DEGRADATION OF LANDS IN URBAN AREAS

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INTRODUCTION

The works about soil's erosion have been object of wide studies in the district of Viçosa. It is characterized by hilly and inadequate occupational soils management that increase occurrence of soil erosion by gullies and ravine in amphitheater form. The present work tried to monitor a hillside in the urban area of the municipal district.

MATERIALS AND METHODS

1. Gully monitor using the technique of Guerra (2001); 13 wood stakes were made in the following dimensions: 80 cm of height, for 2 cm of thickness and 5 cm of width, numbered, buried it a depth of 30 cm in the soil and at a medium distance of 2,70 meters of the lateral walls of the gully. The medium distance among the stakes was of approximately 7,50 meters.
2. Quantification of the Tax of Infiltration using the method of Hills (1970) aped War (2001); it consists of the construction of an infiltrometer to measure the speed that the water of the rain is infiltrated in the soil. For that, it was used a pipe of PVC, with dimensions of 15 cm of height and 10 cm of internal diameter, penetrated it a distance of 5 cm of the level of the soil.
3. It collects of inclination data using the rising technique through the apparel of Pitty (1968). This apparel, denominated pantometro, is formed by two vertical bars, in this case of aluminum, of 1,5m of length, each one with a close screw to the ends. In each one of the bars was put a big transferrer, centered in the superior screw.

RESULTS AND DISCUSSION

The main causes of the instability of the hillside are the removal of the vegetation, the concentration of pluvial waters, the exhibition of the lands and the inadequate execution of

highways, which intensify the ravines processes and gullying. The following erosive processes were verified:

1. Erosion to laminate. The water goes down the hillside, "washing" the surface of the land as a whole, do not forming much defined channels of drainage (Illustration 1).
2. Erosion in furrows. The water ponders for preferential roads, deepening the furrows for the transport of material of the soil, what can cause the appearance of ravines (Illustration 2).
3. Erosion for gullies. The ravine reaches such depth, reaching the sheet water table. The removal of material of the bottom and of the walls of the gully it forms emptiness inside the soil, creating collapses (Illustration 3).

Illustration 1 – Erosion to laminate

Illustration 2 – Erosion in furrows

Illustration 3 - Erosion for Gullies

Origin: Authors Elaboration. 2004.

Contributory factors to the Occurrence of the Processes

Human Activity- inadequate execution of highways.

The hillside has been characterized by a process of environmental degradation, fruit of straight cuts that were implemented in the hillside. A first cut, developed in the central part,

and a second cut, implemented starting from the medium segment until the top. It's produced a vertical degradation of the landscape and appearance of ravines and gullies.

Volume of water and his distribution in the time

The distribution of the precipitation in Viçosa indicated that the months of October until March are the most susceptible to the progress of the erosion on the unstable areas. Already the months of April to September, they are characterized by deficient periods of rains. However, in the year of accomplishment of the present work, the distribution of the rains was differentiated, pondering between the months of October and June.

Volume of water and his distribution at the space (Tax of Infiltration)

The infiltration tax was determined with base in three point's samples, for a darkened day of winter, with humid soils. The Illustrations 4, 5 and 6 correspond, respectively, to the first, second and third point of the sample.

The first point consists the base of the gully. That place is characterized by the prevalence of Red-Yellow Latossolo, with horizon exposed C. The Illustration 4 shows the tax of infiltration of the level base of the gully, elapsed 30 minutes of the first observation. It is observed that this place of the gully possesses a low capacity of infiltration of water, only 3,5 dl^3. The characteristics that contribute to that result are the compacting of the horizon C in that place, which is very susceptible to the intense superficial erosion, due to the low capacity of retention of water. That contributes to the lowered of the level of base of the gully, pressing the bottom and their walls, giving origin to the fractures or collapses that can enlarge and/or to create arms in the gully.

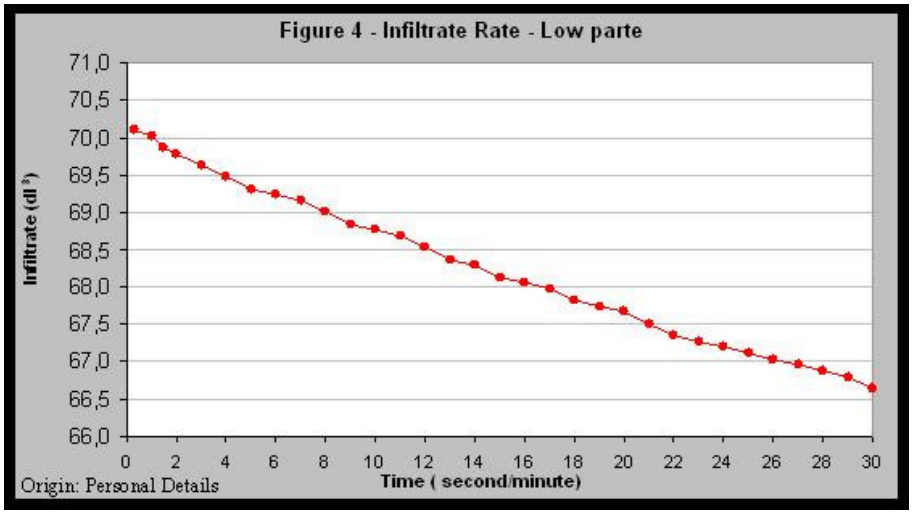


Figure 4 - Infiltrate Rate - Low parte
Infiltrate (dl³)
71,0
70,5
70,0
69,5
69,0
68,5
68,0
67,5
67,0
66,5
66,0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Time (second/minute)
Origin: Personal Details

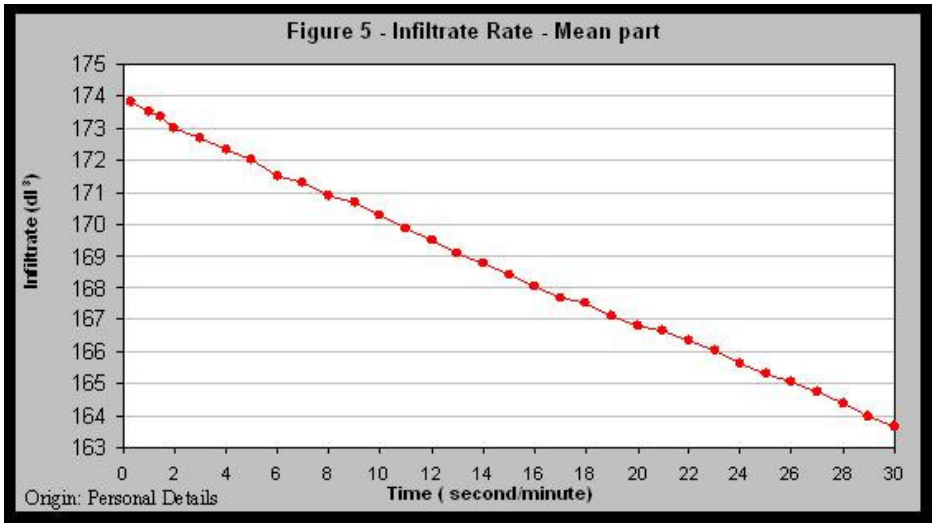


Figure 5 - Infiltrate Rate - Mean part
Infiltrate (dl³)
175
174
173
172
171
170
169
168
167
166
165
164
163
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Time (second/minute)
Origin: Personal Details

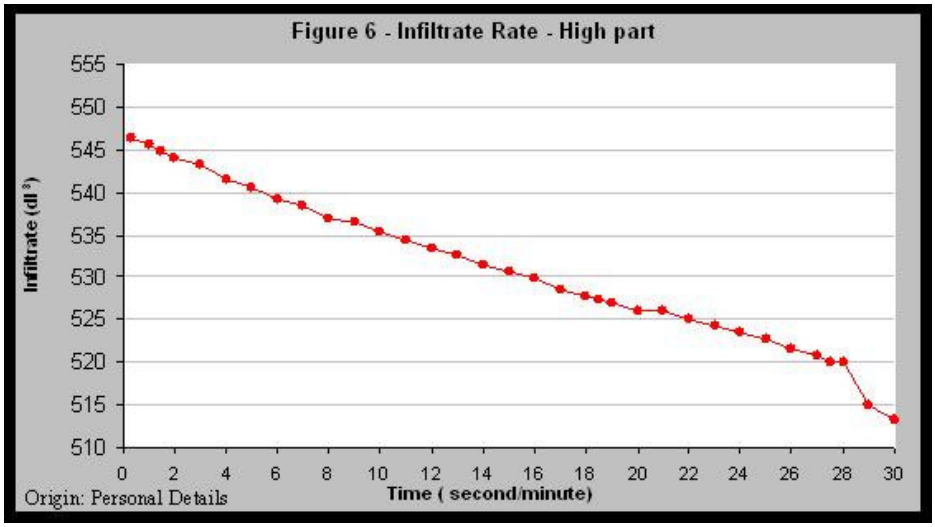


Figure 6 - Infiltrate Rate - High part
Infiltrate (dl³)
555
550
545
540
535
530
525
520
515
510
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Time (second/minute)
Origin: Personal Details

The second point's sample consists of the medium part of the gully. That place is characterized by the prevalence of Red-Yellow Latossolo, with horizon A superficial varying from 5 to 10 cm of thickness. The Illustration 5 presents the variation of the tax of infiltration of the medium part of the gully, elapsed 30 minutes of the first observation.

In this place, the gully presents a capacity of infiltration of water superior to the first point, being of the order of 10,5 dl^3. The characteristics that contribute to that result are the existence of a superficial layer of organic material.

It is foreseen that such results can act in two ways: in an initial moment of precipitation, in the case that the capacity of the infiltration soil is not exceeded, the superficial erosion will be smaller, contributing to certain stability of the walls of the gully. On the other case, in casing the precipitation exceeds the capacity of infiltration of the soil, taking it to the saturation, fact already observed in the swinging watery rain of the months of October to April, this can cart the fall of the walls of the gully and formation of new arms.

The third point's sample consists of the superior part of the gully. That place is characterized by the prevalence of Red-Yellow Latossolo, with horizon A varying from 15 to 20 cm of thickness, with low vegetation. The Illustration 6 presents the variation of the infiltration tax at the superior part of the gully, elapsed 30 minutes of the first observation.

The capacity of water infiltration at that place is very superior to the first and second points, being of the order of 34 dl^3. The characteristic that favors that result is the existence of a significant layer of organic material. This contributes to promote the reduction of the superficial erosion, which collaborates for the stability in the degradation of the superior part of the gully.

Vegetable covering.

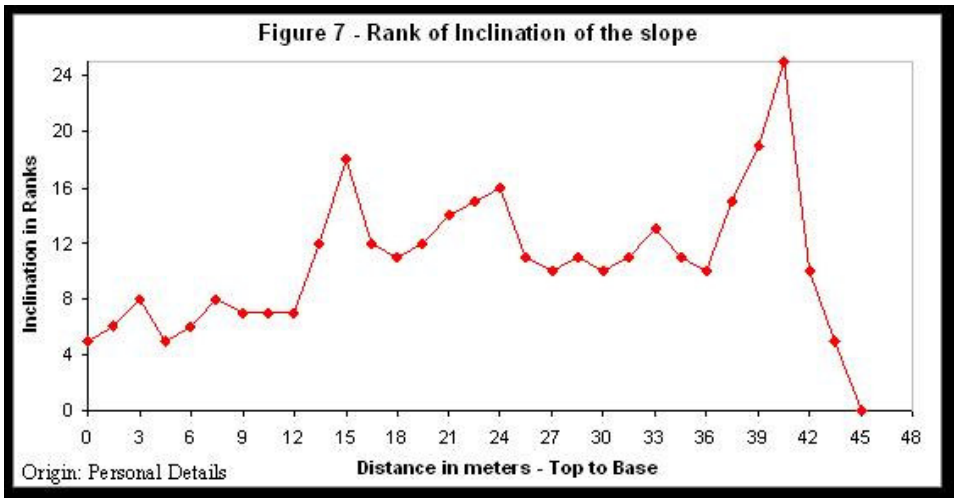
The type of vegetable covering determines the larger or the smaller protection against the impact and removal the particles of the soil for the water. In the studied hillside it is noticed a low vegetation formed by pastures of *Brachiaria*. This vegetation type, in spite of little contribution for the stability of the hillside, is significant in the formation and retention of organic material.

Soil Type / Rock.

The different characteristics granule meters, structural and of thickness of the soils determine the susceptibility to erosion. However, related studies were not made between properties granule meters of the soil and occurrence of erosive processes in the hillside.

Steepness

The largest steepness of the hillsides implicate in larger speeds of the superficial drainage of the waters. A larger length of the hillside suggests in a larger time of drainage, consequently, larger erosion. The Illustration 7 display the degree of steepness of the hillside where locates the gully, according to the method of Pitty (1968).



It is verified starting from the graph that in the high part of the hillside, place where begins the gully, the steepness are in general smaller and relatively homogeneous. However, in the medium part of the hillside, the steepness begins to oscillate with more frequency. There also locate the largest gullies of the lateral walls of the gully. Already in the base of the hillside this possesses a high steepness, but stabilizing quickly. Such results obtained don't make possible to associate yet, the lateral degradation of the gully with the intensity of the steepness variation, because the monitor results of the evolution of the gully still preliminary.

CONCLUSIONS

The identify erosion process were laminar erosion and in gullies reaching huge proportions. The main factors which contribute to those processes are the human activity and volume of water distributed in the time and in the space.

The human activity in the slope is an aggravating of the reaching huge proportions process, because the erosion, which was distributed in a dispersed way, passed pondering in channels due to the cuts and to the deforestation made.

The quantification of the infiltration rate allowed inferring that the retreat of the vegetation will commit the amount of accumulated organic material in the superficial horizon of the soil, increasing the drainage probability, lateral degradation of the reaching huge proportions and your progress to upstream.

In the rising of the steepness, it was noticed that these begin to oscillate in the medium part of the reaching huge proportions, place where it also locate the largest land falls. The results point to a tendency of larger lateral degradation of the reaching huge proportions, because the rain allied to the steepness and the current deposition of residues. It was some factors that are aggravating the stability of the place.

It is supposed that measures of reforestation and contention of the concentrated drainage in channels should be made.

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