

## **Agricultural land use system on Apid Island, Inopacan, Leyte, Philippines**

**Ruth O. Escasinas<sup>1</sup> and Joachim Sauerborn<sup>2</sup>**

<sup>1</sup>*Department of Agronomy and Soil Science, Visayas State College of Agriculture, Baybay 6521-A Leyte, Philippines;* <sup>2</sup>*University of Hohenheim, Stuttgart, Germany*

### **ABSTRACT**

Escasinas, R.O. and J. Sauerborn. 1999. Agricultural land use system on Apid Island, Inopacan, Leyte, Philippines. *Ann. Trop. Res.* 21:33-40

Characterization of agricultural land use systems on Apid Island was done in order to understand the agroecosystem and its impact on the ecology of the island. Of the total land area only a small portion is planted to cash crops. *Pandanus* sp. seems to be the major cash crop on the island. It occupies the largest area.

Multi-storey cropping system is a dominant cropping system on the island. Coconut is grown in combination with breadfruit, banana, pandanus and cassava showing that the land is used to a maximum resembling the ecosystem of the rainforest.

Diverse crop species could be observed in the site. People grow food crops, fruit crops, fruit trees, sugar and spice crops as well as medicinal plants for home consumption.

**Keywords:** Apid island. diverse crop species. land use system. multi-storey cropping.

### **INTRODUCTION**

Land resource is limited and finite while human population is progressively increasing. These conditions will eventually lead to increasing and competitive demand of land both for agricultural production and for other purposes. Experts pointed out that there is

therefore an urgent need to match the land types and land uses in the most rational way to have sustainable production and satisfy the needs of the present generation while at the same time conserving the resources for the future.

Knowledge on land use system is fundamental to this process. It is a basic element in agricultural development and conservation. FAO (1993) defined land use system as a specific land use type applied to a particular area of land while a land use type is a kind of land use described in detail to assess its land use requirement and to plan the necessary inputs. The amount of detail varies with level, scale, purpose of survey, from generalized to detailed description of plants, management, inputs, etc. in more intensive surveys. Land use is the result of a continuous field of tension created between available resources and human needs and acted upon by human efforts (Vink, 1975).

The island of Apid belongs to the island group of "Cuatro Islas" which can be found west of Leyte, off the shore of the municipalities of Inopacan and Hindang in the middle of the Camotes Sea. It is inhabited by about 106 households, roughly 426 people. Land area available per person is only 0.08 ha while the world average is about 1.5 ha per person.

Apid island is one of the treasures in Leyte. Small as it is, biodiversity exists in the site. Human pressure is tremendously affecting the ecosystems. In order to understand the agroecosystem, the activities of the people and its impact on ecology, a characterization of the land use system in Apid Island is therefore necessary.

## METHODOLOGY

Observation on the distribution of the different crops as well as on the different cropping systems adopted by the farmers in the locality was done by walking through the island and conducting informal interviews and conversations with the residents. Approximate estimation of density of some useful crops and frequency of sample plant species was made by counting the total number of crops in the sample area.

Collection of different plant samples in the different ecological zones was likewise done. After which, identification and recording of plant samples were

being made. Plant species that could not be identified were preserved and brought to ViSCA for further verification. Other data such as yield of some crops and land area of the island were taken from the socioeconomic group (see: Socioeconomic Profile of Apid, Mahaba and Digyo, Inopacan, Leyte of this volume). The following literatures were also used in the making of this report: Brucher (1985), Forest Department (1972), Maberly *et al.* (1995), Rehm & Espig (1991), and Sauerborn (1999).

## RESULTS AND DISCUSSION

Milan and Margraf (1998) stated that before World War II, Apid Island was blessed with forest trees and abundant marine life. Dynamite fishing within Apid territorial waters started in 1938 but not prevalent. Only few people lived in the island. They grew corn and other crops which thrive in the site. After World War II, clearing of trees and *kaingin* farming was practiced. People started planting fruits and coconuts. Dynamite fishing tremendously increased. Fish catch are sold at high prices. People living in the area likewise increased.

Population pressure and reduction in fish catch could be one of the reasons why some inhabitants moved and lived in the upper part of the island and do farming. Apid Island has a total land area of 35.6 hectares (Fig 1.)

Of the total land area, only a small portion is planted to cash crops such as coconut, cassava, banana, sweetpotato and pandanus mainly at the upper part of the island. Pandanus seems to be the major cash crop of the island. Per ocular observation, this crop occupied a larger area among other cash crops planted. The dominant cropping system in the area is a multi-storey cropping system where perennial crops are in mixed stand with annual plants. Coconut is grown in combination with breadfruit, banana, pandanus and cassava (Fig. 2). This shows that land is used to maximum following the ecosystem of the rainforest. Under this condition, tree crops have a protective role on the site since the canopy shades the soil reducing the physical damage by rain, wind and, consequently, soil erosion.

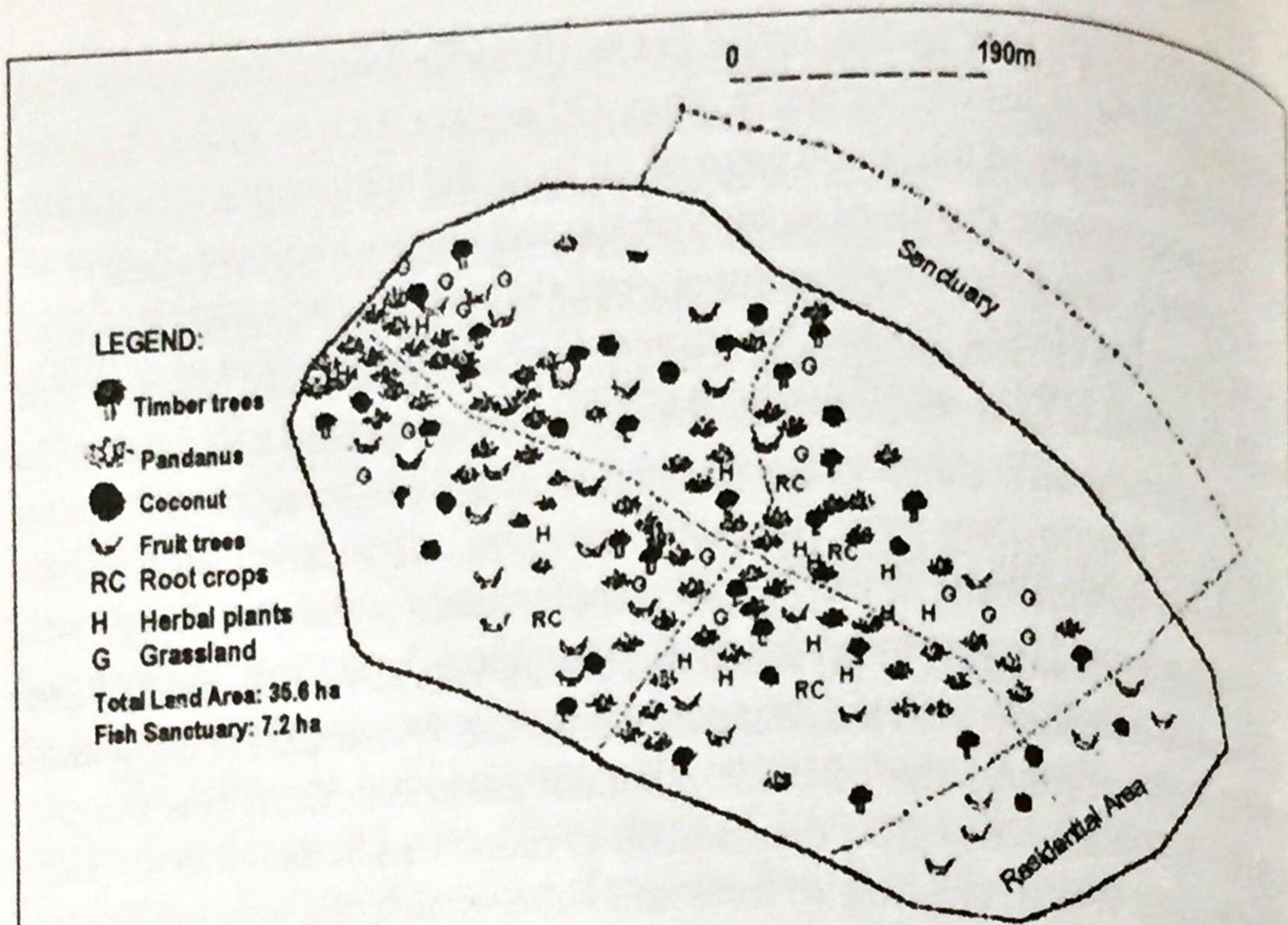


Figure 1. Land use map of Apid Island



Figure 2. Five-strata multi-storey cropping system in Apid Island

Aside from the multi-storey cropping system, one can find a cassava-dominated field, pandanus, sweetpotato areas as well as banana-dominated area, all in small patches of land (Table 1).

Table 1. Estimated density of the most important crops

Crop	Density	Per hectare
Coconut	3/60 m <sup>2</sup>	500,000
Cassava	154/80 m <sup>2</sup>	19,200
Pandanus	60/100 m <sup>2</sup>	6,000

Planting distance of *Pandanus* sp. and coconut is very irregular. On the other hand, cassava is regularly planted at a distance of 1x1 m. Farmers on the site do not apply fertilizer and pesticides to their crops. Sixty coconut trees in this island gave a yield of 50 kg of copra per harvest. However, farmers were not able to get income from the trees for almost two years now due to the adverse effect of El Niño. Most trees were also damaged by rhinoceros beetle (*Oryctes rhinocerus*). Other trees are too old, hence productivity declines, and farmers cut them and use as lumber.

Another important crop is *Pandanus* sp. The leaves of this plant are harvested every 3-4 months and are used for mat weaving. This serves as an alternative source of livelihood of the people. A pandan mat weaver could realize an income of P2,000.00 per year.

The yields of cassava, banana and pineapple are too low to meet a family's food requirement. Only few farmers grow cassava and banana for snacks and as a staple food when they run out of supply during bad weather. In the village, diverse crop species could be observed. People grow food crops, fruit trees, fiber crops, sugarcane and spice crops as well as medicinal plants for home consumption only (Table 2).

Table 2. Crops grown on Apid Island

Genus-species	Family	Used Parts
<i>Fruits</i>		
<i>Ananas comosus</i>	Bromeliaceae	fruit
<i>Annona squamosa</i>	Annonaceae	fruit
<i>Artocarpus heterophyllus</i>	Moraceae	fruit
<i>Averrhoa bilimbi</i>	Oxalidaceae	fruit
<i>Carica papaya</i>	Caricaceae	fruit
<i>Psidium guajava</i>	Myrtaceae	fruit
<i>Musa x paradisiaca</i>	Musaceae	fruit
<i>Pouteria campechiana</i>	Sapotaceae	fruit
<i>Food</i>		
<i>Artocarpus altilis</i>	Moraceae	fruit
<i>Cocos nucifera</i>	Arecaceae	fruit
<i>Dioscorea alata</i>	Dioscoreaceae	root
<i>Ipomea batatas</i>	Convolvulaceae	root
<i>Manihot esculenta</i>	Euphorbiaceae	root
<i>Xanthosoma sagittifolia</i>	Araceae	rhizome
<i>Vegetables</i>		
<i>Cucurbita maxima</i>	Cucurbitaceae	fruit
<i>Moringa oleifera</i>	Moringaceae	leaf/fruit
<i>Momordica charantia</i>	Cucurbitaceae	fruit
<i>Vigna unguiculata</i>	Fabaceae	seed
<i>Spices</i>		
<i>Capsicum annuum</i>	Solanaceae	fruit
<i>Sugar</i>		
<i>Saccharum officinarum</i>	Poaceae	stem
<i>Fiber</i>		
<i>Pandanus</i> sp.	Pandanaceae	leaf
<i>Sansevieria zeylanica</i>	Agavaceae	leaf
<i>Ceiba pentandra</i>	Bombacaceae	fruit
<i>Medicinal Plants</i>		
<i>Euphorbia hirta</i>	Euphorbiaceae	dengue fever
<i>Kalanchoe integra</i>	Crassulaceae	boil
<i>Leucaena leucocephala</i>	Fabaceae	anthelmintic

Table 2. (continued)

Genus-species	Family	Used Parts
<i>Medicinal Plants</i>		<i>Used Against</i>
<i>Melanolepis multiglandulosa</i>	Euphorbiaceae	muscle pains
<i>Morinda citrifolia</i>	Rubiaceae	cancer, kidney trouble, etc.
<i>Plumeria rubra</i>	Apocynaceae	herpes
<i>Moringa oleifera</i>	Moringaceae	high blood pressure
<i>Botanical</i>		
<i>Melia dubia</i>	Meliaceae	leaf/seed
<i>Ancillary plants</i>		
<i>Glyricidia sepium</i>	Fabaceae	whole plant
<i>Leucaena leucocephala</i>	Fabaceae	whole plant
<i>Desmodium</i> sp.	Fabaceae	whole plant
<i>Ornamental plants</i>		
<i>Bougenvillea spectabilis</i>	Nyctaginaceae	
<i>Kalanchoe integra</i>	Crassulaceae	
<i>Nerium oleander</i>	Apocynaceae	
<i>Philodendron</i> sp.	Araceae	
<i>Plumeria rubra</i>	Apocynaceae	
<i>Rhoeo spathodea</i>	Commelinaceae	

## CONCLUSION

Apid island has a total land area of 35.6 hectares. Of this, only a small portion is planted to coconut, cassava, banana, sweetpotato and pandanus mainly at the upper part of the island. Pandanus seems to be its major cash crop occupying the larger area. This crop is an alternative source of livelihood of the people in this island.

Multi-storey cropping system is a dominant form of cropping system in this island. Perennial crops are in mixed stand with annual plants. Coconut is predominantly grown in combination with breadfruit, banana, pandanus and

cassava. Aside from the 5-strata multi-storey cropping system, a cassava-dominated field, pandanus, sweetpotato areas as well as banana dominated area, all in small patches of land could be observed. Planting distance of *Pandanus* sp. and coconut is irregular except cassava which has a planting distance of 1.0 x 1.0 m. Farmers do not apply fertilizers and pesticides to their crops.

Diverse crop species could be observed in the village. People grow food crops, fruit trees, fiber crops, sugar and spice as well as medicinal plants for their home consumption.

Population pressure and reduction of fish catch could be one of the reasons why some inhabitants moved into the upper part of the island to practice upland farming.

## REFERENCES

- BRUCHER H. 1985. *Useful Plants of Neotropical Origin and their Wild Relatives*. Springer-Verlag Berlin, Heidelberg, Germany. 296 pp.
- FOOD AND AGRICULTURAL ORGANIZATION. 1993. *Guidelines for Land-Use Planning*. FAO Development Series # 1. Rome, Italy. 91 pp.
- FOREST DEPARTMENT. 1972. Tree Flora of Malaya. In: *A Manual for Foresters* (T.C. Whitmore, ed.). Vol. 2. Longman Malaysi SDN. Berhad. Kuala Lumpur, Malaysia.
- MABBERLEY D.J., C.M. PANNEL and A. M. SING. 1995. Meliaceae. Series 1 Spermatophyta. *Flora Malesiana*. 12:330-334.
- MILAN P.P. and J. MARGRAF. 1998. *Environmental education for fisherfolks in small islands*. Terminal Report. ViSCA-GTZ Applied Tropical Ecology Program. ViSCA, Baybay, Leyte, Philippines.
- REHM S. and G. ESPIG. 1991. *The Cultivated Plants of the Tropics and Subtropics*. CTA. Verlag Josef Margraf. Priese Gmbh, Berlin, Germany. 552 pp.
- SAUERBORN J. 1999. Agroecosystems of tropical Southeast Asia. In: *Lecture Notes, 7<sup>th</sup> Int'l. Sem. and Workshop on Tropical Ecology* (F. Goeltenboth, P.P. Milan and B.B. Dargantes, eds.). Aug. 22- Sept. 5, 1999. ViSCA, Baybay, Leyte.
- VINK A.P.A. 1975. *Land Use in Advancing Agriculture*. Springer-Verlag. Berlin Heidelberg. New York 369 pp.