

**MONITORING, POSITIONING AND QUANTIFICATION OF THE
HUMAN SETTLEMENT IN THE FISHERMEN'S COMMUNITY IN
THE COAST OF GOIANA-PE - BRAZIL**

José Jorge de Seixas
Professor Titular

Alexandre Tadeu de Oliveira Lima
Professor Assistente

Kátia Virgínia Kater
Cartographic Engineer
Departamento de Engenharia Cartográfica
Universidade Federal de Pernambuco-UFPE
Cidade Universitária - Recife-PE, Brasil

Maria das Graças Lins Kater
Researcher

Fundação Joaquim Nabuco
Recife - Pernambuco - Brasil

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ABSTRACT:

This paper presents the results of a research program developed by the Department of Cartography of the Federal University of Pernambuco and sponsored by CNPq-Conselho Nacional de Desenvolvimento Científico e Tecnológico (Brazil) and GTZ - Gesellschaft für Technische Zusammenarbeit (BDR) as a pilot plan. The aim of this program is to establish a value system for monitoring the degradation of the environmental condition and their effects in the fishermen's community in the municipality of Goiana-PE, Brazil. It is a multitemporal approaching which apply techniques equipments and methods of photogrammetry and remote sensing as well as information from the leaders of the community.

KEY WORDS: Photogrammetry, Remote Sensing, Satellite Images, Rectification, Human Settlement, Peneides, Value System.

1. INTRODUCTION

Large countries like Brazil, where the population increases rapidly and the society demands better and better quality of life, face increasingly complex problems in order to produce food, shelter, improving the environment etc.

An emerging and potential trend in Brazil is that Science and Technology must have up-to-date and regional attributes to be really powerfull enough to tackle such difficult problems. This does not mean that we should disregard everything already discovered and applied but to consider the existing technologies from the viewpoint of Brazilian environments, and more important, to develop concepts and equipments for the Brazilian peculiar conditions.

This paper intends to be a starting point for the establishment of a multi-disciplinary and professional group in North Eastern Brazil for applied photogrammetry and remote sensing in the Brazilian Development process.

The Government has the task to generate, to gather and to dispose the pertinent cartographic information which is demanded, not only by the public institutions but also by the private enterprises. It is widely known that cartographic information is fundamental both for the urban and the

rural activities, that is to say in the field of the Urbanology which treats integrally complex interrelated events in the urban areas, and for Rurology which does the same within the rural space. In this paper, emphasis will be given to the photogrammetric and remote sensing applications, in order to get all the metric and semantic information involved in the analysis of the environmental conditions and their effects in the fishermen's community in the municipality of Goiana-PE.

Extension to others areas of the urbanologic and rurologic activities can be imagined as they are similar in nature.

Thus, in this context, considerable attention should be given by the government to the preservation of the fishermen community and its environment in order to maintain and, expand fishing production in Pernambuco, specially that one in Goiana, because of its proximity of Recife, the capital of Pernambuco and main commercial centre of the Recife metropolitan region.

It is relevant to emphasize that many of these communities are disappearing, victims of the so called "Development Progress" mainly caused, by demographic pressure, as consequence of disorganized and inadequate human and industrial activities, attracted by the potentialities of the area, such as

its sunny climate and beautiful environment. Then, a special attention should be given to the survival of the fishermen's communities.

The usual and frequent expulsion of fishermen from their original habitat, the inadequate occupation of the shores through many land parcels for the medium and rich groups and the exploitation of the fishermen by bad merchants were the main aspects observed during the field work phase.

The expulsion of the fishermen led and encouraged a new form of occupation through illegal settlement (invasão) organized by themselves. On the other hand, many enterprises are planning allotments in inadequate areas most of them, only looking for profits. This fact has causes many problems by filling borders of the rivers and mangroves, essential for marine life because they are used as natural nurseries for shrimps, crabs, oysters etc.

Given all these problems, this research aims to present a base for evaluating the social and economic impacts caused in this environment.

2. AREA STUDY

In order to tackle the main problems regarding environmental control in the fishermen communities, the study established an area for research in the coast and river delta in the north of Pernambuco. This area was selected considering criteria of desirability and feasibility. It is limited at North and South respectively, by the UTM coordinates 9.164.000m N and 9.150.000m N, at East by the Atlantic Ocean and at West by 296.000m E. The area has approximately 3111 ha, Fig.1- Location of the Area of Study and Fig. 2-Satellite Image of the Area of Study.

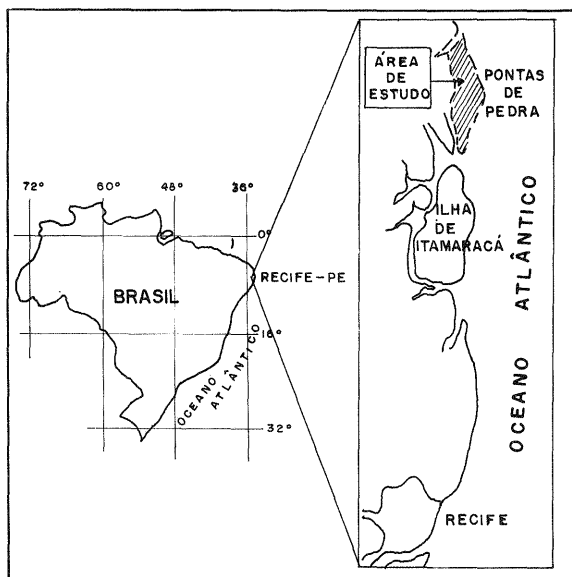


Fig. 1- Location of the Area of Study

3. METHODOLOGY

The Fig. 3 presents the general structure of the methodology applied in this research.

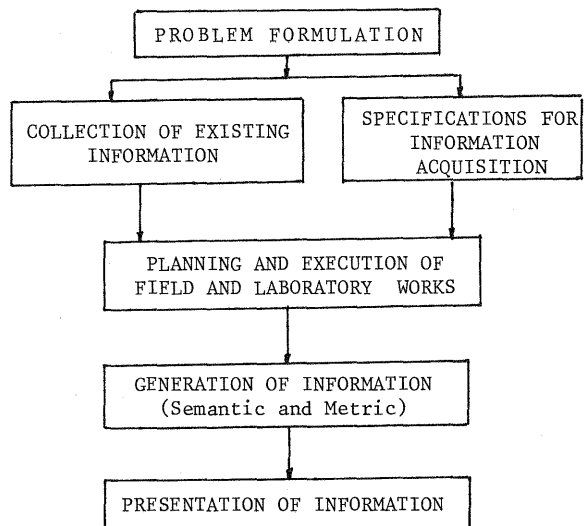


Fig. 3- General Structure of the Methodology

3.1- Problem Formulation

During the phase of problem formulation for decision making, a well balanced set of rules was used involving the influencing factors classified as affecting desirability and influencing feasibility.

Desirability was judged by means of value parameters and feasibility was judged by means of value objectives.

Thus, the general decision involved the whole class of fishermen in the community, technicians and professors, most of them working in the Department of Cartography.

3.2- Collection of Existing Information

In this phase special care should be taken to get all the pertinent existing information which directly and/or indirectly affects the project. The collection should cover a wide range of techniques ranging from local observation to remote sensing (satellites). Much of the information derived from them can be obtained from aerial photographs.

The existing information can be given in the form of:

- Survey Photography (multi-temporal)
- Satellite Images (Landsat TM, Spot)
- Hydrographic Map
- Topographic Maps at different scales (coast, border of the rivers and mangroves)
- Geological Map
- Geomorphological Map
- Survey Network
- Documents from classes entities and others

3.3- Specification For Information Acquisition

Much of information to be acquired and handled in project concerns the digital terrain data. For this acquisition we may use different methods such as ground survey, topographic and photogrammetric maps



Fig. 2 - Satellite Image of the Area of Study

and satellite images. These specifications should be related to the area of study, the classification of items of information and the presentation of the information.

3.4- Planning and Execution of the Field and Laboratory Works

The field work comprised:

- Definition of the sample area applying the supervised process of digital classification with TM images and the interpretation of aerial photographs;
- Review for the definition of some anomalous area during the process of digital classification when it presented difficult correlation;
- Elaboration of precise survey using questionnaire among the leaderships of the community regarding land occupation, polluted areas and environmental degradation, and

- Analysis of the existing basic ground control and planning of the additional ground control involved in the process of the photogrammetric restitution and in the establishment of the pattern recognition (geometric pattern) to be used during the process of rectification of the satellite images.

The laboratory work comprised:

- Interpretation of orthophotocartas, aerial photographs and satellite images with a defined temporal resolution. For mapping purpose, evaluation and later on comparing the effects caused by natural and anthropic changings;
- Elaboration of the thematic maps, and
- Analysis of the questionnaires applied to the community's leaderships.

3.5- Generation of Information (Semantic and Metric)

The generation of information was carried out in the laboratories of the Cartographic Engineering Department of the Federal University of Pernambuco.

- Remote Sensing Laboratory:

It was used the Earth Resources Data Analysis System-ERDAS as software. For hardware a terminal with a Compaq Deskpro Computer 386/20, a video Mitsubishi, a Cipher 9000, a text printer RIMA, an image printer Textronics 3693DX and a tablet digitizer DIG PAD were used.

- Photogrammetric Laboratory:

Planicom System-Zeiss/Hewlett Packard Computer 9000A and Planitab Plotter TAB 110-Wild.

3.6- Presentation of Information

The information can be presented in various forms. However for operational reasons a visual display was preferred. Different possibilities of presentation of information can be classified as:

- Photographic Records (and printed)
- Digital Maps
- Tabular or Narrative
- Graphic-Symbolic Maps

4. SUMMARY OF RESULTS

The summary of results of the research are shown through the series of map and tables here presented.

Fig. 4 is a photogrammetric map obtained from 1:30.000 and restituted in the scale 1:10.000.

Fig. 5 is a line map acquired from an orthophotocarta in the scale 1:10.000. The photographs were taken in 1978.

Fig. 6 presents the automatic classification of the area of study using the ERDAS supervised method and a Lansat TM image obtained in 06.05.'88.

Fig. 7 presents a table with content of the most important features monitored for the years 1940, 1978 and 1988.

One can observe through the different classes analysed during the automatic process of supervised classification that is very simple to monitoring, positioning and quantification the global problem in the area study employing photogrammetry and remote sensing.

5. CONCLUSIONS

According to the results above observed and presented one can extract the following conclusions:

- . The modifications occurred up to now in the soil use have shown up an intensive and usually anarchical process of urbanisation throughout the area and has created very severe problems in the human environment for the fishermen, in particular in long term.
- . Expulsion of the original inhabitants (fishermen) mainly from the area near to the coast, obliged them to go to the neighborhood incentivating the illegal occupation (invasão) in other allotments and consequently, created a very high instable situation among other dwellers.
- . A large destruction of the mangroves in the area caused a drastic reduction of the peneides mainly in the Z-3 Colony which corresponds to the shores of Pontas de Pedras, Catuama, Carne de Vaca e Tabatinga. This fact contributed to aggravate the social and economic problems in the whole community.
- . On top of everything the use of photogrammetry and remote sensing has constituted a powerful tool for monitoring, positioning and quantifying; the impacts of tourism and, human and industrial settlements over the coastal and delta areas of Pernambuco State. Its use allow a rational management of the exploitation and/or protection of the area, particularly because the conventional investigation means are costly, demand time and are difficult to operationalize.

6. BIBLIOGRAPHY

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 DEPARTAMENTO DE GEOGRAFIA / CNPq / GTZ

MAPAS DE POSICIONAMENTO DE SISTEMAS
 NATURAIS E ARTIFICIAIS EM 1940 E 1978

ESCALA GRÁFICA

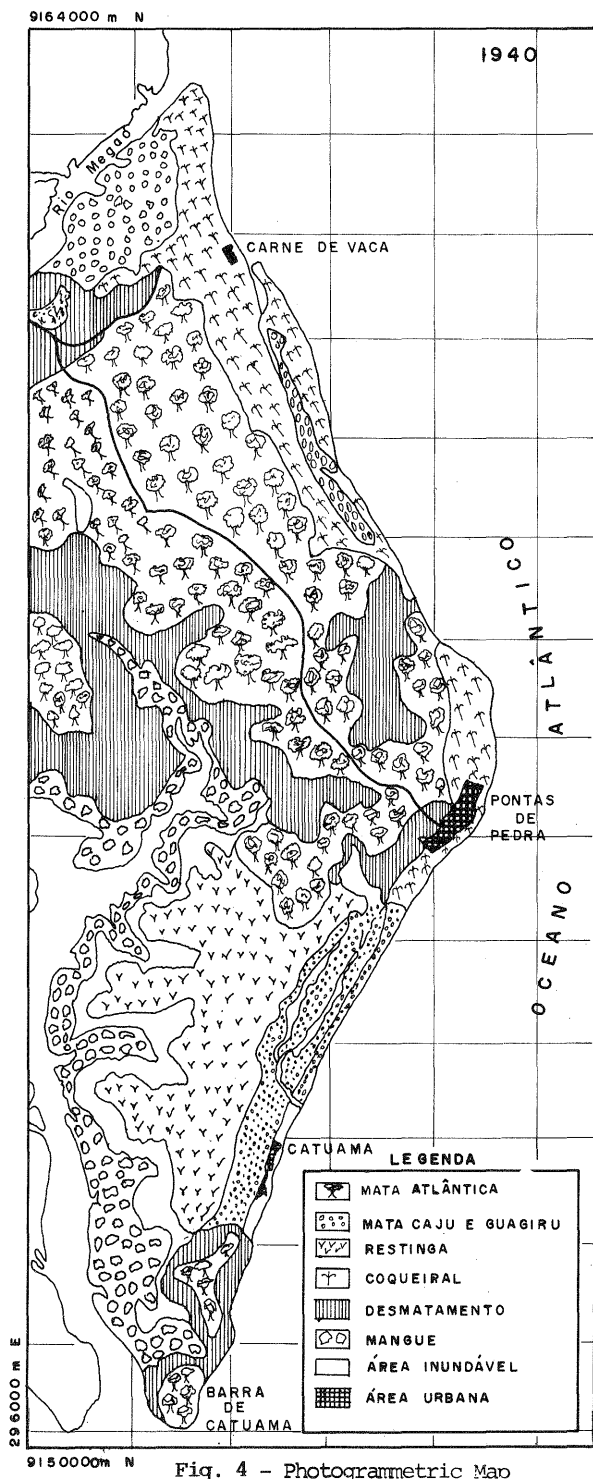


Fig. 4 - Photogrammetric Map

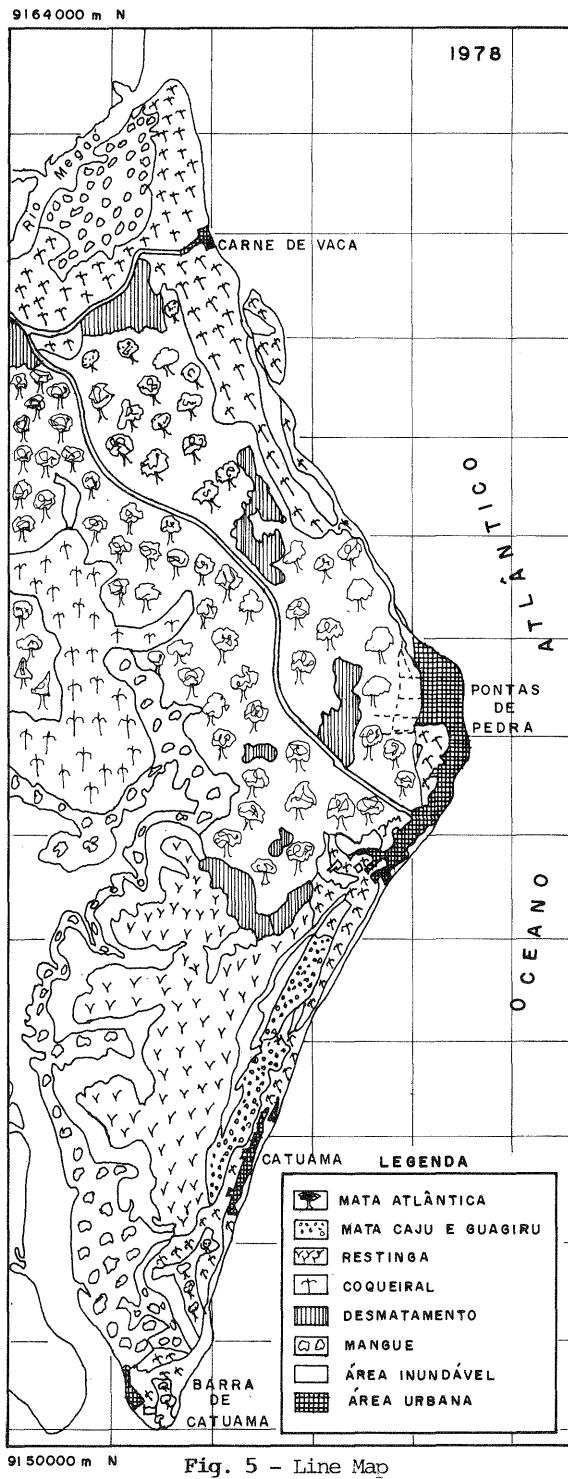


Fig. 5 - Line Map

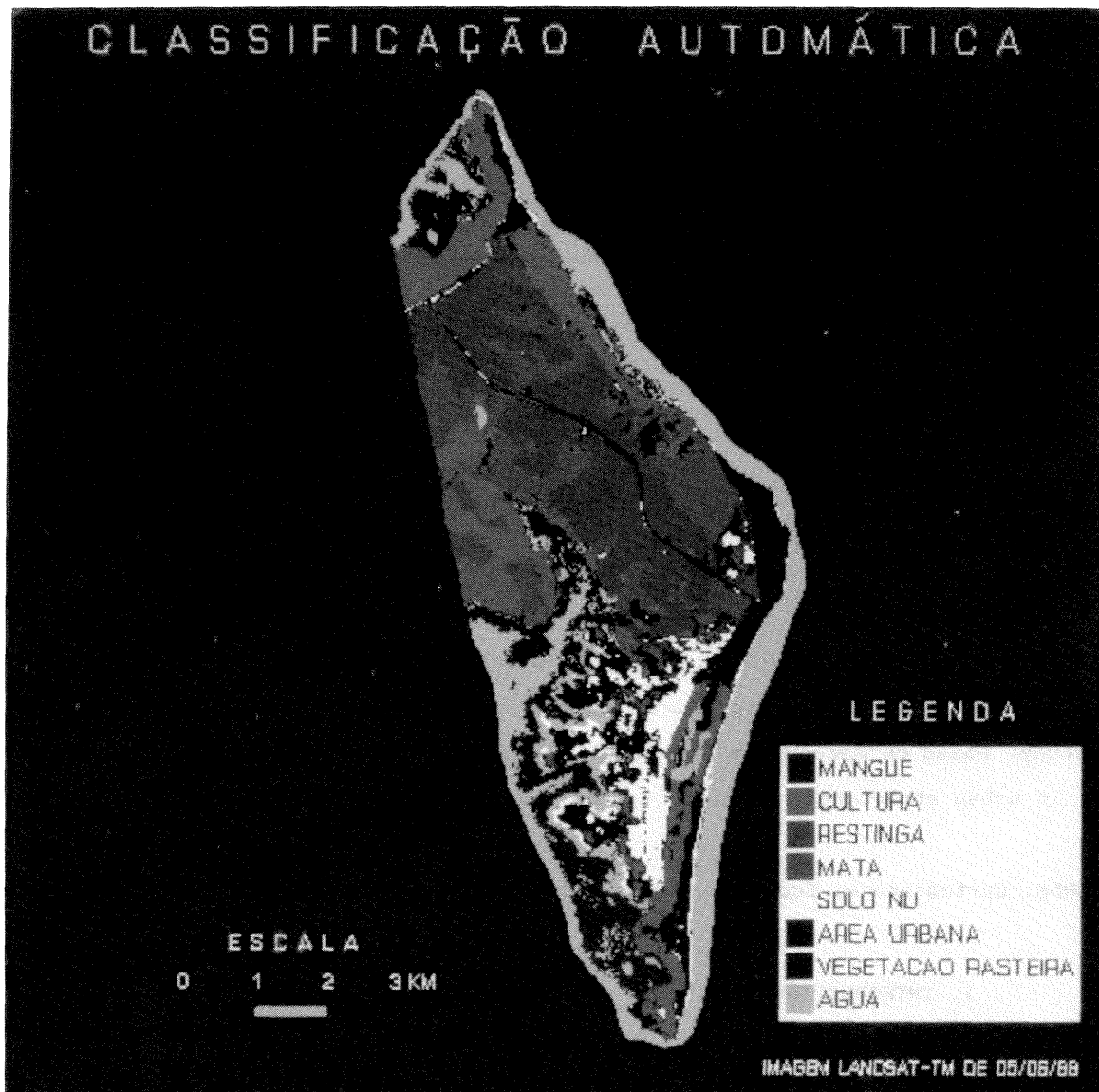


Fig. 6 - Automatic Classification of the Area of Study

AREA COVERAGE		YEARS		
		1940	1978	(UNIT. IN HA.) 1988
IMPORTANT AREAS	MANGROVE	502	453	416
	FOREST	1291	1276	407
	URBAN	19	90	219
	SAND BAR	384	403	587
	COCONUT AND CASHEW*	374	723	642
	SUGAR CANE*	-	-	749
OTHERS AREAS	BAR SOIL, LAKE, DAM ROADS ETC.	541	166	91
	TOTAL	3111	3111	3111

Fig. 7 - Content of the most important features monitored in the years 1940, 1978 and 1988

* Cultures