

## 32. FLORISTIC ASSESSMENT OF SMALLHOLDER S IN LEYTE ISLAND, PHILIPPINES

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An assessment of the floristics of tree farms was undertaken as part of a tree measurement project on Leyte Island in the Philippines between May and September 2005. The aim was to assess the vascular plants on four types of rural land use: private smallholders; Institute of Tropical Ecology (ITE) assisted reforestation farms; secondary forest; and open areas. All species of vascular plants were recorded at each sample plot, and herbarium specimens prepared. In addition, data on soils, landscape and vegetation structure was gathered at the same locations. This project will enable integration of the social, biodiversity and economic components of smallholder tree farms in the Philippines.

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### INTRODUCTION

There has been significant deforestation within the Philippines in the past fifty years, with a corresponding reduction in biodiversity. It is likely that smallholder tree farms have the potential to ameliorate at least part of this loss of biodiversity. The aim of this study is to assess the contribution that smallholder s can make to restoring biodiversity on Leyte Island and other parts of the Philippines.

In conjunction with the activities of the tree measurement team (see Monterola *et al.* 2007) information on the biodiversity values within smallholder farms, including those with and without tree farms are recorded and compared to reference plots of secondary forest<sup>1</sup> and grasslands which are at the two ends of the biodiversity spectrum. This paper describes the activities associated with floristic assessment, although other components of biodiversity including birds, vegetation structure, soils and landscape attributes were also gathered at the same sites. The data collected are used to assess the biodiversity value of smallholders, and the role that they can play in restoring highly degraded sites on Leyte following decades of inappropriate clearing and land management activities. The dataset will also be used in identifying and designing livelihood systems that are most appropriate for Leyte Island.

Importantly, the floristic dataset can also be directly linked to datasets containing social, economic, attitudinal and productivity information also collected from the smallholder tree farm sites. This forms a unique dataset to assess the socio-economic factors that affect biodiversity and its management, and the economic consequences of increasing biodiversity within smallholder tree farming systems.

### RESEARCH METHOD

Floristic assessment was carried out primarily at sites in the municipalities of Hindang in southwestern Leyte Island and Dulag in the eastern side of the Island. These are also sites included as part of the tree measurement activities (Monterola *et al.* 2007). Additional sites were also included from municipalities which were the subject of the previous research project of ACIAR. These were Babatngon in the northern part, Ormoc and Baybay in the northwestern side, Matalom, Maasin and Macrohon in the southern area, and Mahaplag and Abuyog in the eastern portion.

Floristic data was usually collected by a team of two local enumerators from the ACIAR project located at Leyte State University (LSU), the Philippines, whose main responsibilities were to identify all plant species found in each sample plot, and a biodiversity specialist from The University of Queensland, Australia, in the person of Grant Wardell-Johnson whose expertise was tapped by ACIAR to spearhead the study. This partner periodically visits Leyte, Philippines to check the progress of the fieldwork, and the data collected.

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<sup>1</sup> Under normal circumstances, primary forest would be used as a reference (see Catterall *et al.* 2004). However extensive clearing for agriculture and the impact of extensive logging activities have resulted in little primary forest remaining.

### Establishment of Sample Plots

This study included four rural land use types as the ‘treatments’ for assessment (see Catterall *et al.* 2004, Wardell-Johnson *et al.* 2005) for a description of the general approach used to compare the four land cover types or ‘treatments’). Because of the variation within the various categories, each ‘treatment’ included at least 10 replicates.

#### *Smallholder tree farms and rainforestation farms*

Smallholder farms contain a mix of agricultural activities, which sometimes include tree farms. An initial discussion with the owner of the farms surveyed identified the main activities which are undertaken on the farm, and a sketch of the farm was then prepared which identified the location of these activities (i.e. blocks). An example of how the blocks within a farm are recorded is shown in Figure 1. For tree farm areas on farms, separate ‘blocks’ were identified within tree farms according to the criteria species: age composition, topography, aspect, slope and size used by the tree measurement team. Where possible, data collection was carried out simultaneously with the activities of the tree measurement team (see Monterola *et al.* 2007 for details) since most of the sites were the same for both studies. Where the farm was being measured by the tree measurement team; the blocks were identical for both teams. The tree measurement team only measured plots within the blocks – at least two plots per block of trees in the farm (centre and edge plot), and ignored blocks containing other agricultural activities. The plots established by the biodiversity team were separate and identified using different criteria. The biodiversity assessment team established at least 10 plots per farm. All tree measurement plots on the sampled farms were included for this work. Additional plots were established in the blocks containing other agricultural activities, with at least one plot in each block.

#### *Open environments and secondary forest*

Plots were also established in open areas and secondary forest to provide a basis for comparison concerning biodiversity values. These areas were located at least 500 m apart. Such sites may be composed of farms owned by one or more landowner, as long as the land use is consistent throughout the sampled area. Topography was not used as a basis for stratification. Plots within this site may include at least one coconut or other tree per hectare (i.e. a tree cover of less than 5 %). Individual plots were located at least 30 m from the edge of the open area. In secondary forest, plots were established to represent the whole area together with its different features from that of a private tree farm, rainforestation farm and open area. In all areas, circular sample plots were laid out with the use of a 5 mm size nylon rope, marking every 1 m length distance to a 5 m radius. Individual plots were located at least 30 m from each other, as for open areas.

### Data Collection

Where possible, identification of plant species was made in the field. All species were recorded in the Floristic Assessment Form (Annex A). The heading includes information on the name of the municipality (first three letters) and the specific barangay (first two letters). This served as the Plot reference number. There is also an assigned farm number which consists of three digits, assigned Block number which has two digits and assigned Plot number which also has two digits. For instance, the assessment was made in Barangay Caridad, Baybay, Leyte. It was the first farm to be assessed and specifically, it was in plot 1 of block 1. Then it should be coded as, Plot reference number Bay Ca F 001 -B 001 -P 001. The date when the assessment was conducted and the initials of the assessor were also recorded. The list of plants encountered in the plot was then recorded. The first column is the Field number. The first species identified was regarded as Sp 1 and Sp 2 for the next species and so on. Assigning of Field number was continuous from the first plot to the second plot of the first farm and down to the next farm. The second column is the species name. This consists of the first four letters of the genus and the first four letters of the species. For example, *Gmelina arborea* would be coded as GMELARBO. The common name for the species is entered in the third column. This is the official common name used in the area, (e.g. Yemane for *Gmelina arborea*). Abundance is entered in the fourth column according to six categories (1 - < 1% cover, 2 - 1 to 5% cover, 3 - 6 to 25% cover, 4 - 26 to 50% cover, 5 - 51 to 75% cover, and 6 > 75% cover). Abundance is recorded in four layers (ground, middle, canopy layer and overall). The ground layer includes plants with a height of one metre or less. The middle layer includes plants that are taller than 1 meter but shorter than  $\frac{2}{3}$  of the canopy layer. The canopy layer includes plants that are at least  $\frac{2}{3}$  of the total height. The rating for the overall column provides the overall cover for the site (rather than the sum of the ratings the assessor gave to ground, middle and

canopy). This usually applies only to sites with trees. In addition, the assessor may make personal remarks that serve to guide for the identification of the species.

#### Collection and Preservation of Specimens

The plant species able to be identified in the field were recorded and assigned a field number. Those species which could not be identified in the field were collected. Collection of specimens was done using a knife (for larger stems) or heavy duty scissors (for lighter and softer stems). Two sets of specimens were preserved. The first specimen was pasted or taped on a 12.5 x 20.5 cm index card. The information was the same as in the heading of the Floristic Assessment Form (Annex A), supplemented by the common name, family name and scientific name of the particular species. These preserved specimens were brought back to the field during the next assessment to help facilitate the identification process, and speed up the field sampling.

The second specimen was pressed (using a plant press, cardboard and newspaper). Specimens for this preservation were larger than those on the index cards. Freshly cut samples were labelled with a tag (2 x 3.5 cm). The tag included information on the date of collection and the field number. The specimen was arranged in the half portion of the newspaper and moistened using 70% isopropyl alcohol. The other half of the newspaper was then folded to cover the mounted specimen. The group of specimens included a label concerning the location (i.e. particular farm). This was fixed inside a cellophane bag large enough to accommodate the group of specimens. Specimens were stored permanently at room temperature. At two-weekly intervals, these specimens were checked to expose them to the air to dry and small amounts of 70% isopropyl alcohol regularly added to prevent mould.

#### Identification Process

After a week in the field, the team visited the Department of Biological Science at Leyte State University Herbarium. Those unidentified specimens in the field were matched to the identified specimens in the herbarium. Careful observations of the leaf size, pattern, arrangement, venation, flower, fruit, seeds and length of petioles enabled identification. Literature, including plant identification keys in the university library and in the Institute of Tropical Ecology library, both situated on the LSU campus, also assisted in the identification process. Experts from the College of Forestry and Natural Resources also contributed to final identification.

### PROGRESS OF THE STUDY

Unfavourable weather conditions led to the temporary suspension of fieldwork in September 2005. At that time, priority was given to the tree measurement component of the study. Thus the biodiversity team members were also involved in the tree measurement work to fast track the tree measurement activity. Preliminary results from 151 plots in 57 blocks and 17 farms have yielded 782 records of plant species. Some 254 (32.48%) have been positively identified. A further 284 species (36.32%) have been identified up to genus level and there remain 244 specimens to be identified. Data collection and processing is expected to recommence in the second half of 2007.

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