

THE UTILIZATION OF THE GEOGRAPHIC INFORMATION SYSTEM IN THE ENVIRONMENTAL PROBLEMS EVALUATION OF ITAJUBÁ CITY.

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ABSTRACT

The environmental problems are constant in many cities of the world and made it difficult for human life. In Itajuba city (located in 22° 26' S of latitude and 45° 27' W, in South of Minas Gerais State in Brazil) there are several problems, because the occupation of this area is inadequate. The city expansion in a plain where the principal river is Sapucaí, that divides the urban space in two parts (from east to west). The development also occurred in slope during the last time. In this research utility many techniques with the cartographic, the photo interpretation of thirty air pictures (aerial photos) and use of the GIS. In the digitization of the planimetric plans (blocks plan, pluvial system plan, hydrography and contour line map) scale 1:10000 from 1981 and 1998 of Itajuba city was used the software AutoCad R-14. In following a map was elaborated about the use of the urban soil resulting the photo interpretation. The software IDRISI FOR WINDOWS 2.0 was used to elaborate the declivity of map and to cross this data with the map use of the urban soil (1981). After crossing the data with the blocks plan (1999). Many considerations were made for example: 1) the city expansion in Sapucaí plain, right riverside affluent Ribeirão Jose Pereira, Ribeirão Agua Preta and left affluents Ribeirão Anhumas and Ribeirão Piraguçu further on the slopes 2) this urban development, without planning with occupation of the river plain and the intersection-cross-tabulation of data in IDRISI FOR WINDOWS 2.0, demonstrated that there are many environmental problems. In Itajuba city: during the flood rivers, in summer, which is the rain station, due to the inadequate occupation of 1,782 Km² the inundation of plain, the population suffer (there are many unfamiliar residential in this area); 3) other problem is the pluvial system that is insufficient during the pluvial period, that contribute for overflowing and crumbling in the occupation of the slopes without vegetation and pavement. The research demonstrated that in Itajuba city there are several problems that result of the expansion and occupation of the uncontrolled use of the urban soil in Itajuba city.

INTRODUCTION

The city represents the humanized nature making an artificial environment, where environmental problems can appear because of an inadequate occupation. The city watching and the survey of the soil use are indispensable for the rational planning on a municipal and regional aspect. They can overcome the development problems and the deterioration of the environmental quality. Based on these considerations, a study about the city of Itajubá has been done. This area located on the South of Minas Gerais state 22° 26' S of latitude and 45° 27' W of longitude, Itajubá has about 80.000 inhabitants. The objective of this research is to identify and take up the environmental problems decurrent of the urban soil occupation in Itajubá, with conventional, mapping, remote sensing data and use of the GIS from 1981 to 1999.

CHARACTERIZATION OF THE AREA

The borough is located on the South of Minas Gerais state, bordering the borough of Piranguçu, Brasópolis, Delfim Moreira, Wenceslau Braz, Marmelópolis, Maria da Fé, São José do Alegre and Piranguinho.

The height quotas on the urban area of Itajuba vary from 840 to 920m and it is crossed by Sapucaí this space from east to west. The climate of the region is tropical mesotermic – mild moist with an average annual temperature varying

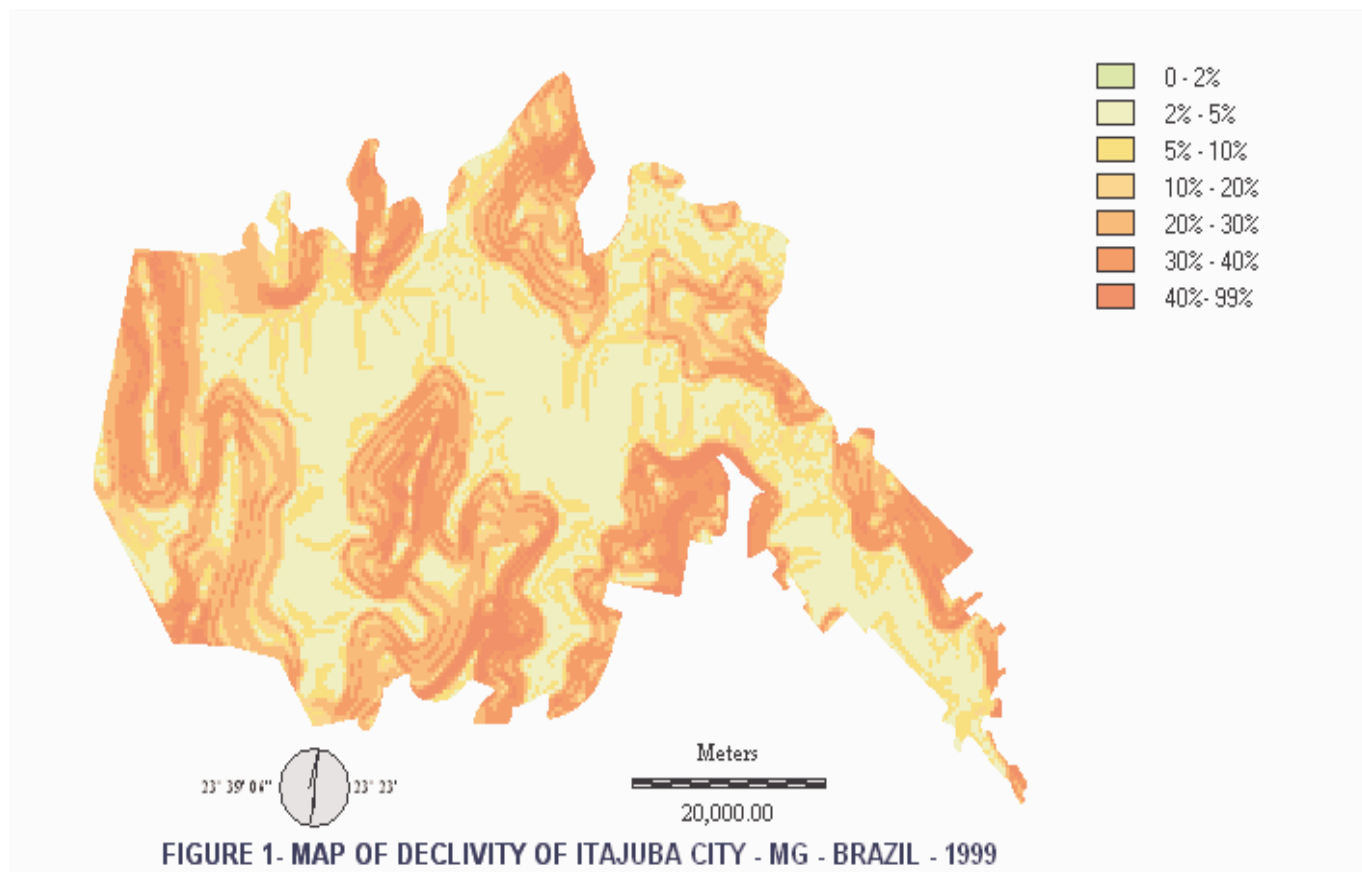
around 18° C to 19° C. According to GUIMARÃES (1987), the climate is the type Cwb, considering the classification of Koeppen.

The average rainfalls is around 1400mm yearly. Itajubá lands are on the Mantiqueira foothills, and the geomorphologic complex is made of the following principal chain of mountains: Juru, Ano Bom, Goiabal, Lourenço Velho, to the north; Água Limpa e Toledos, to the east; Pouso Frio, to the south; Morro da Piedade to the west. The height quotas on the urban area of Itajubá varies from 840 to River, which divides the city in two equal parts. The river flows urban soil as: Ribeirão José Pereira (José Pereira Small River) right riverside affluent and Ribeirão Água Preta (Água Preta Small River), Ribeirão Anhumas (Anhumas Small River) and Ribeirão Piranguçu (Piranguçu Small River), left riverside affluents.

METHODOLOGY

A planimetric plan had been taken to map the use of the soil in the urban area in 1981. It had been made by Itajubá city hall, on a scale of 1:10.000. Thirty air pictures (photos), on a scale of 1:8.000, had been selected. The photo interpretation together the work field were done and the process of getting the order of the use of the urban soil was based on urban target shadows (KURKDJAN 1987; NIERO 1988), by this analysis, the interpretation key was set. The planimetric plans of the city on the same scale 1:10.000 from 1981 and 1998, made by Itajubá city hall, were utilised to compare the urban extension in this period. The planimetric plan digitization, on the scale 1:10.000, of the urban area with its blocks and drainage and the use of the urban soil had been in AutoCAD R-14. The urban pluvial system, on the scale of 1:10.000, was digitized in AutoCAD R-14 and checked with the other data. In the decurrent research the GIS utilized for interpretation the urban space of the Itajubá was the IDRISI FOR WINDOWS 2.0 in the intersection of data. The integration of the cartographic data allows a pre-analysis of the city spreading, showing that it occurred not only on the main riverside (Sapucaí River) which flows across the city on East-West way, but also on the uphill over flowing. On the urban soil occupation 10 steps were identified: 1) Residential Unifamiliar; 2) Residential Multifamiliar; 3) Conventional And Works; 4) Institutional; 5) Lots; 6) Empty Areas; 7) Empty Areas With Native Forest; 8) Industrial; 9) Water Flow or Water – Course; 10) Cattle – Breeding Areas; 11) Transport 12) nude soil.

The IDRISI FOR WINDOWS 2.0 was used to elaborate the declivity of map (Figure 1) and to cross this data with the map use of the urban soil (1981) (Figure 2). After crossed the data with the blocks plan (1999) (Figure 3).



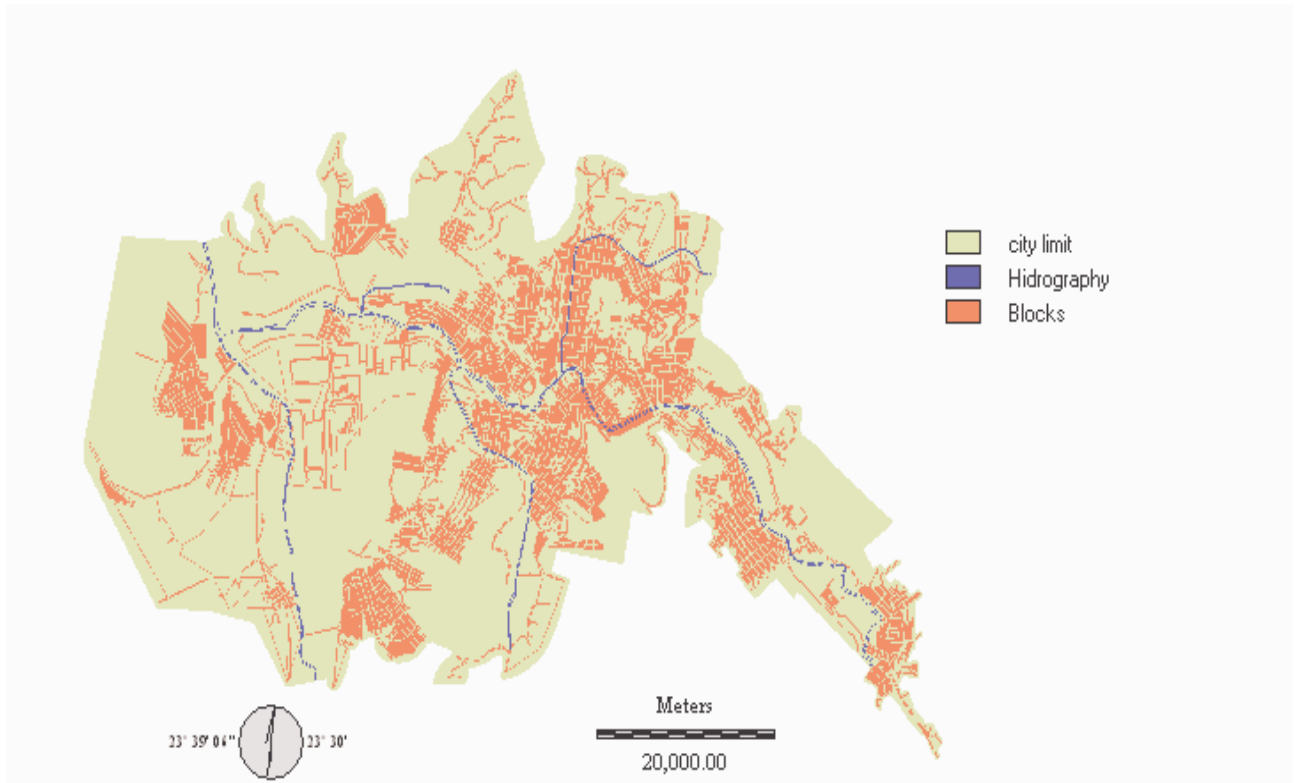


FIGURE 3 - MAP OF BLOCKS OF ITAJUBA CITY - MG - BRAZIL - 1999

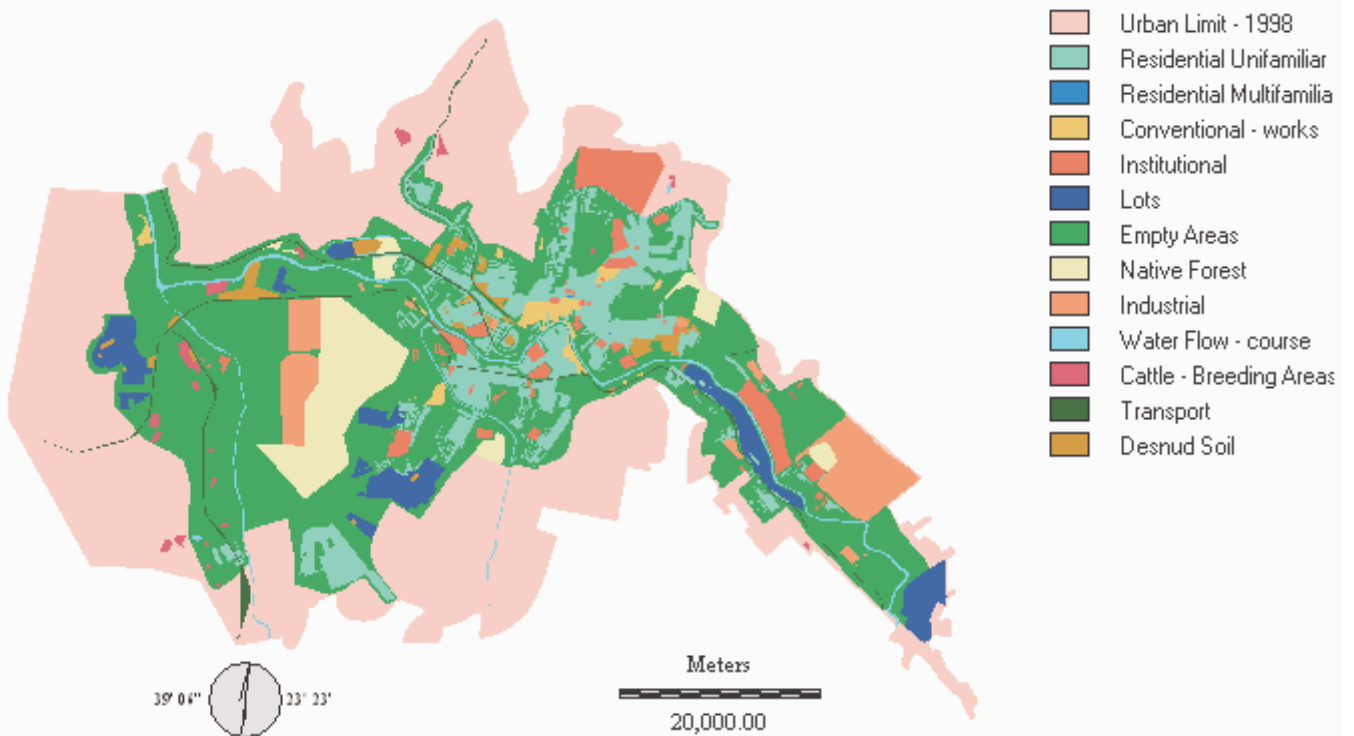


FIGURE 2 - MAP USE OF SOIL OF ITAJUBA CITY - MG - (BRAZIL) - 1981

DISCUSSION OF RESULTS

Many considerations was made for example about crossing of data with use IDRISI FOR WINDOWS 2.0 that demonstrated that there are many environmental problems in Itajuba. The flood rivers in summer result of the occupation inundation plain (1,7824 Km² in declivity class - 0-2% and 2%-5%).

Studying the map of the urban soil use, the declivity plan, the pluvial system and associate the evidence on present day in the field, confirm there are districts (Varginha, Medicina, Estádio, Santa Rosa, Pinheirinho e Vila Rubens) that submit the flood principal in rain events in the summer. The analyse of the journal news, the rain events cause several environmental problems like slime and rainoff that cause the population damage. For example there are districts like Cantina, Nossa Senhora de Fátima, Novo Horizonte, Água Preta e Morro Chic.

CONCLUSION

The factors that contribute for the environmental problems and flood in Itajubá city are associated with the use of the urban soil, the high declivity with the occupation steep slope, decrease of the vegetation in the city, paving united of the superficial drainage and occupation of the river plain(Sapucaí River and the affluence). The expansion and occupation of the uncontrolled use of the urban soil in Itajubá, asks a deep study to audid the sprouting and the aggravation of environmental problems.

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