A Study on the Habitat of Gidra Community in Papua New Guinea with Satellite Remote Sensing

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Abstract: Gidra speaking people living in Wonnie area of western province in Papua New Guinea are traditionally dependent on hunting and gathering. Sago is the main staple food and the vegetation consists of rain forest (*Bua*) and trees with savannah grass (*Yap*). The population density is very low and the people are very little affected by modernization. This study is an attempt to look at the people-resource interaction in the area for the past thirty years based on aerial photographs and various satellite data. The study showed the trends of *yap* versus *bua* distribution as well as the location of garden and Sago grove areas, which is important for studying the livelihood of the people.
Keywords: Wonnie, *yap*, *bua*, Sago, remote sensing

1. Introduction

The village of Wonnie is located in the western province of Papua New Guinea, and is inhabited by Gidra speaking people. It is a very rural community with traditional life style based mainly on hunting gathering. The main staple food is Sago and people also eat meat by hunting animals (such as wallaby, deer, casawary, etc), and various produces from gardens such as banana, sweet potato, cucumber, vegetables etc.

This is a very thinly populated area with a population density of less than 1 person per Km^2 and is located in the Oriomo Plateau [1]. The vegetation consists of savanna forest (called *yap* by the local people) and the dense rain forest (called *bua* by the local people). The people have been practicing burning of the savannah forest area every year in different parts, thus maintaining certain proportion of *yap* and *bua*.

2. Data and Methods

2.1 Data used

A variety of data have been used for this study. These include aerial photographs from 1970, Landsat MSS data from 1972, Landsat TM data from 1997 and Ikonos data from 2001.

2.2 General methodology

The following is the brief description of methods used in this study.

GPS field work

GPS fieldwork was carried out in January 2002, for collecting ground control points for geometric correction and for collecting training data for the classification of satellite data. Differential GPS was carried out using Trimble GPS system using Geo Explorer III and 4600LS as a base, and using the software Pathfinder for differential correction, as used in previous studies [2].

Geometric correction

Since the available topographic map (scale 1:100,000) was not good enough for Ikonos data, the geometric correction of the Ikonos data was carried out using the geometric coordinates of the GCP's calculated from our GPS field survey. Other satellite data (Landsat MSS and TM) and aerial photograph were then registered with the geo-corrected Ikonos data.

Classification of Land use/cover

Ikonos data (both panchromatic as well as multispectral) was classified using the training data based on the ground truth survey carried out in the field. A combination of supervised maximum likelihood classification and visual interpretation for certain features was used for this purpose. Similarly, Landsat TM for 1997 was classified using maximum likelihood classification. For MSS 1972, training data were selected with reference to aerial photographs, which were then used for supervised maximum likelihood classification. For a better estimate

of land cover classes considering the coarse resolution of MSS data, classification was made for four broad classes of *bua* (rain forest without savannah grass), thick *yap* (*yap* with thick and big trees, and also having savannah grass), small *yap* (*yap* with sparse or no trees, and consisting of savannah grass), and bare soil.

Temporal analysis

Based on classification results from the various satellite data, temporal analysis was made for understanding the trends of land use and cover dynamics. For the purpose of spatial analysis, square meshes, 1 km x 1 km were drawn by considering the Wonnie village at the center and then making such 100 meshes around the village, so as to see the temporal change in land use and cover over different meshes, representing different spatial relations with relation to the village.

3. Results and Discussion

Maps were produced for land use and cover for 1972, 1997 and 2001 based on classification as mentioned above. Figure 1 shows one such map based on classification of 1997 Landsat TM data. It shows the classification into four categories of *bua*, thick *yap*, small *yap* and bare areas. Table 1 shows the preliminary results of land use and cover for the years 1972, 1997 and 2001.

It was found that *yap* and *bua* were quite distinct even with MSS data, thus the results depict the condition of land use over time fairly well.

Also, with the high resolution data (Ikonos), the location of gardens and houses could be located well for the year 2001.

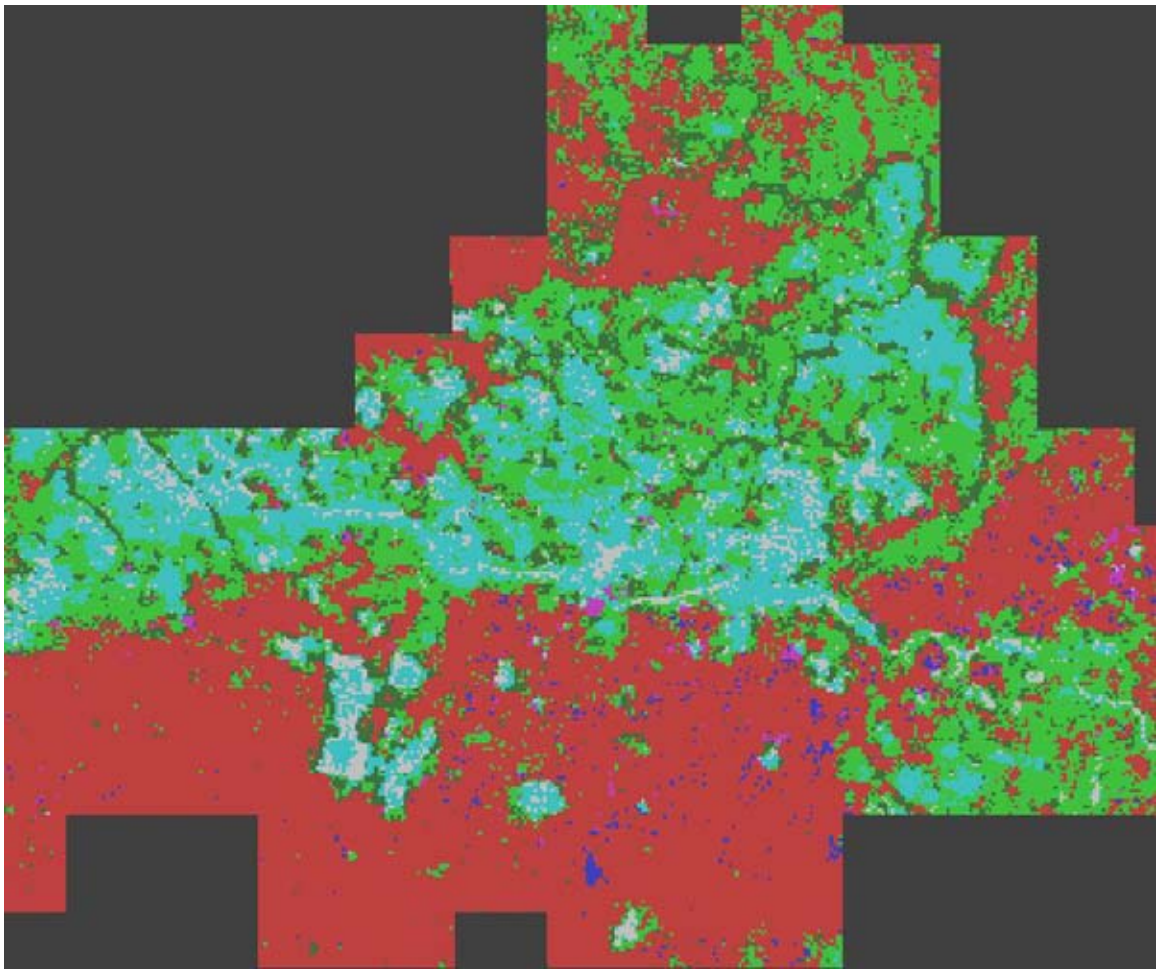

Fig. 1: Land use classification(1997) for Wonnie area based on Landsat TM (covering a total of 100 meshes 1 KM x 1 Km). Four broad classes are bua (red), thick yap (green), small yap (cyan) and bare area (white).

Table 1 Comparison of Land use 1980 and 1999

Land use/cover	% of total area (1972)	% of total area(1997)	% of total area(2001)
Bua	41.90	56.23	53.50
Thick yap	31.91	26.84	25.58
Small yap	21.62	13.41	18.47
Bare	4.58	3.52	2.45
Total	100	100	100

It can be seen from Table 1 that the areal coverage of *bua* has increased over this thirty-year period and that of *yap* has decreased. This could be probably due to less burning of savannah forest practiced by people these days compared to before. Another reason could be that thickly wooded *yap* might have converted themselves to *bua* over this period. However, it needs to be supported by field investigations.

However, broadly it can be seen from these results that, there have been relatively little change in the overall environment of the study area. This is also reflected in the traditional life style still being practiced by the villagers. Though there have been few new things in the village, which are an indication of modernization, such as more abundance of iron roof on buildings (compared to all thatch roofed buildings before), use of few guns for hunting (compared to use of only bows and arrows before) and so on, the basic living strategy of the people with respect to the local environment remains largely similar to the past. They still keep on burning *yap*, sago is still the main staple food (though occasionally they also eat imported rice), depend on subsistence gardening and hunting of animals with primitive methods.

4. Conclusion and Further Works

The results demonstrate the dynamics of land use and cover in the study area, especially in terms of *yap* and *bua* distribution, which is very vital for the ecology of this area. Also, together with the location of garden and houses with the high-resolution satellite data, this provides important information for the relation of local households with the resources in this area. More works are necessary to verify the overall results as well as to link them with the detailed household and garden information obtained from high resolution data.

References

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