Chapter 163

Physiomic classification of vegetation in the municipality of Vitória da Conquista – Bahia

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ABSTRACT
This research aimed to map and classify the phytophysiognographics de part of the municipality of Vitória da Conquista-BA, specifically the central portion where the city is located. It aimed to identify the main fragments of vegetation, also the different aspects of the current landscape using the LANDSAT 8 satellite images and the mapping of these variables. This research had a qualitative background character, a photographic survey was carried out in the period of 1 year and a half and associated with satellite images. The region analyzedis in a transition area between the Caatinga biome and the Atlantic Forest biome, regionally called theCípó Forest, for some a separate biome, that is, dry forest biome. It is an important study because it is an unrepresentative area in the national territory. In the course of the analysis within the municipality of Vitóri da Conquista, a variety of phytophysiognomy was found , such as the deciduous seasonal forest, semidecidual, areas of low forest between caatinga and cerrado, caatinga and deciduous forest and the shrub-tree caatinga. This gamma diversity is due to a gradient of climatic, geomorphological and lithological variables mainly. All vegetation is entirely uncharacterized and degraded with an intensepredominance of pasture, as well as areas with coffee and eucalyptus, a fact that is due to the expansion of private rural properties.

Keywords: Phytophysioginmia, Vegetation, Use of Solo, Geoprocessing, Victory of Conquest.

1 INTRODUCTION

Due to the intense process of urbanization and the growth of the population in large urban centers, the natural landscape has been changing and with it the existing natural vegetation cover. Based on this, the main objective of the research was to carry out a new phytophysiognomic survey based on satellite images in the central portion of the municipality of Vitoria da Conquista – BA. Images from the LANDSANT 8 satellites were used to perform part of this analysis. A cartographic cut was performed between the coordinates ranging from South Longitude of 14 0.74' to 15

0.02' and West Latitude ranging from 40 0, 68' to 41 0.18', throughout this dissertation Chart 04 is pointed out for greater accuracy of geographic coordinate data.

The coordinates were explored and recorded by the SIRGAS 2000 and QGIS 2.16 systems, starting in an east/west direction so that it encompassed almost all the phytophysiognomic varieties of the Plateau of the Conquest.

The vegetation of Brazil is diverse and complex from a structural and biological point of view, and the municipality of Vitória da Conquista is inserted in this scenario of gamma and alpha diversity. Lately it has been reconfiguring itself due to socio-spatial transformations, local anthropic interventions, rapidly modifying natural processes mainly in recent decades, thus justifying a more recent study that addressed this theme. This research shows fragments of vegetation, their physiognomies, life forms and the most common species of the municipality. The municipality has species of Mata Atlântica, C aatinga and Cerrado, this is because it is in an area of climatic transition, varied topography and different classes of soil, giving conditions for a biological diversity, including with endemic species.

2 METHODOLOGY

This research will have a case study character, because it consists of a deep study of few objects, in a way that allows its ample detailing. In addition, it inserts the researcher in the researched reality, in order to interpret it and interact with the subjects and the territories Lakatos and Marconi (2003). This is because this research aims to perform a more recent phygnomic classification in the municipality of Vitória da Conquista – BA, using a spatial orientation in the Northwest/Southeast direction. Initially, a bibliographic survey was carried out, through the review of the literature for a good theoretical basis acerca of the theme studied. Then, thematic maps of the studied area were made, data collection of satellite images, and later, photographic records were made to ensure the effectiveness of the research, ensuring this as an auxiliary document for the analysis of changes in the territory studied.

In the discussion of the research, several authors such as the RADAMBRASIL Project were used, as well as dissertation theses, statistical data, satellite images, radar images, as well as consultations such as the EMBRAPA, IBGE and SEI website. In the preparation of the maps, the QCGIS 2.16 program was used, which is a geographic information system (GIS), is a free software, accessible to any user, where it is possible to make modifications and constructions of maps.

For the processing of geographic data, Raster data were used, which is nothing more than an array of pixels, also called cells, where each one contains a value that represents a condition of the covered area; vector data that were the municipal base and topographic chart corresponding to the research area.

The satellite images of LANDSAT-8 are available on the USGS on the NASA website and were essential for the construction of the land use map, in addition to the radar images, which were obtained on the INPE website and used to perform the 3D morphometric map, in addition to the slope, altimetry and level curve maps.

The fieldwork was an important tool for conducting the research. Thus, according to Suertegaray (1996) fieldwork requires the recognition of local dynamics and allows the observer to question the facts and anthropic processes.

For the photographic survey, the first step was to follow the cutout stipulated for the study area, as shown in Figure 1. The second step and the way the photographic record was conducted, was the use of a camera and the aid of the GPS Essentials application. This application allowed to capture the images and at the same time capture the exact coordinates of the place, this ensured a greater accuracy of the areas photographed. The photographic record was made bordering the highways BA-262, BR-116 and BA-415, which approaches the municipality of Anagé, surrounds the surroundings of the municipality of Vitória da Conquista and approaches the municipality of Itambé, respectively.

Cartography was also used as a tool in the mapping of the studied area within the proposed cut of the municipality. Data were organized into maps, tables and graphs. Their analyses werebased on the concepts and themes concerning Geography.

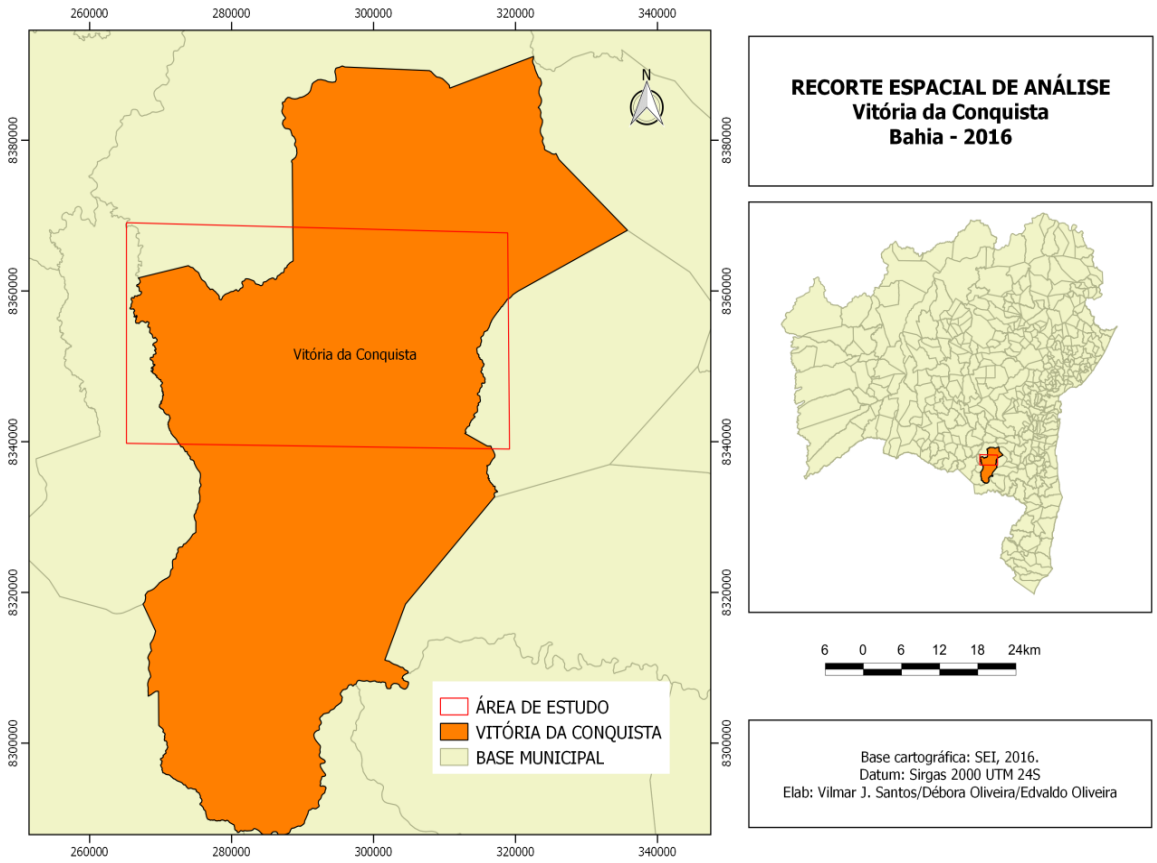
The delimitation of the vegetation cover of the municipality was quite laborious, since the researcher has to go to the field to verify the veracity of the mapping. A cartographic clipping was carried out aiming at a more detailed phytophysiognomic study and possible realization within the central part of the municipality. To verify the vegetation units, a script was followed along the highways that cross the municipality of Vitória da Conquista. The calculation of the occupied area for each landscape unit was performed with the aid of the QGIS 2.16 program, with the aid of LANDSAT 8 satellite images. The results obtained were compared with the photographic record in the present units. The numerical results can be identified in figura 21 and table 1 showing the classes of land use and land cover in square kilometers (Km^2 of the area under study.

3 RESULTATIONS AND DISCUSSIONS

3.1 LOCATION AND ENVIRONMENT

With an area of 3,743km2, between the coordinates of 14^0 30' and 15 0 30' South latitude and 40 0' 30' and 41 0 10' to the West, the municipality of Vitória da Conquista is located, in the mesoregion of Centro Sul Baiano and microregion of Vitória da Conquista (Classification applied by IBGE and SEI) – (Figure 1).

Figure 1: Location of the study area.



The specific area of the study corresponds to the space defined by thecoordinates described earlier. It is an area with great topographic unevenness by Brazilian standards ranging from 400 to 1,100m approximately. Several types of climate, soils and vegetation are found in this space under study.

The municipality, the most important in the mesoregion of the South Center of Bahia, was favored by the junction of highways, enabling the dynamization and growth of trade, a result of BR 116, and the interpellations with BA 262, BA415 and BR 101. This makes the municipality a strategic pointfor other municipalities. It is bordered by the municipalities of Anagé, Barra do Choça, Belo Campo, Cândido Sales, Encruzilhada, Itambé, Planalto and Ribeirão do Largo. There was a process of growth of the economy of the municipality, which from the 80's with the implementation of the Industrial District of Imborés, can improve the techniques in coffee production. This strong culture of coffee production in the municipality remains to this day, with less intensity due to the urbanization process, but it gave the municipality room to act in the implementation of commerce and in the provision of services, which makes the municipality a pole, leading to a strong commuting migration almost daily. Vitória da Conquista became a student center, with several public and private universities, increasing the unofficial population of the municipality.

The municipality of Vitória da Conquista has some different characteristicsof surrounding cities, as it is located at 923 meters above sea level in its municipal seat. Little is known about the floristic composition and the forest fragments located in the world. Themoment the dissertação of Soares Filho (2000) developed in the Plateau of Vitória da Conquista is an important contribution, and since then no

other study has been carried out, so this region has an information gap. The climate of the region of the Conquista plateau, according to the Koppen classification, is of the Tropical CWA type of Altitude, however it presents characteristics of transition climate between humid and semi-arid, with an average annual temperature of 19.6^{0}C and with rainfall around 730mm, characterizing the existence of transitional vegetation in thes parts highers and with occurrence of forest of Cipó, and can be classified as Deciduous Seasonal Forest, where in some points can be observed the culture of coffee, pastures and forestry.

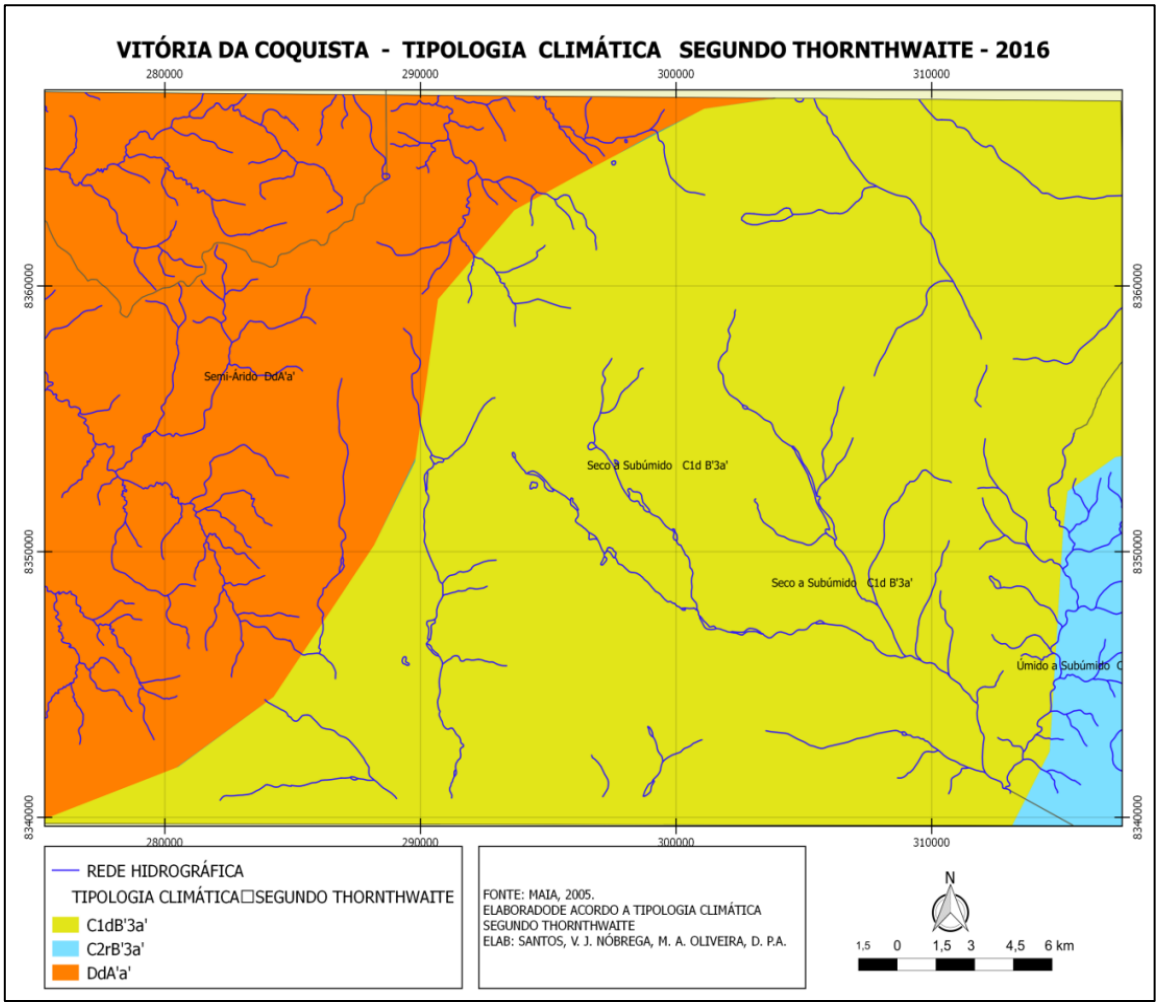
According to the SEI (1998), the municipality has three climatic types: semi-arid, subhumid to dry and humid.

According to Maia (2005) the area delimited in the study (Figure 1), can also be classified into three distinct typologies, according to the Thornthwaite classification method below. Semi-arid: Where it has characteristics of dry and hot climate, with rains that are concentrated in summer and autumn; Dry to sub-humid: With characteristics of hot climate, but greater intensity of rainfall in summer, where they directly influence the annual averages; Wet to sub-humid: In this area the humidity level is higher if compared to the other areas highlighted in the figure, this is due to the altitude level, relatively higher than the others.

The region of the municipality of Vitória da Conquista is predominantly plateau, being an area of interfluvium, dividing the waters of the basins of the river of Contas to the northeast and and Pardo river to the south (Souza, ET al. 2008). The municipality is marked by periods of rainfall that can vary from October to March and the driest periods in the months of July and August (Maia, 2005). The author also gives greater clarity about the climate:

> The irregularity in the distribution of rainfall and its torrential character are the climatic characteristics of greatest relevance in environmental vulnerability. The torrential rains, combined with the lack of soil protection as it occurs, mainly in the semi-arid areas produce a large volume of surface runoff, causing phenomena of accelerated laminar erosion, sometimes reaching to be severe, especially in rugged and deforested areas. Thus, it is perceived that even in areas of low rainfall, the erosive power of rainfall is enhanced by its concentrated character and the little protection of the soils. (MAIA, 2005).

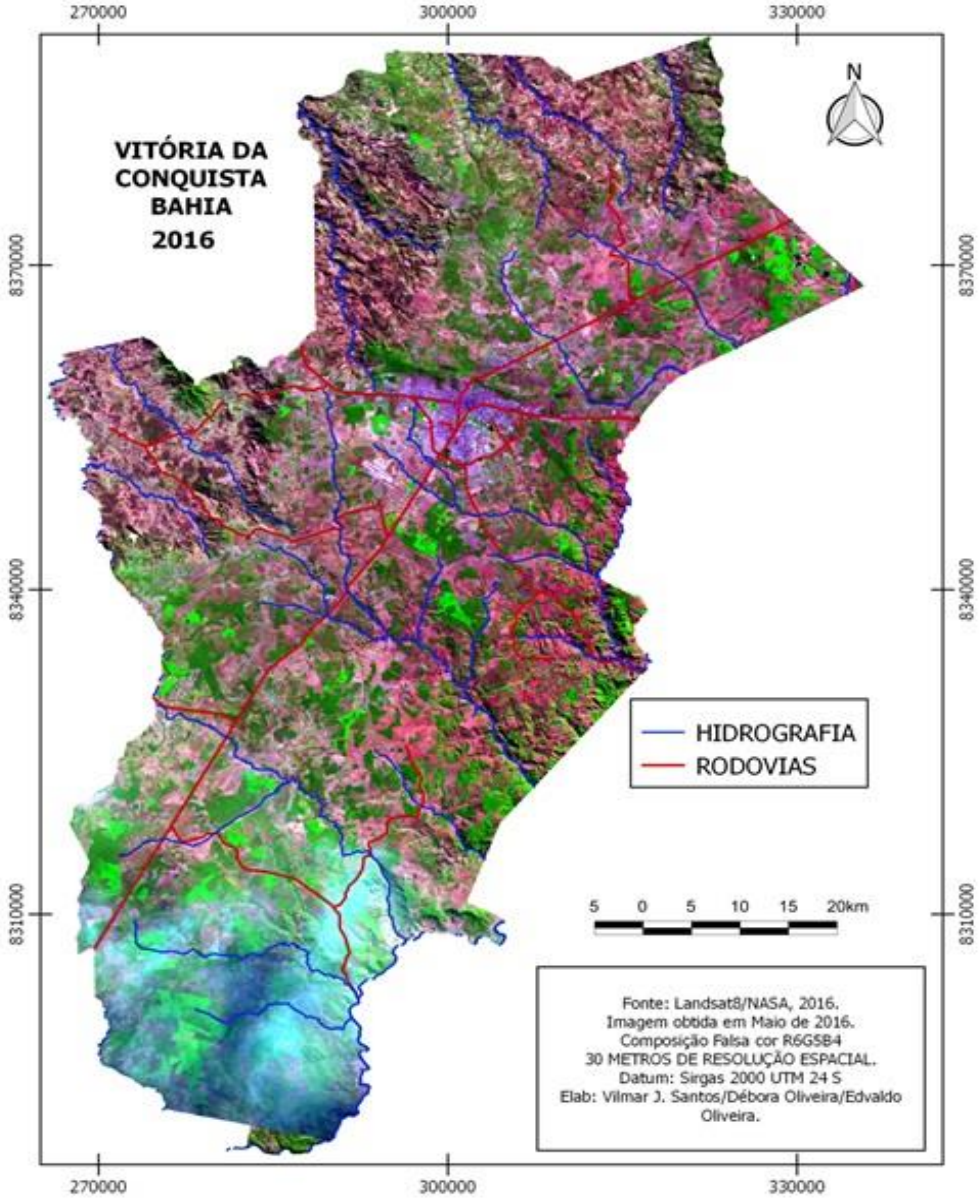
Figure 2: Climate Typology of the municipality of Vitória da Conquista – BA.



Some points of the municipality are marked by the colder areas, this happens with greater intensity in the higher areas. In the Marçal mountain range, the rainfall totals are relatively higher (976.1mm) when compared to the data of the other localities analyzed. These rainfall totals come from the combined action of altitude and exposure of the relief to the displacement of moist air masses, benefiting the area with orographic rainfall. These climatic characteristics directly influence the aspects related to environmental dynamics. (MAIA, 2005)

The municipality has a variant thermal amplitude during the day, especially in the higher parts, such as near the Serra do Periperi. Near the village of Pradoso, where it is characterized as a dry to subsumed climate. Na figura 3, it is possible to notice part of the vegetation with the most dry foliage, which indicates the beginning of Caatinga vegetation in transition with Mata de Cipó.

Figure 3: Satellite image chart of the municipality of Vitória da Conquista- BA.

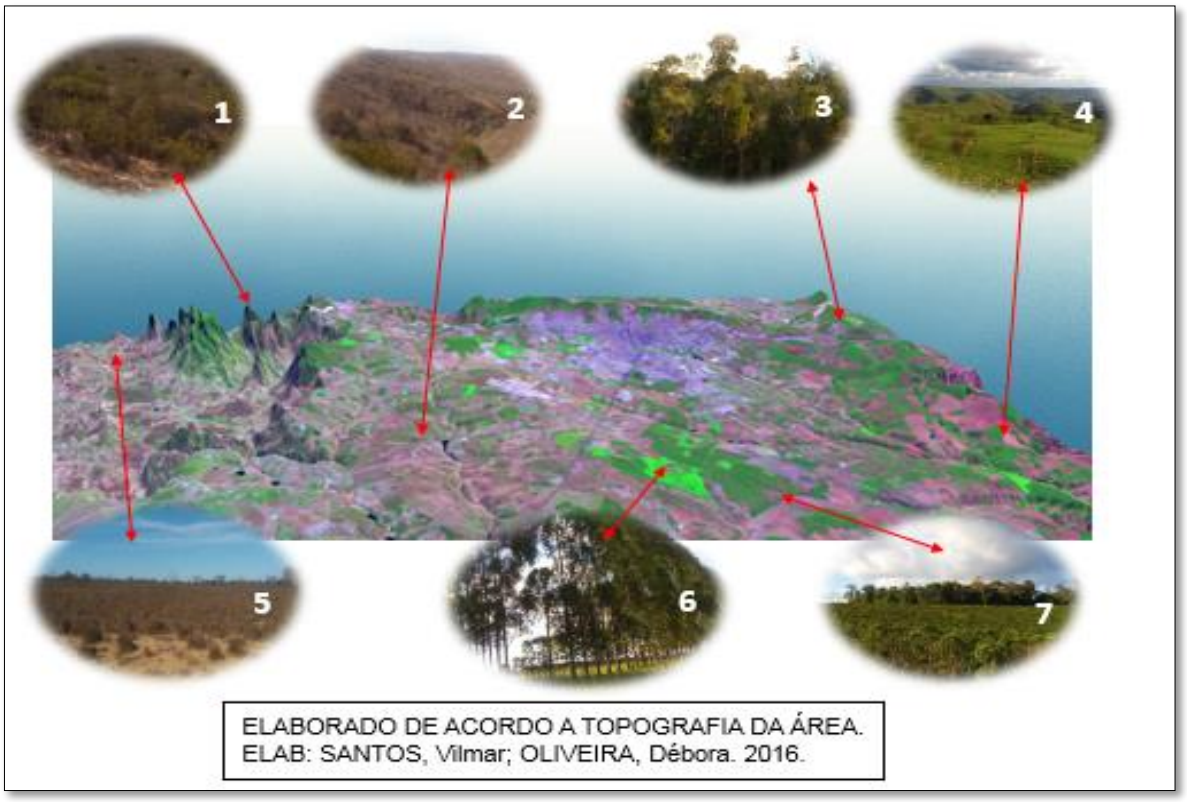


When approaching the village of Capinal, heading towards Itambé, the region is already characterized within the subsumed to humid range and presents lower temperatures at night with variations during the day.

Based on radar image and the land cover map imaged by the LANDSAT 8 satellite, shows a diversity of phytophysiognomic types, including dry forests (vine forest – deciduous seasonal forest, ecotone between caatinga and vine forest, ecotone between cerrado vine forest), savanna (caatinga), cultivated vegetation (artificial pastures, agriculture and forestry), degraded grassland vegetation derived from vine and caatinga forest, in addition to the semideciduous seasonal forest and its variants.

According tothe topographic model showing a variation of colors and textures on the surface of the terrain, a variation of altimetric levels is observed contributing to a diversity of phytophysiognomies. (Figure 04)

Figure 04 – 3D topographic model of the municipality of Vitória da Conquista – **BA.**



Source: Santos, V; OLIVEIRA, E. Débora, 2016.

3.2 PHYTOPHYSIOGNOMIES

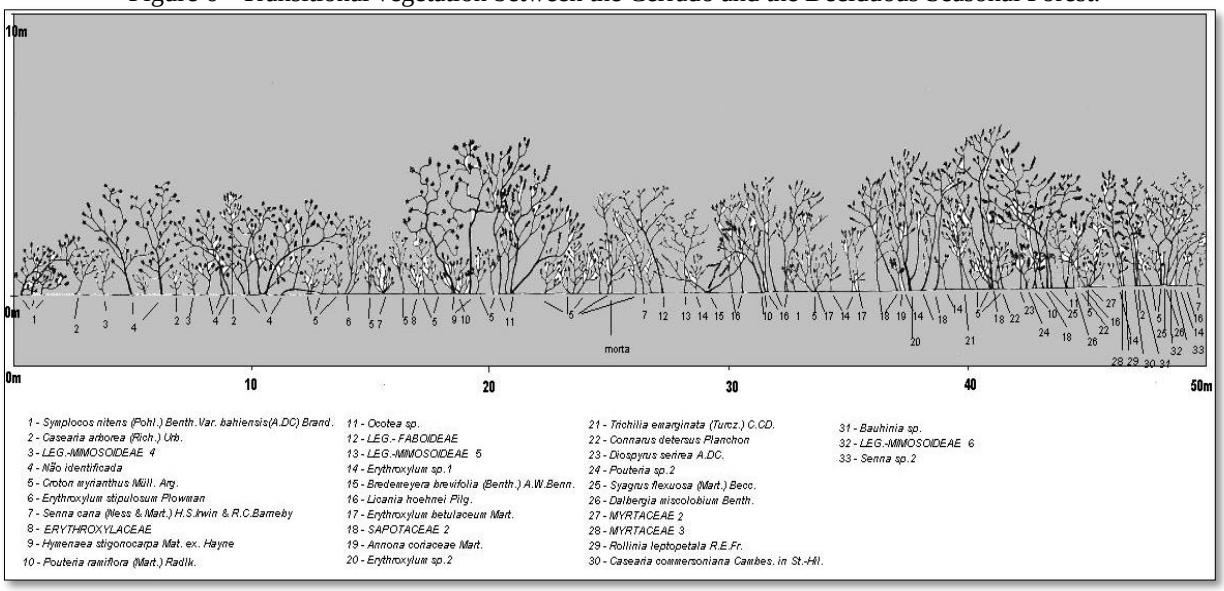
Severalphytodynamic typeshavebeen identified in the study area as a function of climatic, lithological topographic and anthropic variables. One of them a transitional vegetation between Mata of Cipó and Cerrado located around the serra of Periperi, nthe coordinates S14 0 49.52' and W 40 0 50.15' (Figura 05)

Figure 05 – Transition vegetation between the vine forest and the Cerrado.

Source: Fieldwork (2016) / Photo: Vilmar Joaquim dos Santos

For a greater description of the area,we can take into account the contributions of Nóbrega and Meguro (2003), Nóbrega and Vilas Boas (2021) that traces a phytophysiognomic profile of what would be a transition area similar to areas of the municipality under study. It is a dense shrub-tree community with species of both types of vegetation (Figure 6)

Figure 6 - Transitional vegetation between the Cerrado and the Deciduous Seasonal Forest.



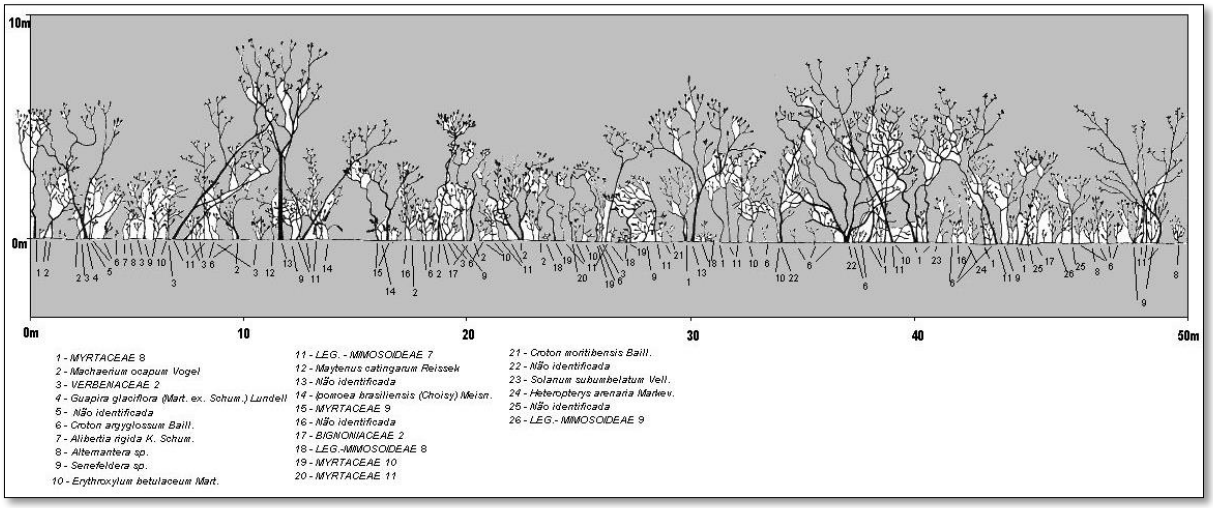
Source: NÓBREGA and MEGURO, 2003; NOBREGA AND VILAS BOAS (2020).

Thetype of phytophysiognomy found is a transition between the vine forest and the caatinga, this is due to climatic and geomorphological variables and human action. This low forest has this characteristic with some trees due to small reservoirs located in its surroundings. Located at coordinates S14 0 46.96' and W40^{0}59.27', near the municipality of Anagé. One can perceive a predominant height, as shown by thes profiles elaborated by Nóbrega and Meguro (2003); Nobrega and Vilas Boas(2021) (Figures 07 and 08).

Figure 07 - Transition area between Mata de Cipó and Caatinga.

Source: Fieldwork (2016) / Photo: Vilmar Joaquim dos Santos.

Figure 08 - Transition vegetation between the caatinga and the mata of vine.



Source: NÓBREGA and MEGURO (2003); NOBREGA AND VILAS BOAS (2020)

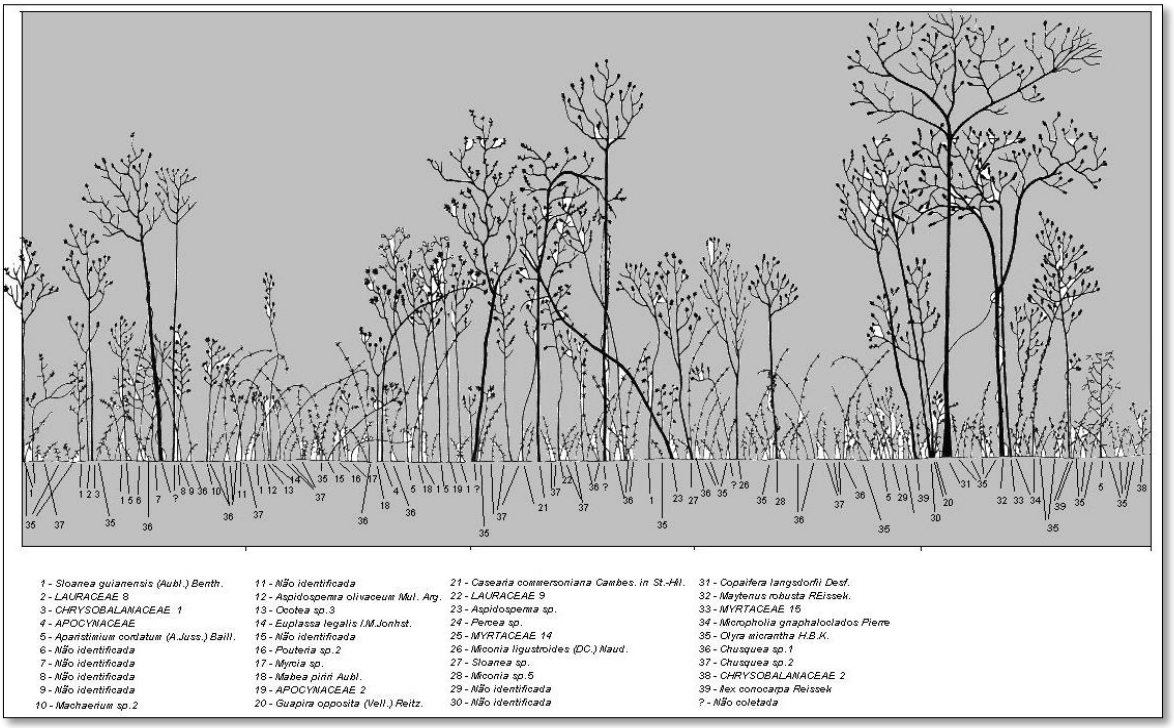
Ootro type found was the Semideciduous Seasonal Forest, composed mainly of mesophanerophytes, thedaptável to an intense rainfall nthe spring/summer and period followed by drought. This area (Figura 09), is located with the coordinates S14º59.13' and W 40º48.49', in the vicinity of the municipality of Itambé.

Figure 09 – Semideciduous Seasonal Forest.

Source: Fieldwork (2016) / Photo: Vilmar Joaquim dos Santos

The phytophysiognomic profile (Figure 10) illustrates a point of view close to the studied area. It is noted that the height around 15 to 20m is predominant in most of the vegetation and without sparsing, which indicates a region with more humidity. (Nóbrega and Meguro, 2003; Nobrega and Vilas Boas, 2020).

Figure 10 - Phytophysiognomic Profile of the Semideciduous Seasonal Forest.



Source: NÓBREGA and MEGURO, 2003; NÓBREGA AND VILAS BOAS, 2020.

It was possibleto observe several areas of pastures during the field analysis. Because with the population growth and increase in production, it is noted that there is a constant modification in the vegetation, which being removed, gives room for the increase of pastures, suitable for the implementation of cattle farming and poultry constructions. Located at coordinates S15^0 24' W 40º45.31', in the municipality of Vitória da Conquista. (Figura 11)

Figura 11 – Pastures.

Source: Fieldwork (2016) / Photo: Vilmar Joaquim dos Santos- S1502.243' W040º45.315'

The Caatinga is an exclusively Brazilian biome from a geographical point of view, where most of the vegetables have deeper roots to facilitate the search for water reserves, covered by thorns. Located at

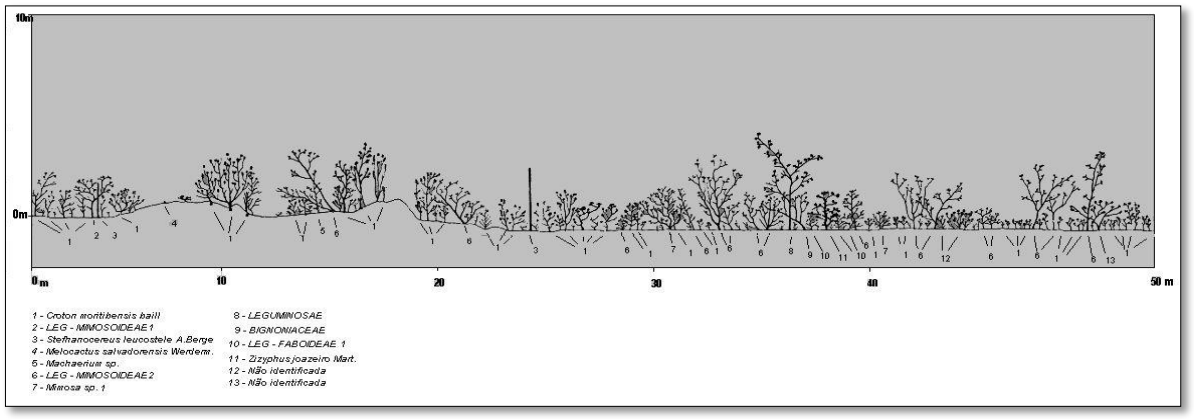
coordinates S14^{0}48.26' W 40 0 58.45', in the central part of the municipality of Vitória da Conquista, in the vicinity of the municipality of Anagé, and being within a transition area, one perceives a more spaced and dry vegetation, with few shrub points. (Figura 12)

Figure 12 – Caatinga.

Source: Fieldwork (2016) / Photo: Vilmar Joaquim dos Santos

Nóbrega and Meguro (2003), figuratively demonstrates the phytophysiognomic profile of a caatinga, where the predominance is of smallbusts interspersed with grasses and camephytes. (Figure 13)

Figure 13 - Profile of the vegetation of sparse shrubby Caatinga.



Source: NÓBREGA and MEGURO, 2003; NÓBREGA AND VILAS BOAS, 2020.

Located at coordinates S14º50.61' W 40º50.86', this eucalyptus planting area is located along private properties, which they use for logging or even for the isolation of rural properties. It is very common to plant Eucalyptus, due to the climatic conditions that greatly favor and by the industry itself that supplies raw material in the northern region of Minas Gerais. (F igura 14)

Figure 14 – Forestry.

Source: Fieldwork (2016) / Photo: Vilmar Joaquim dos Santos

Figure 15 shows a coffee plantation and in the background a preserved area of Semideciduous Seasonal Forest, locatedat the coordinate 15º01.32' W 40º46.03'S.

Figura 15 – Coffee agriculture, in the background preserved area of Semideciduous Seasonal Forest.

Source: Fieldwork (2016) / Photo: Vilmar Joaquim dos Santos

3.3 VEGETATION MAPPING

For the mapping of vegetation and land cover, another terminology better adapted to the resolution of the satellite image was used. Are found during the study, strips of vegetation in the direction noroeste-s udeste and east west, ranging from exposed soils to capoeirões of the semideciduous seasonal and deciduous forest, that is, it is a mosaic of vegetation of different sizes, degrees of regeneration and

differentiated species . 8 classes were defined: urban agglomerations, agriculture, water bodies, capoeira, capoeirão, capoeirinha mosaic and pastures, forestry and exposed soil. (F igura 20 and table 1)

Some points were photographed, such as the area of transição of mata of c ipó and caatinga, found in a less dry region than the shrub caatinga a-a rborea, which favors the emergence of trees, localized in the coordinates S 14º55.33'e W 40º50.59' . (F igura 16)

Figure 16 – Transition Area of forest of c ipó/caatinga and pastures.

Source: Fieldwork (2016) / Photo: Vilmar Joaquim dos Santos

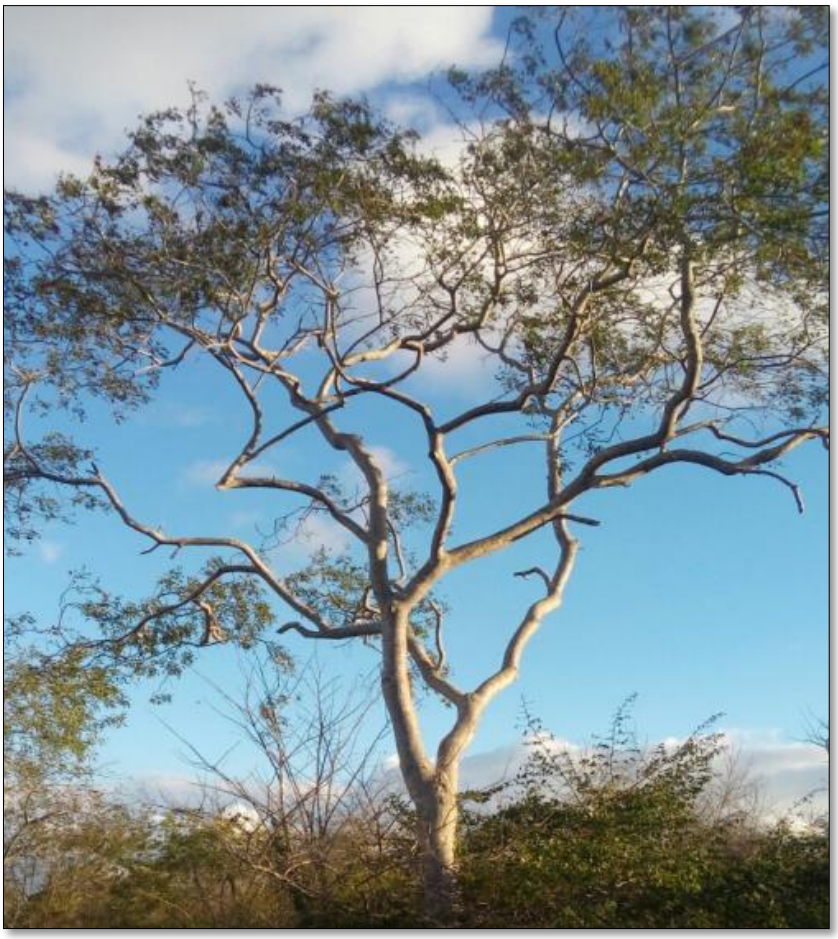
Capoeira derived from species of the wrong cand deciduous forest – vegetation at an intermediate stage of regeneration, which can take around 10 years or more to be considered as such. Located at coordinates S14 0 47.005'e W40^{0}59.15'. (F igura 17)

Figure 17 – Capoeira.

Source: Fieldwork (2016) / Photo: Vilmar Joaquim dos Santos

Capoeirão – Vegetation with primary forest species in the process of advanced regeneration, which make up species of vegesuch that it can reach 25m in height and with a predominance of mesophenophytes in the tree stratum. Located at coordinates S14º58.60' and W 40º49.00'. (F igura 18).

Figure 18 – Capoeirão.



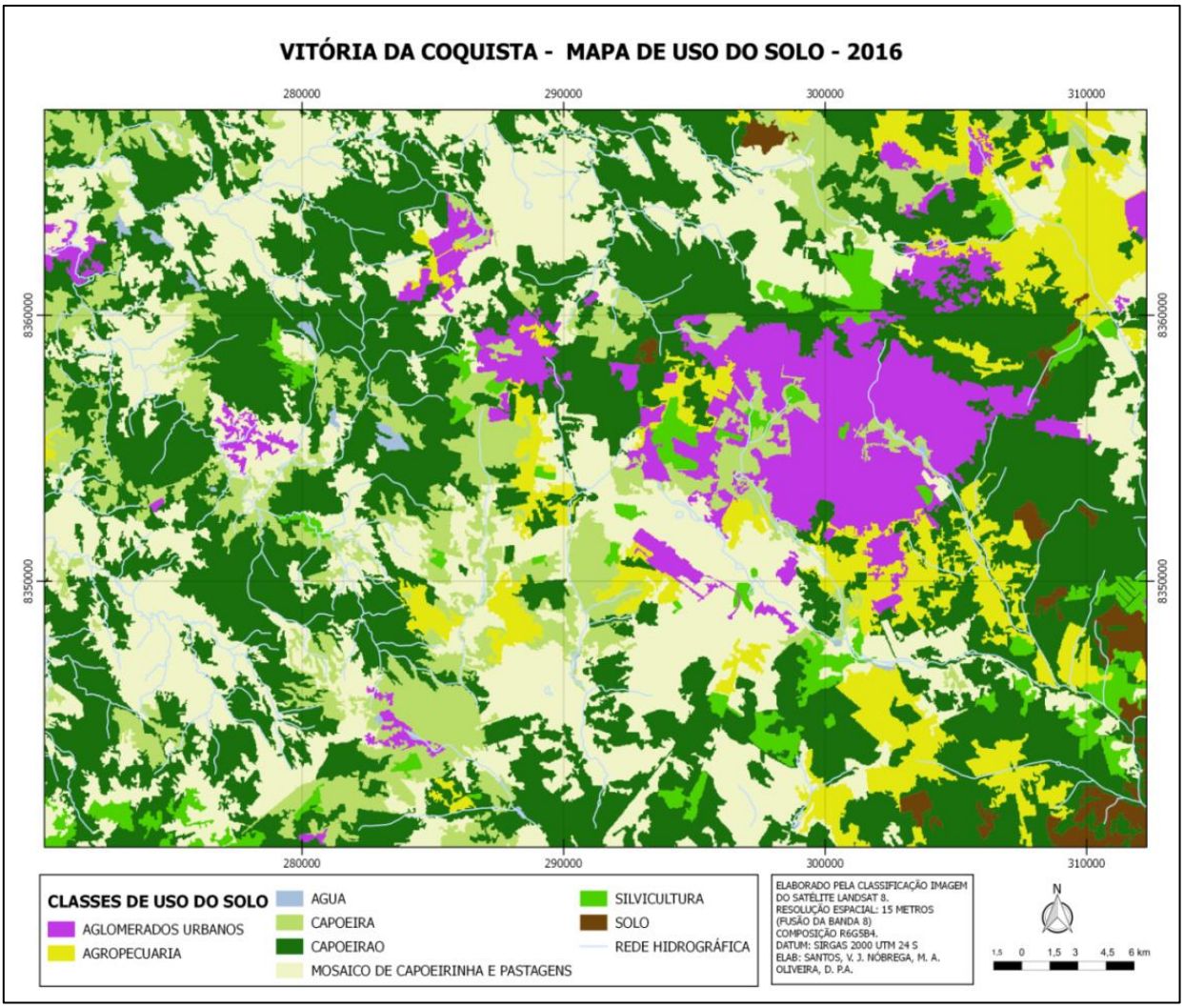
Source: Fieldwork (2016) / Photo: Vilmar Joaquim dos Santos

Pastures and exposed soil – It occurs a lot in the region, due to several factors: intense exposure to solar radiation or even to anthropic action for reasons of deforestation for pastures or agriculture. Located at coordinates S14 0 47.84' W40^{0}58.59'. (F igura 19)

Figura 19 - Pastures and exposed soil.

Source: Fieldwork (2016) / Photo: Vilmar Joaquim dos Santos

Figure 20 – Map of land use and land use coverage of part of the municipality of Vitória da Conquista – BA.



In the field it was found that the exposed or almost exposed soil concentrates approximately 71 Km^2 of extension, part of this soil is in the process of desiccation due to erosive processes. Ha

predominance of grasses and other herbs, but in some points, the soil is totally exposed without any vegetal layer because of the intense process of degradation of the surface layer.

About the urbanglomerates – corresponding to color in purple (Figure 20) where the urban perimeter of the city and the main neighborhoods and district headquarters are located. It occupies about 108 Km^2 as shown in Table 01. With regard to the capoeirões, there is a predominance with greater visibility in the study delimitation, about 649 km^2, this classification is better defined by the IBGE:

> This phase, dominated by mesophosphoryocytes that exceed 15 m in height, is an eminently woody stage, without emerging plants, but quite uniform as to the height of its dominant elements. (IBGE, 2012. p.152)

Capoeira is also known as degraded or regenerating vine forest, that is, an intermediate stage between the primary forest and the initial phase of plant succession in the Cipó forest. Andssa area occupies about 168 km^2, where most of the time it is only possible to identify and detail better through a mapping and photographic record. As for water resources (Water), it was cataloged through mapping, about 3km2 of points with this characteristic, however, in the case of a vast delimited area, during the photographic record not visible these points. Agriculture was quite visible in the records, an area with 134 km^2, ondand it was possible to conclude that most of these points in yellow are predominantly pastagens. This fact is due to deforestation for cattle owners, and the cultivation of coffee near the region of Serra do Marçal and cassava in the vicinity of the village of Pradoso towards the municipality of Anagé. The capoeirinha comprises an area of 409 km2, where it is possible to notice a small vegetation, basically composed of grasses, and being used for the use of animal pastures. For a better understanding of the classes of land use, the understanding is better given through table 1, where the area of each identified class and the percentage of each area are shown.

TABLE 01 – Table of areas with specification of land use in the area under study, municipality of Vitória da Conquista - BA

Type of coverage		**Area - Km^2**	**%**
Exposed soil		71	5
Urban agglomerations		108	7
Capoeirão		649	42
Capoeira		168	11
Water		3	0
Agricultural		134	9
Capoeirinha Mosaic and Pastures		409	26

Source: Land use map 2016. Elaboration: Vilmar Joaquim dos Santos.

The figures point to a total of 1542 km² of mapped coverage of the municipality of Vitória da Conquista, which means approximately half of the total area of the municipality. Foram defined seven types of land cover with predominance of vegetation patches of different sizes and physiognomies (Table

01). For the most part, 42% characterized as capoeirão, and 26% mosaic of Capoeirinha and pastures. Most of the vegetation cover is under the domain of private properties.

4 FINAL CONSIDERATIONS

The phytogeographic survey, with identification of the main phytonomic types in the municipality of Vitória da Conquista – BA was a contribution to the lack that exists about works in the line of research on phytogeography and land use. In general, the results were considered satisfactory, because they were possible to identify and map 9 different vegetation and land use covers: Capoeirão, capoeirinha, capoeira, mosaic of capoeirinha and pastures, exposed soil, where the predominant cultivation of coffee and cassava and eucalyptus is perceived. , as well as small strips of water sources, as well as the urban agglomeration of Vitória da Conquista. Thenatural fifophysiognomies found were deciduous seasonal forest, semideciduous forest, low forests between deciduous seasonal forest and caatinga and cerrado, and the shrub-tree caatinga, all in a state of degradation.

The mapping carried out, where it is limited to the east, with the municipality of Barra do Choça and Itambé-BA, and to the west, with Anagé-BA, allowed an analysis of the degree of conservation of each phytophysiognomy and its types, where deforestation is noted. for agricultural or pasture areas. During the photographic survey, it is noticed that, of the 26% that is now a mosaic of capoeirinha and pastures and another 9% of areas destined to agriculture, indicate that these points have had anthropic action in recent years. The importance of this work is to serve as a source for the next academic works that will surely come and even to improve it and deepen it in a future master's and doctoral degree. It was possible to identify some classes of land use and cover, but for a work of academic level in geography there was no need to explorethe theme in detail, because it is difficult to accomplish, requiring a longer time and budget to carry out a more detailed work. Andthese classes were diverse due to the great variability of climate, pedological, human action, in addition to the local geomorphology presenting great unevenness in a relatively small space. The purposeis that the fruits of this research can be useful and a reliable source of information for possible studies that may be carried out by various professionals in the environmental sciences.

This work also represented a personal achievement, since there is an interest of mine inphytogeography and related areas. It was a sum of efforts, readings, studies based on satellite data and geoprocessing, fieldwork, in order to expand my knowledge.

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