

THE USE OF PHOTOINTERPRETATION FOR SOCIO-ECONOMIC
CHARACTERIZATION OF URBAN POPULATION

Maria de Lourdes Neves de Oliveira
Maria Suelena Santiago Barros

Conselho Nacional de Desenvolvimento Científico e
Tecnológico
Instituto de Pesquisas Espaciais
12200 - São José dos Campos - SP - BRAZIL

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ABSTRACT

This paper describes the use of aerial panchromatic photography for analysis of urban residential environments in Brazilian towns. The lack of information about the discrimination of different segments of urban population according to their socio-economic characteristics, as required by urban planning process, motivated the development of this work. Through the examination of relevant physical aspects of residential areas, these are classified into groups, according to their socio-economic status. This classification was validated using survey data about total family income and the main householder's income. The results showed the usefulness of aerial photography for this purpose. São José dos Campos, SP, Brazil, was used as test area.

I - INTRODUCTION

Urban planning consists of a decision making process which depends on a system to delineate, obtain and provide useful information to this process.

There is no doubt that the urban planning efficiency (and more broadly that of municipal management) is dependent on the knowledge of urban reality, which must also be achieved through collection and analysis of data.

One kind of information very useful in urban planning process is that one related to the discrimination of different segments of urban population according to their socio-economic characteristics. It enables the planner to act within the internal town structure.

The lack of this kind of information for municipal management agencies in Brazilian towns motivated the development of this paper, which describes the use of aerial photographs for analysis of urban residential quality and for classification of urban population segments according to their socio-economic status.

The purpose of this paper was to test the validity of predicting socio-economic variables from photointerpreted data in Brazilian towns.

This purpose is related to those ones attained by Green (1956 a e b), Green and Monier (1959), Mumbower and Donoghue (1967), Wellar (1968), Mullens and Senger (1969), Metivier and Mc Coy (1971), Rush and Vernon (1975), who used the aerial photos in order to obtain population characteristics data in American cities.

As the results of the analysis they carried out would not be directly applicable to other towns, mainly from other countries, it was necessary to develop a method with the particular knowledge acquired with the practice of obtaining photointerpreted data in Brazilian urban areas.

II - THE METHOD: SOCIO-ECONOMIC CHARACTERIZATION OF URBAN POPULATION USING PHOTOINTERPRETED DATA

The general process of photointerpretation for the socio-economic characterization of the urban population involved:

- a) the delimitation of visual homogeneous residential sectors of the town, through the analysis of features of their physical environment;
- b) the examination of relevant characteristics of their physical environment supposed to be related to socio-economic characteristics of their population;
- c) the socio-economic classification of urban population of these sectors based on those physical features examined before.

The aerial photograph seems to be useful to this purpose due to its capability to permit obtaining intra-urban information in a quick, economic and efficient way; to its potentiality of enhancing socio-economic characteristics of the populations (associated with some physical aspects of these residential areas); and to the global comprehension of the urban spatial structure permitted by the use of the mosaic.

In this study aerial panchromatic photographs at a scale of 1/10000 were used. The panchromatic photograph is the least expensive and the most flexible among the remote sensor's products considering the purpose of their use. The scale of 1/10000 was chosen considering its great potentiality for analysis which focus of interest is centered at the urban lot level and its compatibility with the plants used in official urban plans which generally are at this same scale.

The physical features of urban residential areas considered to be relevant to classify the urban population segments according to their socio-economic characteristics were:

- lot size;
- home size;
- number of homes per lot;
- dwelling type and characteristics;
- building age;
- streets pattern and upkeep;
- vegetation presence and upkeep;
- presence of local urban facilities;
- land use;
- topography;
- density;
- location in urban structure.

These physical features encompass locational and environmental items and were analysed using individual aerial photos, stereoscopic pairs of aerial photos and the mosaic.

Each one of the homogeneous residential urban sectors of the town was classified in a five category ordinal scale representing five different social levels in the town social structure (high, higher medium, medium, lower medium, low).

The evaluation of the social level of each homogeneous sector was made subjectively, through the convergence of evidences in analysing the physical features in each sector and comparing each one with the others.

The assumption of this paper is that in Brazilian towns some physical aspects of the residential areas are closely associated with the quality of these areas and with socio-economic characterization of their inhabitants.

As an example of how the physical features were used to classify the residential areas, it can be said that in general "high level" population in a typical Brazilian town live in areas with large and well-kept lots and homes, with good streets design and conditions, located in the best sites of the town, while the low level population live in peripheral areas, in half lots and very small homes.

The method was applied to São José dos Campos, SP, Brazil, with 300000 inhabitants approximately (Manso et al., in press).

It was possible to identify 101 homogeneous sectors in São José dos Campos, which were analysed using aerial photos of May, 1977, and then classified according to the ordinal social scale.

The method was evaluated using survey data.

III - COMPARISON OF SURVEY DATA AND PHOTOINTERPRETED DATA

In order to test the photointerpretation process as a tool for analysing urban residential areas and for classifying urban population segments according to their socio-economic levels, survey data collected in 1977 using household samples within each of the 101 homogeneous sectors of the town was used.

Such data were related to total family income and the main householder's income.

Statistical tests were carried out to verify the significance of the difference in these two variables between the five levels determined through photointerpretation. More details can be found in Oliveira and Barros (1982).

Initially the One Way Analysis of Variance with the five levels was applied.

Through the results of this test the null hypothesis was rejected, i.e., it was concluded that there really exists a significant difference between the five levels considering the two variables: total family income and main householder's income. The significance level considered was $\alpha = 0,10$.

Finally the Scheffé test for comparing each one of the ten possible pairs of levels, considering the five existing levels, was applied.

The purpose was to test the significance of the difference in the two variables between each one of the ten possible pairs of levels to be composed with the five existing groups.

The Scheffé test indicated a significative difference between nine of the ten average income pairs, at the level of significance of $\alpha = 0,10$, for both variables being considered. Only one of these pairs did not show significant difference between their average, considering the total family income and the main householder's income. This occurred between the lower medium and the low levels.

All the other results confirm the adequacy of using photointerpreted data as a tool to identify socio-economic characteristics of urban population segments.

IV - CONCLUSIONS

One of the most useful set of information to the urban planning process is that related to the location in the urban structure of the different population segments, and to their socio-economic conditions.

The results of this work show that this kind of information may be obtained through the interpretation of low altitude panchromatic aerial photographs.

This seems to be particularly true in relation to Brazilian towns where the urban residential land is extremely differentiated as a result of the social stratification existent in the country.

This differentiation is emphasised by the occurrence of highly speculative mechanisms on the urban land rent formative process, as well as by the occurrence of a qualitatively differentiated dwelling consumption structure among the different social classes proportioned by the coexistence of differentiated house constructive technologies.

One natural consequence of this work is the suggestion that new studies be performed in order to test the relation between the physical features of the urban residential environments in Brazilian towns and other sets of socio-economic variables relevant for urban planning purposes.

The results of these studies should stimulate the use of low altitude aerial photographs as a tool in urban planning process.

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