

CHAPTER III

METHODOLOGY

3.1 Limitation and scope of the study

The study focused on one type of land use in the upland area of North Central Coast of Vietnam. The study considered homegarden structure including species, layers, density and time. Particularly, it concentrated on the uses of the plants to household and economic influence in terms of income at four separate ecological sub-zones of the upland areas. Each sub-zone, which would be reported in the next chapter, differs in altitude and distance from the central market of Thuathien-Hue Province.

3.2 Method of study

3.2.1 Data collection

The analysed data were gathered from both primary and secondary data. The data collection was conducted from March to May 1998. Diagram of collection is illustrated in Figure 4.

3.2.1.1 Primary data

Household survey

Primary data were collected from three main sources. Household surveys were conducted in two stages. Firstly, in order to learn more about homegarden practices at

the communes with semi-structure questions and direct interviews were used. The survey was carried out in all households of the commune with the participate of commune chairpersons, agricultural agents, village leaders and District Unit forest administration officers. Eight households with homegardens of each commune were then surveyed in detail. For the second stage, the survey was conducted on these selected households with questionnaires.

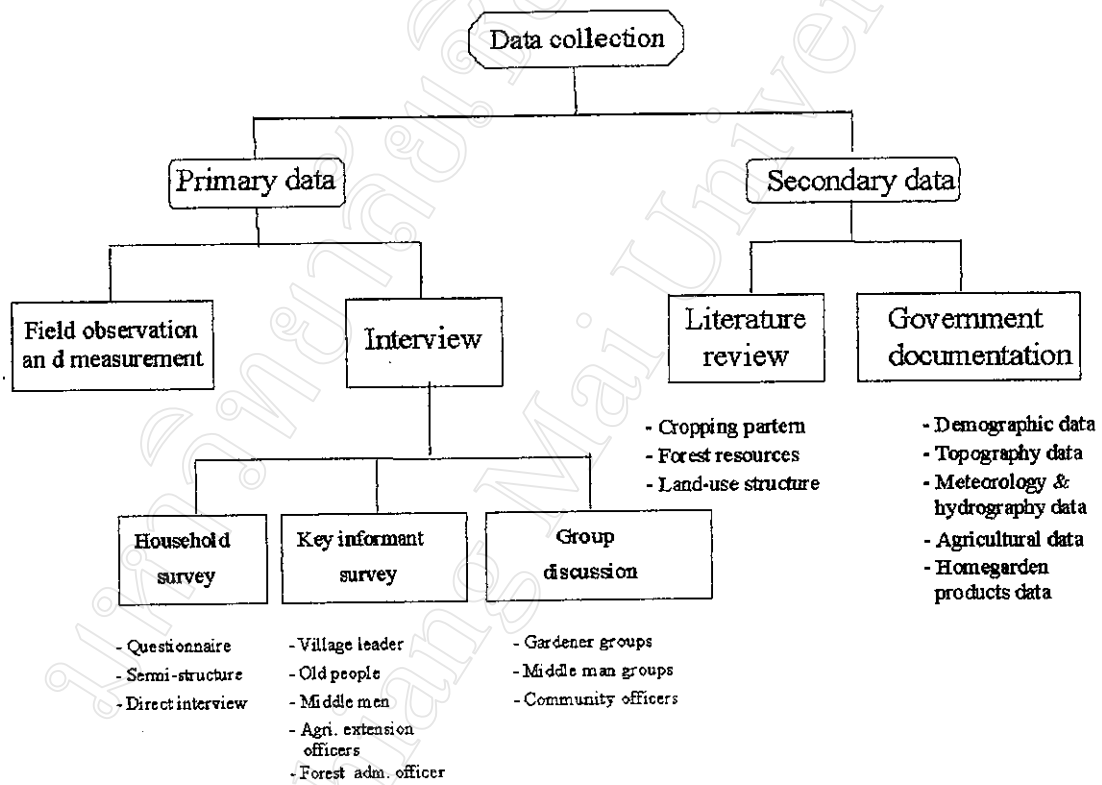


Figure 4. Data collection method diagram

Key informants interview

In order to gain maximum information about homegarden activities at each study site, commune chairpersons, village leaders, commune agricultural agents,

forest administration agents, middlemen of homegarden products, and agricultural extension agents were requested to participate in the interview.

Group participant discussion

Most key informants and homegarden farmers were questioned in the open participatory discussions on species, components of homegardens, seasonal calendar, local name and uses of homegarden trees and crop prices of homegarden products and trade. These discussions also mentioned the market and the needs of the market by middlemen.

3.2.1.2 Secondary data

Secondary resources

Available literature and other data sources on topography, soil, meteorology, hydrography, and demography were collected. Up-to-date information was gathered from the Provincial Department of Agricultural and Rural Development (DARD), the National Department of Meteorology and Hydrography (NDMH), the Aluoi Meteorology Station, the Hue Meteorology Station and the Provincial Section of Forest Administration (SFA).

Field observation and measurement

Information on garden structure by layers, cropping pattern, forest resources and land-use structure in general were gathered by direct observation. This

information was then discussed with the local people in the semi-structure survey and group participatory discussions.

3.2.2 Information collected

Bio-physical information

- Homegarden size, field size, forest area
- Land holding, land typing distribution and use
- Crops and cropping pattern in the agricultural land
- Existing homegarden tree species, crops production and management
- Species component, horizontal, density and time structure of trees and crops in the homegarden
- Trees, crops, botanical specimens, local name and uses
- Farm inventory of trees and crops in the homegarden

Socio-economic information

- Homegarden income (cash and non-cash income) in 1997
- Demographic data
- Farmers thinking on homegarden development

3.2.3 Data analysis

3.2.2.1 Local name and scientific name (Latin name)

Local names of trees and crop species were identified at studied sites whilst botanical specimens were collected for re-identification at the Herbarium of the Faculty of Forestry (Hue University of Agricultural and Forestry) for their scientific names. Results of this analysis were confronted to An Illustrated Flora of Vietnam (Ho, 1992; 1993), Vietnamese Herb Dictionary (Chi, 1997) Vietnam Forest Trees (Forest inventory and planning institute, 1996) and Manual on Research of Biodiversity (Thin, 1997).

3.2.2.2 Homegarden structure

Homegarden structures were analyzed by investigating vertical and horizontal arrangement, density and time of establishment. Biodiversity of homegardens was analyzed by diversity indices.

Diversity indices

Richness indices (R) were based on the relationship between the number of species (S) and the total number of individual plant observed (n) (Ludwig and Reynolds, 1988)

Margalef index

$$R_1 = \frac{S-1}{\ln(n)}$$

Diversity indices (N) were based on Shannon's index H' or Simpson's index λ (Ludwig and Reynolds, 1988). From Simpson's index an unbiased estimator λ^* for sampling from an observed population was given as

$$\lambda^* = \frac{\sum_{i=1}^S n_i(n_i-1)}{n(n-1)}$$

where n_i is number of individuals of the i^{th} species.

The Shannon function H' is the average uncertainty per species in an infinite make up of species's population parameter with proportional abundances of the i^{th} species.

Shannon's index was estimated from H'^* (Ludwig and Reynolds, 1988), given as

$$H'^* = -\sum_{i=1}^S \left[\left(\frac{n_i}{n} \right) \ln \left(\frac{n_i}{n} \right) \right]$$

Evenness indices (E) refers to how the species abundances are distributed among the species (Ludwig and Reynolds, 1988). The indices selected and compared against five indices of Ludwig and Reynolds (1988) at the four studied sites was the modified Hill index

$$E_5 = [(1/\lambda^*) - 1] / [e^{H'} - 1]$$

Diversity index N_1 measures the number of abundant species in the sample

$$N_1 = e^{H'}$$

The familiar J' of Pielou index, the Sheldon index, the Heip index, and the Hill index were also calculated for reference.

3.2.2.3 Homegarden uses analysis

Fifteen different uses of tree species were considered.

3.2.2.4 Homegarden income analysis

Cash and non-cash incomes of the homegarden farmers were analysed.

3.2.2.5 Homegarden structure recommendation

Homegarden structure in four sub-ecological zones would be recommended based on the common species, income generating species and species that could fulfill farmers' needs.