

AN EROSION PROCESS STUDY AND THE APLICATION OF THE DEVICES TO MONITORING IT: a case study in Ipameri – GO – Brazil

Érica Aparecida Vaz Rocha¹ – ericaavr@ibest.com.br – UFU

Ricardo Reis Alves¹ – rreisalves@aol.com - UFU

Silvio Carlos Rodrigues² – Silgel@ufu.br - UFU

Ipameri city is located in southeastern of Goias State in the south of Central Brazil, between the Veríssimo and Corumbá rivers, tributaries of the Paranaíba Hydrographic Basin. The municipal district holds a big territorial extension, occupying an area of 4.691 Km², and having the geographical coordinates as follow: 17° 13 ' 10" of south latitude and 48° 09 ' 44" of longitude west.

This city is located in Brazil's Savannah, where the predominant kind of vegetation is formed by bushes and grassy. As in the other part of the Brazil's Savannah, the most part of the vegetation had been putted down because of the expansion of the Human kind use on the land, like agriculture, construction of factories, roads, railroads, etc.

The region of Ipameri is constituted by an old rocky formation, dated from the Pre-Cambrian, composing a part of one formation that is known as Complexo Goiano Formation. The rocks that constitute this formation are basically Granite and Mica-schist. Nowadays, the most part of the rocks have being suffering a decomposition process, and so, it is easy to see a lot of soil formed from this formation of rock.

The relief forms are basically the same, the terrain is composted of more resistant rocks, presenting altimeters levels more accentuate, that form a characteristic relief of plateaus and elevation isolated, with hill and saw of prominence in the landscape. The most part of the municipal district is located in the quota 800 meters of altitude and, but with no high steepness (under than 10%).

Prevail in the municipal district red-yellow soil and dark-red soil. This paper had shown that the land use in the research area is a big problem, because first, the vegetation had been putted down, and consequently, the rains drops fall direct on the soil and start the erosive process. The erosion begins as water flow and use to develop to big gullies, as this one where this research has being developed.

¹ Master degree students of Federal University of Uberlândia

² Doctor professor of Federal University of Uberlândia

The climatic conditions of the municipal district are enough defined, in harmony with the climate of southeastern Goias state, it can be considered typically tropical. The rains have periods delimited, 80% fall on the months of December, January and March, however the rest is distribute on the mouths of October, November and February, with average annual precipitation of 1750 mm.

As the main activity of the municipal district is the agricultural, this activity, that come occupying the savannah since the begin of the century, this seems to be associated to the installation of gullies, which brings a lot of problems related to the soil loss in *situ* and other environmental problems related to the sediments dynamics.

The erosive processes are unchained basically by the drastic alteration of the environment, and such a process caused by the action of the water in the deforested soil intensifies the superficial drainage becoming a serious problem due to destructive power and the great soil losses, that brings damages to every society and expense to the public power.

Erosion is the detachment process or it drags accelerated of the particles of the soil caused by the water or for the wind. An erosion process constitutes the main cause of the accelerated depletion of the lands (Bertoni & Lombardi Neto, 1990).

With the erosion process there is a depletion of the soil, and so, the lands reduce its production capacity, because there is a decline of its fertility, besides others serious environmental problems, as: high sedimentation in water courses, pollution of waters, desertification, etc.

The present paper intends to develop a research in a gully (linear erosion) (fig. 1), a fact that worries all, specially that people who are directly related to an erosion process, having problems as roads and houses destruction, loss of the fertile soil, possibility of damage to the factories areas, etc.



Fig.1 – In this picture it is possible to see the erosion process where this paper have being developed. Also, it is possible to make a comparison between the size of the facture (at the bottom of the picture) and the gully studied located at the front of the picture (ROCHA, Erica – 2004).

The studied gully is located in a rural area. This kind of big gully is very common in the region, and in this case, the gully is approximately 15m depth, reaching the sub-superficial watery, 1040m length and 40m width. However, this research have being done just at a sub-channel (fig. 2), which holds less measurements than the mainly channel (it is shorter). This study place had been chosen because it had presented a lot of characteristics related to the high activity of the erosion process. So, it was started a collection of sediments for making quantitative and qualitative analyses, a measurement of the gully's edge advance, picture comparison, and with this, the evolution of the channel would be evaluated along to the time.

The objective of this study is to know how the linear erosion process happens, with its origin being natural or with Humankind intervention. For this, some devices have being used into the gully channel, collecting data about what is happening inside the channel related to sediment transport. For helping understand this process, other methods have being used, for example, gully channel monitoring with dots of collect data in each 5 meters around the study area and the comparison between pictures taken from the same places, which represents the erosion action.

The data collected have being analyzed in the lab, following a method related to the quantification and qualification of the material. Whit this analyze method, this research

will show information about the kind of the sediment transported and the erosion process evolution.



Fig.2 – Picture from the studied area. The area is detached with a red circle (ROCHA, Erica – 2004).

For reaching the objectives of the research, an embankment with a floodgate was installed into the secondary gully channel (research area) (fig. 3). With this device, it was possible to collect data about the quantity of the sediments transported at the bottom of the channel. For this, a sediment trap has being used in each 7 days, and after the sediment collection, the sediment was transported to the lab where it has to pass through a dry process, and after that, the quantity and quality analyses were done using some lab devices and tools.

Other method used is the monitoring using stakes. This monitoring will be done with wood stakes, in rectangular distribution, with intervals of 5m between each other. The measurement will be done after each 15 days to supply data for evaluating the intensity of the gully edges evolution along to the time.



Fig. 3 – This picture shows an embankment with a floodgate that was installed into the gully channel for collecting data about sediments transported at the bottom (ROCHA, Erica – 2004)

Other techniques will be used for helping to get the objectives of this research, which will be picture-comparison, rain quantity measurement and soil analyses. The picture-comparison will be done after each month in two different points and always from the same position and using a digital camera. For making the measurement of the rains quantity an improvised pluviometer has being used, which collect real data about the rains in the research area. The soil analyses will be done around all the secondary channel studied, given the size of soil particles in different places, making possible a map confection about the size of particle around the studied place.

With this kind of information, this research will probably provide enough information to do some comparison between the used techniques and results and other used by other researchers. The data collected will either be used to do a regression and progression model, which will be very important to propose the problem mitigation of this area.

BIBLIOGRAPHY

ALVES, Roberto Reis; REIS, Ricardo Alves; RODRIGUES, Silvio Carlos. **Impactos ambientais de processos erosivos em micro-bacia hidrográfica no município de Uberlândia.** In: SIMPÓSIO NACIONAL DE GEOMORFOLOGIA. 2002, São Luis. Anais: São Luis, UFMA. 2002.

- BLOOM, Arthur L. Tradução feita por: PETRI, Setembrino. **Superfície da Terra**. V 1. São Paulo: Edgard Blücher, 1996.
- CARVALHO, Newton de Oliveira et al. **Guia de Avaliação de Assoreamento de Reservatórios**. 1. ed. Brasília: Agência Nacional de Energia Elétrica, 2000.
- CHRISTOFOLETTI, Antônio. **Geomorfologia Fluvial**. V 1. São Paulo: Edgard Blücher, 1988.
- GUERRA, A. J. T et al. (organização). **Erosão e Conservação dos Solos: conceitos, temas e aplicações**. 3. ed. Rio de Janeiro: Bertrand Brasil, 1999.
- NISHIYAMA, Luiz. **Geologia do Município de Uberlândia e Áreas Adjacentes**. Sociedade & Natureza, Uberlândia, 1 (1): 9-16, junho 1989.
- REIS, Ricardo Alves; ALVES, Roberto Reis; RODRIGUES, Silvio Carlos. **Processos erosivos ao longo da Bacia Hidrográfica do Córrego Lagoinha**. In: SIMPÓSIO REGIONAL DE GEOGRAFIA, 1., 2002, Uberlândia. Anais Simpósio Regional de Geografia. Uberlândia: UFU, 2002. p. 31. CD ROM.
- SILVA, A. Maria. **Guia para normalização de trabalhos técnico-científicos: projetos de pesquisa, monografias, dissertações e teses** / Ângela Maria Silva, Maria Salete de Freitas Pinheiro, Nara Eugênia de Freitas. Uberlândia: UFU, 2000. 163p.
- VILLELA, Swami Marcondes et al. **Hidrologia Aplicada**. V 1. São Paulo: McGraw-Hill do Brasil, 1977.