RESEARCH ARTICLE **(Open Access)**

The evaluation of risk the potential and actual of soil erosion in the watershed Bovilla, Tirana.

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Abstract:

Erosions is present even more in non-agricultural land. So we can say that in some watersheds of the rivers of our country, for the whole territory scraping evaluated various different rivers. Forests continue to be the main source for heating, the destruction of forests is continuously incalculable. All logging of forest massifs (oak, black pine) is converted into a real concern for residents of many areas of our country, after cutting has caused the gëryerjeve and landslides. Erosion is the process of transport and deposition inhibitor of dust and solids during which leave the surface of the earth by the different processes and factors that occur as wind or water leaks and then being transported and deposited elsewhere. While erosion is a natural process, human activity has increased by 20-50 times the rate at which erosion is occurring. Forest area as a result of lowering the level of forest vegetation coverage from deforestation, fires, natural disasters, construction of new roads, andclimate change are among the urban extensions most distinguishing that stimulates the process of soil erosion. Consequently we are dealing with the acceleration of erosion causing problems that can classify as 'on - site' and 'off-site'. Effects "onsite" consequently lead to reduce the productivity of forests and pastures, since we are dealing with the loss of top-level layers of soil that are rich in nutrients and minerals salts. The main objective of this study is to contribute to developing the strategy for the conservation of soil erosion and surface water and also identify potential risk and reflect the current erosion in the watershed of Boville. This study is part of the use of Geographic Information System (GIS). Initially, his main goal was to collect and use environmental data to be used in environmental studies as typical character of the biotope inventory, atmospheric pollution, water pollution. Corine also included the creation of a database in a Geographic Information System (GIS) and the exchange of data generated.

Keywords: Erosion, Geographic Information Systems, cover plans, database.

Introduction

In a broader sense forest management handles administrative aspects, economic, legal, social, technical and scientific, related to use, and forest and soil retention [2]. It includes different levels of human intervention, ranging from actions for the preservation and maintenance of the forest ecosystem and its functions, to promote the species or groups of species on different social values or economic, for improving the production, protection of soil from erosion and environmental benefits [4]. The management plan should be an integral part of the overall plan for land use. The study and development of a forest management plan does not include all the wishes for what should become a forest [7]. In most cases, it relates to selection and classification [5]. Prioritize and actions that can and should be taken to a designated area. It is important to clearly define what is required to achieve. Consideration should be given far better targets, although perfect and righteous, usually are inaccessible (eg ensuring sustainable production of higher timber max protection does not comply with soil erosion in the same area) [17]. Only when the objectives are clearly defined, beanalyzing their suitability and priorities to be set, then we can make decisions for the study method to be used [1]. Making decisions based on criteria evaluated quantified and, seeing qualitative nature of ecological and social functions of land is very difficult to measure and expression in quantitative terms the parameters associated with these functions[19].

Besides the goal, the objective of this study is to develop a concept methodology on measuring and assessing the factors that influence functions "non-wood" (non-manufacturing) of forest and involving them in decision-making and assessment of risk of erosion [24]. In this context, the study shows how a mathematical model analysis can help in making decisions about the management of a watershed [28]. In addition the study shows how the use of multiple data collected during field work, and the role they play in the process of managerial decision-making [31].

Material and method

Methodology used for erosion risk assessment was based on the analysis through Geographic Information System (GIS), developed by the Forest Research Institute of Thessaloniki, Greece, in the framework of the EC AIR3-CT94-2327 "The development and harmonization of systems government monitoring of forest resources in Europe "[6].

This methodology includes three main phases:

1. Collection of data necessary for the risk of soil erosion and soil quality[17].
2. Integration of data in an information-based system that enables spatial data analysis in space and their presentation in the form of maps[12, 6].
3. Presentation of the methodology and results of the evaluation methodology and results on the ground to determine the need for more in-depth study in the future[13].

Assessing the risk of erosion based on the principles and parameters set by the factor affecting the functions of non-timber and analyzing natural phenomena conditional on the fulfillment of these features lead us towards determining the key powers that affect a particular function [6] according to which the factors that contribute decisively to the formulation of functions considered in this study, but many of them are the same for all other functions. The classification means and structure the interaction between factors, by factors affecting each mode each non-wood function. A classification of these factors by analyzing technique [6] system, resulting two sets of factors, namely, the system external factors and system internal factors. The system of external factors: rock, soil, climate, landscape and human impact. The system of internal factors: the structure of the soil cover, the structure of the heap, while the coverage of land management systems of the pile, harvest conditions [11, 12].

Rezults and discussion

Boville watershed location in V-L Tirana district, placed in north latitude 41 ° 24 '÷ 41 ° 31' east longitude at 19 ° 51'55 "÷ 20 ° 00'00"[15]. Distance from Tirana is 18 km, considered one of the most remote areas that continuity of time in history, taking into consideration the distance from the center of the largest developed country [16]. This specificity is conditioned by the lack of adequate road network not before '90. Seeing geographical position and the values that it provides today entered the spotlight of various researchers and investors. Strait at the entrance of the River tërkuza Zall Herr after a long period of reservoir dam was built which enables the collection of all water flows throughout the watershed [20].

Table 1 Use of territory

Use of territory	Area (ha)	%
Forest	5059,6	55
Pastures	584,12	7
Agricultural	1352,5	15
Rocky	938,98	10
Water	365	4
Urban	229,5	3
uncultivated	640,3	6
	9170	**100**

Use of territory and area. The division of the basin area, under the forms of land use, given in tab. No. 1 in the following. Changes the surface by use of the territory [22], commented on the fact that, on the one hand clothingbare terrains (fallow) with forest vegetation, and on the other hand lack of investment over the years have done to change the destination of the surface in these territories keeping unchanged the surface of the basin [24, 23].

The total area of 91.70 km2 basin is (or 9170 ha). Water flow in the distribution of FACTORS reflected the impact of different physical-geographical, especially change during rainfall. Determining the surface is as survey realizur in terre borders and through natural topography map scale of 1: 25,000 which we then digitized (GIS).

The average altitude of the basin (Hm). Given the height above sea level, as well as being bazar in the configuration of the terrain, the pool has a vertical extent of visible specifically stated with many ripples. The minimum height of the surface basin of Lake is 318 m above quota sea level, while the maximal height is 1628 m Peak Repesa [26]. The average altitude of the basin affects food hydrographic network and directly in its development. The average altitude of the basin is determined by the method of applying equalization contour line below:

$$H_m = \frac{f_1h_1 + f_2h_2 + ... + f_nh_n}{F} = \frac{\Sigma f_i h_i}{F} = 620m.$$

where: h1, h2, ... are secondary .

hn arithmetic heights between two successive limit izohipsa surfaces f1, f2, ... fn

f1, f2, ...fn surfaces that limit the contour line.

F- basin area in m^2

Surface distribution by height above sea level is presented in figure 1 the following.

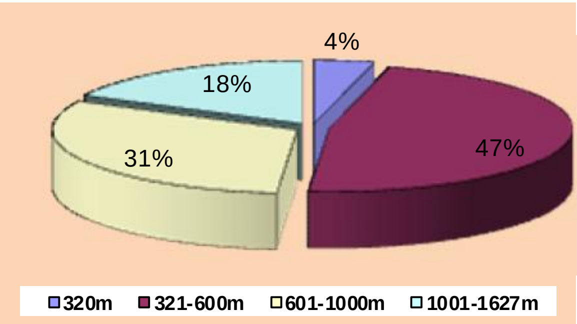

Figure 1 :Distribution of surface

The average slope of the basin is the most dynamic progress bar water network development and therefore directly affects the speed of the flow of water and concentrated sipërfqësorë affecting the intensity of abrasion. According to various autorve it has been proven that by doubling the slope erosion increased 2-3 times [34]. The average slope of the watershed is defined by the formula:

$$I_m = \frac{h[0.5(lo + \ln) + l_1 + l_2 + ... + l_{n-1}]}{Fp} = 52$$

%

Where: Im - the average slope of the basin in%.

h - equivalent height 100m.

lo, l1, successive length of contour lines with baraslartesi 100m at km.

Fp - km^2 watershed area.

Distribution of the basin area under the slope is shown in figure 2 of the following.

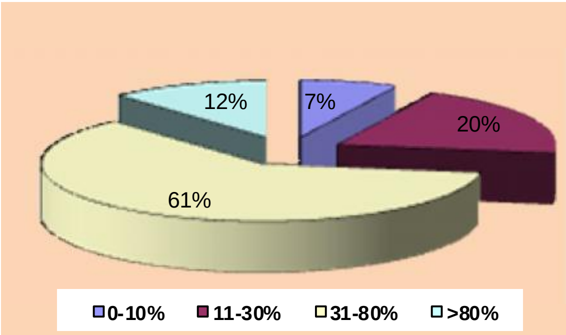

Figure 2 Surface distributions by slope

Salt precipitation and hydrology are among the most important climatic elements. These express the water that falls to the ground from the upper layers of the atmosphere as rain snow or hail. Average yield many years of precipitation station Mnerit totaling 2019.1 mm, where about 35% is concentrated in the winter months with 707.9 mm, while in the autumn months 27% to about 539.8 mm and spring months have 25% 521.3 mm. During the summer months it has been observed that falls about 13% of the amount of rainfall with 250.2 mm. So they are calculated and station 2. More detailed data are presented in the following tables no. 4.The data table shows that the amount of rainfall is greater and more monthsThe most humid months are November, December, January, February and March. The precipitation by seasons reflected in the table 2 the following

Table 2 Rainfall seasonally

Rainfall (mm)	Seasons			
	Winter mm	Spring mm	Sammer mm	Autumn mm
Altitude 400 m	707.8	521.3	250.2	539.8
Altitude 1000 m	865.7	608.9	314.4	730.6

The largest amount of 24-hour rainfalls in the basin are 237.4 mm, on 25.X.1982. Maximum values of 24-hour values are observed over a period of time once certain thresholds as well as for absolute air temperature, they can not serve a full notice. But given the great importance of their results that 24-hour rainfall with a recurrence period of 50 years once Bovillën reached 237.4 mm. So maximum 24-hour precipitation are associated more with certain synoptic situations with weather fronts and specific types of clouds that accompany.

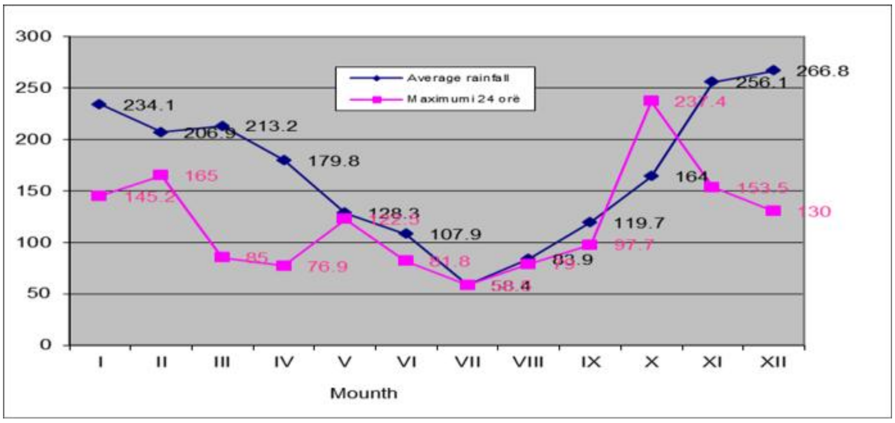

Figure 3. Graphic presentation of rainfall max. 24-hour.

The impact of this type is significant rainfall in geomorphological processes (mainly the dynamics of the slopes, as landslides, scraping, money, etc.). In winter a part of the annual precipitation falls in the form of snow which starts from November and ends months in April, especially in altitudes above 1200 m above sea level. The average thickness in the neck - strains reaches about 50 cm, while the height 400-800m below it reaches 3 cm thick. The average number of days with snow layer and the average height of the layer of snow teaching at No. 2 cm illustrated in the graph below. Bursts watershed is rare atmospheric phenomenon, the number of days with hail is 8.

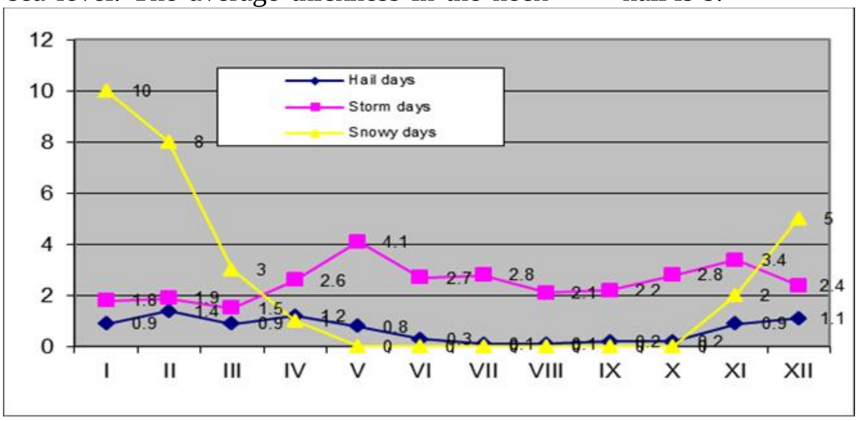

Figure 4. Graphic presentation of the number of days with snow, storms and hail.

The annual average temperature for this watershed ranges from 10 ° C - 13 ° C. absolute values are observed value once during a specified time period. Temperature of vegetation a fully possible plants for the wood to normal growth (scrub) forest and agricultural plants (corn bread) after lasting 9-15 hours. Values temperatures greater than or equal ME10 ° C and 20 ° C have different start and end in this watershed. Temperatures above 10 ° C starts March 10 and ends by December 7 (273 days). Temperatures above 20 ° C begin May 30 and ends on September 27 (121 days). The performance of air temperature in the watershed presents a maxsimum and a minimum [30]. Absolute Maximum temperature is reached on July 13, 1957 that had the value 35.5 ° C, while the absolute minimum was recorded on February 9, 1956 that there was value - 13.3 ° C. The values of effective temperatures have value not only theoretical but also practical, as on this basis it can be provided at the time of planting crops, and forest faragjere ensuring optimum seed afatësi depending on requirements for germination and normal development to temperature. In connection with the birth and development of erosion soil plays a double role: on the one hand it represents the object on which arises and operates erosion, in this case it differs in terms of morphology, and toward its own merits, and by next it is one of the main factors that, in different measure, conditional erosion rate of development. It sticks in varying degrees of this phenomenon (erosion) depending on the specifications of the building morphology, as well as physical property and chemical as well as in conjunction with other factors, conditions the extent and character of the action of abrasion, sets and changes the pace its development in different areas [32]. The study pedologic we made basin lies in three vegetation zones ranging from 318 m height above sea level to a height of 1628 m above sea level and consequently on, vertical extent we are dealing with three types of land:

- ash – brown land.
- brown land.
- dun forest land.

Table 3 Type of soil

Type of soil	Area (ha)	%
ash-brown	2698,37	34
brown	4019,67	51
dun-forest	1148,01	15

Calculation of liquid flows and solid.

To calculate the average annual flow of liquid, certainly different, the actual average dry year, max and feeds alluvium is pending and terminal conducted a study more detailed of hydrometeorology in 1984 Institute for ujmbledhës pond. Based on this study we assessed all the indicators dealing with our study. Based on this study brook Tërkuze axis 1 is built dam lake has a surface today Bovilla watershed 91.70 km2 and length L = 13.1 km. By calculations performed we have considered indispensable:The average annual flow of liquid calculated on this axis is.

$Q = 3.02\ m^3/sek$

Average annual flows of liquid certainly different set are given in table 4 the following:

Table 4. Average flows for sure different

Seat	Average flows for sure different p %; m^3/s									
	1	2	5	10	20	50	75	90	95	99
Aksi 1	5,04	4,77	4,38	4,02	3,6	2,96	2,48	2,11	1,9	1,57

Maximum liquid flows with different security.

Greater flow and more frequently observed in the first half of winter (November 15 to the end of December). In the following period, from January to the end of March, inflows are not so high. From late March to late June observe a second maximum [32]. July September period is generally calmer periods.

Table 5 Maximum liquid flows with different security.

P %	10	5	2	1	0,1	0,01
Flow in axis 1 (F= 91.70 km^2)	180	235	310	380	580	770

3. The flow of suspended alluvium and bottom.

Volume flows calculated in this axis is given in the table 6 the following.

Table 6 The volume of flows in million m^3

P %	10	5	2	1	0,1	0,01
Flow in axis 1 (F=91.70 km^2)	2,767	3,643	4,8	5,894	9,022	12,087

During the 5 year period distinguished with different characteristics in terms of the full regime. The first period is from October 1 to November 15, the second period is from 16 November until the end of December, the third period from the beginning of January until the end of March, the period of four from early April until the end of June and fifth period from early July to late September.

For rigid flow assessment are used data on water flow, turbidity measurements daily and runoff performed on-site measurements during different periods of the years 1970-1985 - 2002.[31]

For axis 1 suspended alluvium flow is calculated as follows:

Axis 1 = 87.900 ton/yaer

Based on calculated suspended alluvium and alluvium other and the total terminal. For the calculation of rigid material (alluvium fans) it is accepted that they constitute 70% of alluvium pending. Suspended alluvium in this way, those fans and both together are given in table 7 the following;

Table. 7 The flow of alluvium

Axis	F *km*^{2}	alluvium in abeyance	alluvium bottom	alluvium overall
		Ton/vit	*Ton/vit*	*Ton/vit*
1	91.70	87.900	61.550	149.450

Starting from the analysis of the results of alluvium look in abeyance flow is 9.5 tons / ha per year if you add bottom and leaks 6.7 tons / ha year, it jointly runs in 16.2 tons / ha per year. Therefore we are dealing with a significant amount of material eroded and transported annually from the surface of the basin. Reasons for this include the impact scraping external complex interior factors affecting non timber functions.

Conclusions

After analyzing the results obtained concrete basin in our research, which we used as an example of the implementation of an advanced methodology for assessing the risk of erosion we can arrive at these important conclusions.

- watershed is located in an area that has a high risk of erosion in 57% of the surface (surface. Agriculture)
- In a medium risk of erosion in 32% of the surface (surface covered with forest vegetation, bushes and grasslands)
- and a very large risk of erosion in 11% of the surface (surface bare)
- qualitative values of the rock type that affects the risk of erosion, belonging to the second class and four. So the average impact on the risk of erosion (second class) and very high impact on the risk of erosion (grade four).
- qualitative values of climatic factors in the whole of the Mediterranean belong four quality grade, having a huge impact on the risk of erosion.
- qualitative land values divided by the quality classes belonging to the class of second, third and fourth quality, having an impact above average and very high risk of rozionit.
- qualitative landscape values belong four quality grade having a major impact on the risk of erosion. Factors affecting these values are numerous.
- human impact has a great impact on the average and the risk of erosion, the impact depends on the form of land use. In the forest area it is moderate, while in agricultural areas, pastures and fallow this impact is high.

In conclusion we can say that:

- the forests are mainly located in terrain with average and high risk of erosion.
- the pastures are located in terrain with high risk and very high erosion.
- agricultural land located in terrain with high risk and very high erosion.
- rock and sand, bare areas are in danger of terrain with high and very high erosion.

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