of anthropic), these being superficial and nestabilizate, serving the growing areas.

Geomorphological processes in the vale-versant is mainly due to erosion, the areas of action areolare (landslides which have a generalized spread) and linear.Geomorphological processes of slope with minor impact on the characteristics of the meeting consists of several factors triggers, each of whom played a significant role in the dynamics of landscape in general, and of the system-versant Valley, notably: factors geologici, geomorfologici (by pluviodenudare, linear erosion, land movements, surpările, lateral erosion – specifies the characteristics of the River minor), hydrological, meteorological, pedologici, biogeografici, anthropogenic factors.

Classification criteria applicable to Small pitch of the roof to the hills

To differentiate classes of processes that take place within a versant depending on its type and the location of the specific processes within sectors of the same embankment was used to rank the pitch of the roof of the basin Şieu, after several criteria, as follows:

-classification by shape in plan (a) and (b), according to which there may be new subtypes (Ruhe, 1975)

-classification as occupied position inside the basin to which it belongs (c); This classification distinguishes hillsides of obârşie, hillsides or spur of the interfluviu end and hillsides of the Valley (Young, 1972)

-classification guidance or exhibition (d), important for a topoclimat that determines the specific (the hillsides oriented towards the four cardinal points and the four main intermediate).

-after dealing with the structure of the classification (e), with consequent hillsides (conform to the structure, leans in the direction of drop layers of rocks – the case of reversurilor cuestă), obsecvenți hillsides (with a seat opposite to the direction of drop layers – the case of frunților cuestă), insecvenți hillsides (which crosses the direction of shear layers fall under a certain angle).

Fig. 29 Slope affected by landslide in sub - basin Small, June 2011.

Geomorphological slope processes

In the erosion surface is found on hillsides with inclination greater than 5 °, which overlaps with the accompanying Small hillsides, Valley Dipşei Valley and Şieului Valley, as well as on the right to contact with area piemontană basin in South-East and the Şieu southern slope of the Hills Was Şieului and Dumitrei, Blăjenilor, Jelna (Cliveț Claudia, 2011).

In the erosion. Processes responsible for shaping the pitch of the roof, namely: ogaşele, ravenele and torenți.

Rigolele and ogaşele are present on the hillsides in the form of şănțulețe/grooved, branched or not created by leaks, vigorous, with sections and lengths of variable depths. Typically appear on the hillsides with inclination greater than 10 °.

Ravena is a relatively deep channel erosion, consisting of four parts: the top, the bottom, the banks and the cone of aluvial. Ravenele can occur alone or to accompany cornişa stall, situations encountered in the right places: Magura, Şieu Măgheruş, Bequests, Chintelnic, Budacu de Sus.

Accelerated land erosion was and by the need to expand the agricultural crops. Conservation and terasarea of land in the gently sloping can limit erosion. Accordingly, we will deal in particular, landslides and erozionale processes of basin subbazine:

In the Budac sub – basin are present all kinds of degradation, with local any differentiation as regards the association between them and the intensity of the processes. The radius of the localities Ardan Meadow, Sebiş prevails moderate precipitation erosion and pu ¢ ternică, assigned in all cases, with more frequent landslides on hillsides with Southwest and exhibition.

Linear erosion, without special consequences affect the border settlements Ruştior, Ardan Meadow, but are particularly intense in the upper Valley of the bazinetul Reign (around the village of Sebiş) and obârşiile branched of the creeks on the right. On the left side of the axle, because forests reaching down from the top of his degradările ¢ Şieu is restricted to the areas grubbed dl. Şieu Southwest, Mr. Thus, Mr. Portiții, Mr. Poeniței where precipitation and erosion are proficient in landslides, very extensive Sântioana.

Slips and merged with denudația surpări, the pitch of the roof with the intense southern and West exhibition, intended, in particular, grazing, Şoimuş Valleys meet on your heavy erosion and not significant (except a few stronger torenți, at the southern tip of Mr. Mr. Măgurii River, North. Mr. Oveştini and the North. Petros).

Fig. 30 outbound panoramic picture highlighting: Domneşti dejecție cones, landslides, torenți, ravines, may 2010.

Bistriţa, is the most extensive of the Şieu. Small Valley, lane (depression Orchards-Bârgău) median subbazinului, North-Eastern hillsides splits from the Mountains of the South Bârgăului-Eastern Piedmont of Caliman. Therefore, on Canal located breaker are flat surfaces,

which have developed processes predominate precipitation erosion embankment where moderate and pu Dorolei ¬ ternică of Piedmont.

On the axis of the Valley Ghinzii, both on the left and on the right, we see the degradation more pronounced in areas (landslides-fig. 31, torențialitate), which with the expansion of the pastures have been intensified. Triggering these slips should be linked in the first row of the General processes, this is occurring in the pornituri portion of the Plateau of Transylvania.

Fig. 31. recent landslides, forest edge, on the right side of the Ghinzii, July 2011.

Sinclinalului axis is almost perpendicular Sigmir crossed by the Small Valley and the hills, in the vicinity of settlements and Viişoara, linear erosion Sărata. Degradările are restricted to dl. Coarnei, Mr. Stone, Mr. Carpenilor, in particular, where precipitation erosion occurs and landslides.

The Bistriţa sub – basin with a network of water tree, but with an important share of the arteries (about 50%) semipermanente, which increases the strength of torențialitate and by default, even for linear erosion valleys of 2-3 km long.

Forests in this sector hold approximately 15% of the total area, occupying interfluviile erosion, protecting and surrounding areas thereof; predominate precipitation erosion on hillsides with southern (Mr. exhibition. Vines, Mr. Bazinetul, Valley Wolf Dosului) and more rarely, the latter being affected and the old land slips (dl. Stânii, Mr. The Vineyards).

The dominant slope processes are erosion, with high precipitation in the Advisory areas intended for grazing (Jeica, Nețeni), also Jeica being teristici and torenții ¢ character, sometimes with remarkable depths (up to 4-5 m). From Small Vineyards and Albeştii-Cladding is added and landslides, with niche desprin ¢ drop just below the forest edge (fig. 32).

The radius of the localities Miceştii de Câmpie, Stupini and moderate precipitation erosion Brăteni prevails and pu ¢ ternică, assigned in all cases, with more frequent landslides on hillsides ou exhibition Southwest and West. Linear erosion, without special consequences affect the Brăteni, Salcuta, localities, but are particularly intense in the upper Valley of the Brătenilor bazinetul (around the village Stupini) and obârşiile branched of the creeks on the left.

Fig. 32. shallow Landslide in early stage of development-South of the cladding, June 2009 Vineyards.

Slips through ' glimee ' feed sizes differ, depending on the thickness of the deposits held, and their slope, but especially of Neotectonics territory (Ocnita and Archiud) (fig. 33).

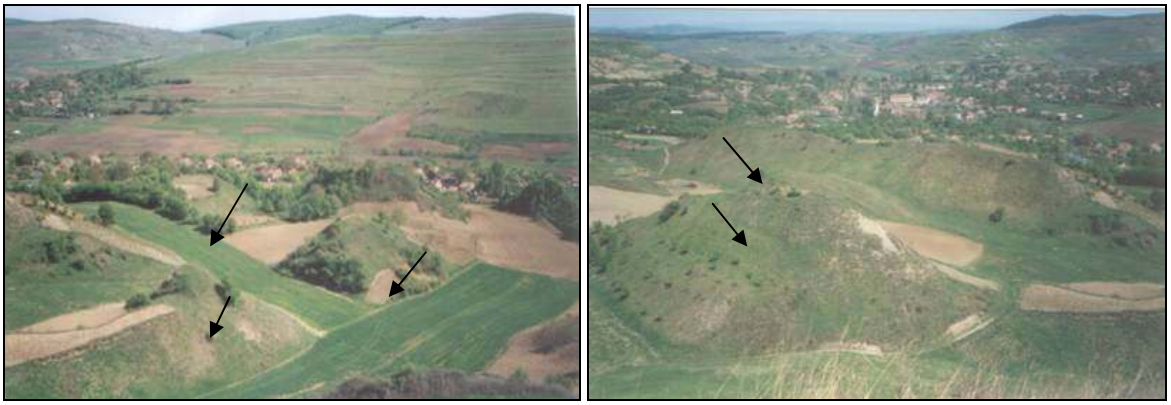


Fig. 33. Landslides of the type "glimee" and position wave slide-Ocnita, June 2009.

It is obvious relationship between the areas of massive landslide zones and areas occupied by the sarmațianului formations, such as landslides from Ocnita. This is explained by the frequency intercalațiilor of clays and marne, between formations of tar, gresii (loose or less cimentate), tufuri and conglomerates.

Landslides from Ocnita and within these, Archiud "glimee" are especially active, and the intensity of the process is given by the emergence of initiating factors between falling and anthropogenic activities.

The Roşua – Blăjeni sub - basin, throughout, presents an asymmetry clearly visible to the left, and the versantului as threatened continuously by Şieului waters, causing torrential downpours and strong erosion processes.

In the northern part, Dumitrei Depression, strong separation so slips with întâlneam to other sectors so far. To the south slope of the steepest causes a landslide area, especially in old wells in heavy, înecate material deluvial today. As you descend the slope gently towards the Valley of Blăjenilor, being devoid of slope processes. On the left side due to the steep slopes where some bodies appear strong downpours, and exceptional phenomenon altogether in the hollow.

Hillsides, wooded mountains sometimes spur of the Hill and the Hill Vineyards Blăjeni are affected by small ogaşe and ravenări (up to 1.5 m), that due to the fact that the slope is lower.

Current and contemporary morphodinamics

Morfodinamica present, unfolds in a morfoclimatic environment characterized by an irregular rainfall. His influence on the processes of river bed is felt because of the spill (pericarpatic – large deepwater transilvan lasting in March, provinieță-pluvială and the nivo-related losses in the period may to July), while the pitch of the roof is on the level of ciclicitatea-induced processes modeling.

The biggest changes in the riverbeds of the Șieu occur during high water and flood-related losses as a result of significant quantities of flow passing bed in a relatively short time. Large flow fluctuations, visited known during these events, which otherwise occur at irregular intervals. In this sense may be floods of: 13 May 1970 (station Domneşti 1130 mc/s), 1977, 2 June 1998 (the Budac River), June 20, 2006, 24 March 2007 (when the villages Şieu, Şieuț, Bârla, Sântioana and Mărişelu were affected), 8-9 March 2008 and on March 20, 2008.

Dynamic characteristics

Modeling processes have outstanding features in the riverbeds of morphological features of the basins of the rivers, and the peculiarities of the substrate and how anthropogenic intervention, which affects principally through the use of the land.

The bed of the River Beszterce minor in the area of the Union is affected by numerous phenomena of erosion and deposition of materials in the stream banks and affecting the stability of levee works in the area.

Fig. 34. Bistrița river bed in the Union, July 2011.

Fig. 35. Excavation in the riverbed between Sărățel-Șieu Domneşti, September 2010.

Fig. 36. Erosion of riverbanks, migrating scour Şieului (Podirei, Arcalia, Chiraleş), aerofoto-august.

Sector eroded from within site Şieu-Sfântu, where they were able to mount the parts fixed withdrawal rates and estimates were based on the identification and measurement of trace to withdraw (grade of crumbling, cracks) and through discussions with the owners of agricultural land in the immediate vicinity of the River.

Stratigraphy of the banks is very variable, with the coarse deposits formed from necoezive (coarse gravel), and continuing to the top with intercalații of clay strate, sandy and silt of varying thicknesses. At the top there is a thick layer of topsoil variable.

For the Şieu-Sfântu, 1870-1962, annual migration values are constants, about 1 m per year, after which the rate of migration increased to over 4 m/year in some sectors. During the period 1984-1989 River migrating both to the right and to the left by erosion (left bank with assets of erosion is a proof of this fact).

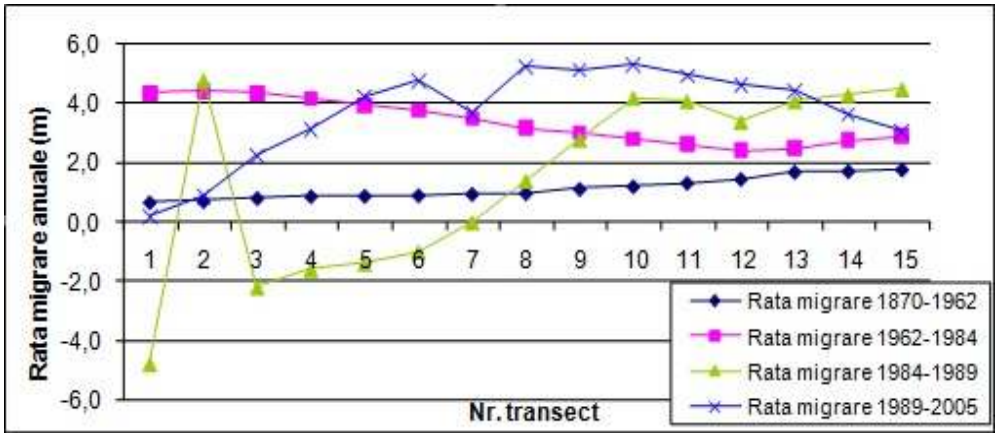


Fig. 37. The rate of migration of the riverbanks in Şieu-Sfântu after *Chiaburu M., 2010.*

Dynamics and terraces

Once the lateral erosion of rivers, floodplain that migrates first, who formed the freedom.

Downstream of the confluence of the Crainimăt, until the Dipşa River (at Chiraleş) Riverbed of the River widens up to Şieu, a width of about. 120-150 m, slopes, and the minor Islands in the riverbed (ostroave) appears with vegetation (Cliveț, Claudia, 2011). Due to the low rate of slope water leak slow and pretty strong sinuozității path in the center of the plan, as well as due to the complex and intense process of erosion-transport-deposition, suburban sprawl of sides alternate with dry material in the bed of alluvial fan of the Şieu River in minor.

Fig. 38. Migrating then Şieului, 1-and 2-Crainimăt, august 2011 Chiraleş.

CHAPTER V.
LAND USE IN THE ŞIEU CATCHMENT AREA

How to use the land and land suitability for default farm and forestry plays an important role in reflecting the vulnerability of target area.

Observing the characteristics of geomorphological characteristics of the area studied, primarily on the strength of geomorphological processes, mainly surface erosion and landslides, it is evident that the anthropogenic influence has an extremely important role in the current land degradation. It transposes into the territory by land use defectos, both as regards the main categories of use, as well as on agrotehnica.

Lands were divided as follows:

-the agricultural land use, represented by arable, pasture, subcategories, and orchard crops;

-non-agricultural land use, represented by areas occupied forested land with water, construction, land with stâncării.

1. *Arable land* shall be defined in accordance with the land cadastre (Law No. 7/1996) as those areas of land which is one every year or every 2-6 years, with annual or perennial plants. In this category have been included and fields that are used as meadow and less frequently and look.
2. *Pastures and grasslands*, naturally or artificially, re-însămânțări at a distance of 15-20 years, being used for animal grazing or grass are operated on cosirea. Because the separation of hayfields, pastures is pretty hard has opted for grouping them into the same category.
3. *Vinneries* are vines noble and hybrid. Here were included and the vineyards are degraded.
4. *Groves* are plantations of fruit trees (Apple, cherry, Plum, pear).
5. *Areas of advanced crops* shall mean arable land, typically in commercial use in the scheme with vegetable gardens, Solaria, vine plantings and isolated trees.
6. *Forests* are land covered with forest trees and shrubs, intended for the production of timber, or for the protection of soil.
7. *Deepwater fields* represent land permanently covered with water, and those temporarily covered with water and after their withdrawal, there are grown. There were Lakes and swamps.
8. *Land under construction* are those areas covered with buildings with various uses, industrial or commercial units, urban and rural area, the dams, roads, etc.
9. *Steep land* are with the rock lands on the surface, free from vegetation, forest are the dominant species, saxicole suited to those conditions.

CONCLUSIONS

The Şieului basin is one of the major basins of the Transylvanian Basin.

The study and analysis of the proposed basin morphology in the context of the changes occurring Şieu in how land use and climate changes in the past 100 years.

In Şieului, the system is an open system, which permits the exchange of matter and energy, inputs and outputs, with neighboring systems-environment, with all the relevant factors and aliens exercising effective actions on it.

The current geomorphological processes cannot parse without taking into account on the one hand the dynamics of riverbeds (as subsystem), the dynamics of the pitch of the roof constituting a system themselves, and on the other side of the Valley-embankment system taken as a whole, spurred on by some system which ensures the functionality of geosistemică factors of the Şieu basin.

Asymmetric water network is ready and has suffered a series of changes as a result of anthropogenic and intervention. The changes that occur in the gravel are nothing but answer geomorphological system, demonstrating the fact that everything changes today will have repercussions on the future of the environment. Morfodinamic potential of the basin Şieu is influenced by geographical position, morfometrici, morfografici parameter values and control factors.

Studying morfodinamicii of the Şieului basin is evident, due to large deployable capacity and transport materials (solid and liquid flow rise), increasing the capacity to scour the bed erozionale and riverbanks, the discharge of materials from the bottom center and washing dejection cones (at Monariu and Budacului River-Simioneşti) and a cyclic periods of erosion with the accumulation.

The față is intended as a study of geomorphology aplicată, in view of its role in investigating and solving territorial management. Practical issues that will be addressed sperăm in this paper a practical tool and a useful database of real use autorităților at local and regional level in support of intervention by măsuri antierozionale to ensure the protection of soil and a territorial grounded scientific amenajări.

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