

QUANG NGAI RURAL DEVELOPMENT
PROGRAM (RUDEP) - PHASE 2

**An Analysis of Farming Systems in Quang Ngai
Province**

Volume 1: Main Report



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ACRONYMS

AEZ	Agro-Ecological Zone
AG	Activity Group
AusAID	Australian Agency for International Development
CPC	Commune People's Committee
DDO	District Development Officer
DPI	Department of Planning and Investment
FGD	Focus Group Discussion
FS	Farming System
FSR	Farming systems research
HH	Household
PPC	Provincial People's Committee
QN	Quang Ngai
RUDEP	Quang Ngai Rural Development Program (Phase 2)

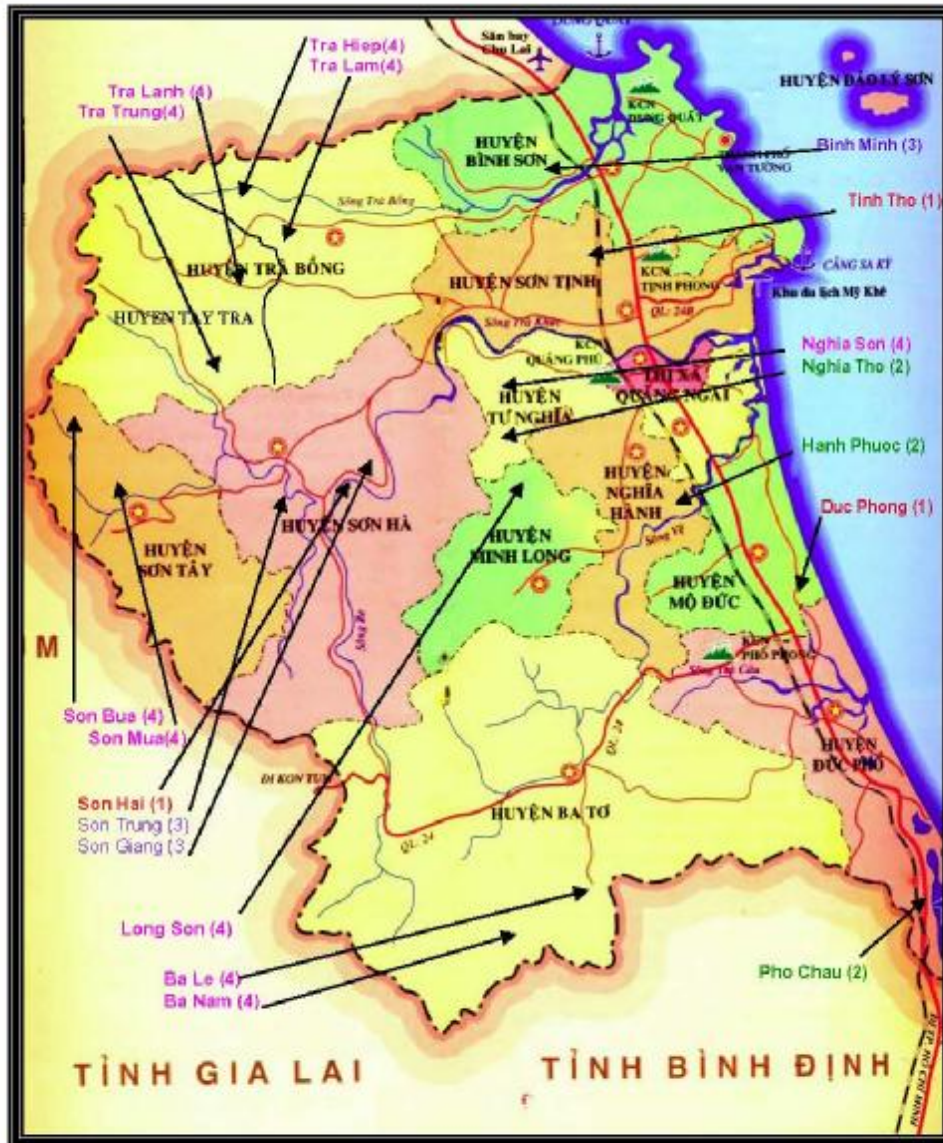
RUDEP Districts and Communes

Cycle	Year of Entry	District	Communes
Cycle 1	2002	Mo Duc	Duc Phong
		Son Ha	Son Hai
		Son Tinh	Tinh Tho
Cycle 2	2003	Duc Pho	Pho Chau
		Nghia Hanh	Hanh Phuoc
		Tu Nghia	Nghia Tho & Nghia Son
Cycle 3	2004	Binh Son	Binh Minh
		Son Ha	Son Trung & Son Giang
Cycle 4	2005	Ba To	Ba Nam & Ba Le
		Minh Long	Long Son
		Son Tay	Son Mua & Son Bua
		Tay Tra	Tra Trung & Tra Lanh
		Tra Bong	Tra Hiep & Tra Lam

Note

- * Cycle denotes the sequence of entry of the commune into the program.
- * Tay Tra is a new district formed in 2004 with the splitting of Tra Bong district.
- * Nghia Son Commune in Tu Nghia Diistrict joined in the program in 2005.

Map of Quang Ngai Province and RUDEP Districts and Communes



Indicates name of commune and bracketed number indicates entry cycle into Program.

SUMMARY

Farming System's Research (FSR) seeks to understand the farming system and to propose changes to the system that can improve productivity and profitability in sustainable ways. A farming system is the relationship between production, consumption, farmers, and surrounding environment.

This study conducted Focus Group Discussions (FGDs) with farmers to gather information concerning existing Farming Systems (FS) in Quang Ngai Province. The main components of Farming Systems in Quang Ngai are: crop, livestock; forestry; aquaculture and off-farm enterprises. There are variations in components amongst FSs in Quang Ngai.

The study used the Agro-Ecological Zone approach to classify the province into three main zones: upland, lowland and coastal. All communes are categorised into these three zones.

The Upland AEZ consists predominantly of ethnic farmers where the FS and their components are simple and basic. The majority of farmers continue to use traditional methodologies such as allowing animals to mate anytime rather than using artificial insemination, or using herbal medicines instead of relying on the local paravet to vaccinate. Resource limitations and traditional beliefs predominately influence the various enterprises, i.e. most enterprises are similar amongst HH as farmers tend to use the same farming techniques. Farmers are active in a large number of enterprises, however the scale of each in terms of land usage or animal per HH is relatively small. Most of the agricultural enterprises have no financial value as they are used for HH consumption and feed for livestock.

The Lowland AEZ consists predominately of Kinh farmers where the FS are more advanced; therefore farmers can adapt and adopt new farming techniques. The majority of farmers have access to water resources and productive soil where the location of HHs determines the nature of enterprises. Farmers are faced with limited land where difficulties in further cropping enterprises is evident.

The Coastal AEZ consists of Kinh farmers where the FS and components are similar to the lowland AEZ.

Each AEZ is different as the location of HHs, resource availability and culture influences play significant roles on the existing FS and its components.

1. INTRODUCTION

This report describes the major farming systems in each of the communes within which the Quang Ngai Rural Development Program (RUDEP) works.

The data collection, analysis and report writing was done by an Australian Youth Ambassador assigned to work with RUDEP in 2006.

This report provides a summary of the farming systems in the main body of the report. The full enterprise gross margins, labour input schedules, labour and cash flow calendars and whole farm models in the annexes for each individual farming system are presented.

The study serves two purposes:

- Allows RUDEP staff to work with extension staff to determine potential income generating activities appropriate to the farming system and available resources;
- To be used as a baseline to quantify the change in farming systems over time against the baseline situation of 2006.

2. QUANG NGAI RURAL DEVELOPMENT PROGRAM

RUDEP is a rural development program financed jointly by the Governments of Australia and Vietnam. Its goal is to contribute to rural development, governance and poverty reduction in selected communes in Quang Ngai province. RUDEP has four program components:

- (1) Household-based rural income generation;
- (2) Commune-based rural infrastructure;
- (3) Commune, district and province capacity building; and
- (4) Management, monitoring and evaluation.

The Vietnamese counterpart agency is the Department of Planning and Investment (DPI). The program owners are the Quang Ngai Provincial People's Committee (PPC) and the Australian Agency for International Development (AusAID). The Program currently works in all 12 mainland Districts in Quang Ngai Province and more specifically in at least one commune in each of these 12 Districts. RUDEP is currently working in a total of 23 Communes.

The Program uses the following approaches to achieve its goal:

- Commune Development Planning (CDP) that supports improving planning processes in the Province
- Commune Development Funds allocated to Communes for income generation (economics), livelihoods (social) and infrastructure activities;
- Activity groups to empower group members and engender local accountability through the planning and implementation of income generation, livelihood and infrastructure activities;
- Income generating options for both on-farm and off-farms activities;
- Savings and credit funds that are managed and operated by the members of the groups;
- Capacity building programs to improve and develop technical knowledge, skills, management, planning and confidence for stakeholders.

3. FARMING SYSTEMS IN QUANG NGAI

A Farming System (FS) is a complex structure that consists of a series of components moving from farm production to final consumption, involving farmers and surrounding environment. Farm production and final consumption systems consist of various enterprises such as cropping, livestock, forestry, and off-farm (secondary activities). Farmers and the surrounding environment are influenced by the biophysical, institutional and socio economic situation.

FSR seeks to understand FS and to propose changes to the system that will improve productivity and profitability in a sustainable way. FSR seeks to identify new methods to overcome constraints in farm production and consumption systems; improve the total yield/output (quantity and quality); business sustainability and enhancing living standards.

In order to understand the provincial farming systems, it is useful to introduce the idea of agro-ecological zones to allow FS to be categorised. A formal definition of an agro-ecological zone (AEZ) is as follows: An agro ecological zone is a land resource mapping unit, defined in terms of climate, landform and/or land cover, and giving a specific range of potentials and constraints for land use (www.fao.org/AG/agk/agll/prtaez.stm, 30/10/06).

The three main AEZs in Quang Ngai are:

(i) Upland AEZ

- Traditional beliefs and practices such as herbal medicine play an important role for farmers and agricultural activities;
- Crops have low yield due to: lack of technology, low water availability, low investment in fertiliser (herbicides or pesticide), limited varieties and low soil fertility;
- Low animal production due to technology deficiencies, reliance on local breeds, low investment in animal feed, limited knowledge of animal care and limited or no veterinary services;
- Forestry is constrained by low soil fertility, difficulty in roads and transportation, lack of technology and reliance on local varieties;
- Farmers are faced with minimal marketing choices as there are inconsistent traders entering the communes;
- HHs are involved in a relatively small number of agricultural enterprises.
- FS in the upland communes are subsistence based.

(ii) Lowland AEZ

- The farmers are able to adapt to new techniques and technologies as ancestral worship (traditional beliefs) do not have an important role in the farmers' lifestyle;
- Cropping production is relatively more productive as most farmers use various chemical inputs to increase output. Additionally, farmers tend to use their land more efficiently by using such methods as crop rotation;
- Diversification of livestock activities (breeding and finishing) as the farmers are able to differentiate between these activities (compared to upland communes);
- Forestry production is limited and only a small number of HHs are involved;

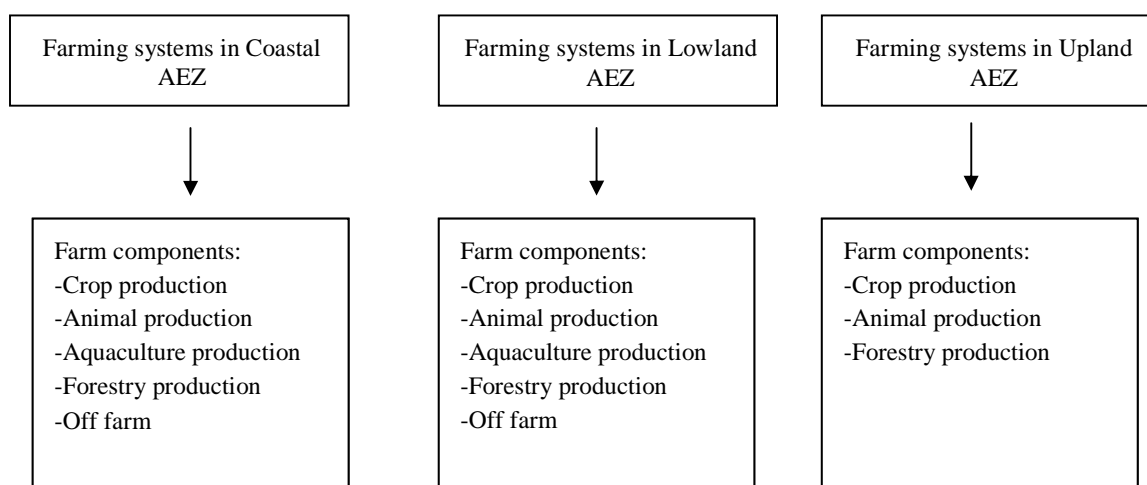
- Off-farm enterprises – there is a large portion of HHs where members migrate to larger cities to earn additional income. These people are absent throughout the year and return during Tet (Vietnamese New Year, usually held in February).

(iii) Coastal AEZ

- Farmers in the coastal AEZ are similar to those in the lowland AEZ; these farmers are Kinh people who better adapt to new techniques. The main production constraint is limited land area;
- More HHs are involved in aquaculture enterprises compared to the lowland AEZs.

Each Farming System contains variations of components such as crop production, livestock production, aquaculture production, forestry production and off-farm activities. Details of the components found in each of the three AEZs in Quang Ngai are given in Figure 1.

Fig 1: Agro-ecological zones and Farming system components in Quang Ngai Province



RUDEP works in 19 communes within Quang Ngai Province and these communes are spread across the three AEZs as per Table 1.

Table 1: Agro Ecological Zones In Quang Ngai Province

Quang Ngai Province		Agro-Ecological Zone		
District	Commune	Upland	Lowland	Coastal
Mo Duc	Duc Phong			X
Son Tinh	Tinh Tho		X	
Son Ha	Son Hai	X		
	Son Giang	X		
	Son Trung	X		
Duc Pho	Pho Chau			X
Nghai Hanh	Hanh Phuoc		X	
Tu Nghia	Nghia Tho	X		
	Nghia Son	X		
Binh Son	Binh Minh		X	
Ba To	Ba Le	X		
	Ba Nam	X		
Minh Long	Long Son	X		
Son Tay	Son Bua	X		
	Son Mua	X		
Tay Tra	Tra Lanh	X		
	Tra Trung	X		
Tra Bong	Tra Lam	X		
	Tra Hiep	X		

NOTE: Ba Nam commune was excluded from the analysis due to the commune being inaccessible during the time of the study.

4. METHOD

4.1 Identification of Farming Systems

A literature review on other RUDEP reports was conducted to identify and understand the various components of farming systems within Quang Ngai Province. In particular, a RUDEP report administered by Hue University consultants identified AEZs and farming systems, forming the basis for any research and analysis conducted in this study.

Each District Development Officer (DDO) was contacted to reconfirm relevant findings and to discuss whether there were any changes to activities, or the need to initiate new activities. This enabled us to determine the main farming systems in each commune i.e. the farming systems practised by the majority of farmers in each commune.

We acknowledge that there are many variations within and across farming systems; however the objective of the study was to gain greater understanding of farming systems that could be used to assist agricultural extension work and to demonstrate to extension staff how to use such information. As such, this study does not attempt to document every possible farming system or activity carried out in the communes, but to describe the main farming systems practised by the majority of farmers.

4.2 Focus Group Discussion

In order to collect information regarding the activities of each main FS, Focus Group Discussions (FGD) were conducted with farmers from villages within each commune. These FGDs were conducted with groups of between 5 to 10 farmers where the details of each activity per farming system were discussed. The format for the FGD involved two stages:

- (i) FS concepts were introduced through visual techniques, where farmers indicated land use areas, agricultural activities, labour activities and seasonal calendars;
- (ii) Understand why farmers do specific activities (cultural/ lifestyle aspects).

The advantages of collecting FS data from focus groups include:

- Basic visual layouts allow farmers to participate, as all information was clearly presented. This allows farmers to form a clear understanding of why they're participating in the focus group discussion. Thus, farmers answer the questions and from there a discussion will follow;
- Group discussions allow any data collected to be more accurate, as there is more than one reference. The farmers can be asked individually about particular agricultural activities and reconfirm the data;
- The majority of discussions were held at a participant's house instead of the commune centre. This created a more comfortable environment and encouraged farmers to open up; and
- Men and women were equally represented in the groups.

There were also disadvantages of using focus groups:

- Some participants are shy and reserved and fail to interact, therefore the facilitator must create an enjoyable working atmosphere and continuously observe the behaviour of participants to promote participation.
- Some discussions can be prolonged when farmers disagree or when groups are not active.
- Discussion may go for too long and participants become bored and tired.

4. 3 Data Analysis

There are two types of analysis used in the report: descriptive analysis and economic analysis.

(i) Descriptive Analysis is a qualitative analysis of farming systems. The analysis aims to establish a clear understanding of the processes of each agricultural activity i.e. the relationships of social, cultural, lifestyle with respect to their agricultural activities. The objective is to provide opportunities that improve or, introduce new and suitable agricultural activities into the commune.

(ii) Economic Analysis examines the quantitative aspects of farming systems by: (i) identifying the representative land use and determining whether or not farmers are efficiently using the area throughout the year; (ii) using an economic indicator to determine whether farmers are making positive or negative returns after taking income and cost into consideration; (iii) identifying the timing and duration of each activity and the amount of labour required; (iv) using a Whole-Farm Model to look at the interactions between all the components of an FS including labour input, gross income, total cost and net income throughout the year.

5. GLOSSARY OF TERMS

LAND

LAND USE: methods in which farmers utilise their land area during the year, including multiple uses of the same plot within one year.

LAND TYPE: Four main types:

- (i) Irrigated; any cropping activities where water is used to irrigate the land via water pumps, natural spring water or irrigation channels.
- (ii) Rainfed; where cropping activities rely solely on rain.
- (iii) Forest; any forestry or tree crop activities (usually rainfed)
- (iv) Other; any land that does not fit in the first three categories, such as residential plots and home gardens.

LAND OWNERSHIP: tenure status of the land used by farmers. There are three types of land ownership:

- (i) Owning the land with a red book. Indicates the farmer has the legal right to use the specified area and has the necessary documentation to prove it.
- (ii) Owning the land with no red book. Indicates that the farmer has a history of using the land and, is recognized as owning the land, but technically is not the legal owner and has no documentation to prove ownership.
- (iii) Using the land with no red book. Indicates farmer is illegally using the area for their own purpose.

ENTERPRISE BUDGET

ENTERPRISE: a specific sub-component of the FS; for example, cropping, livestock, forestry, aquaculture or, off-farm enterprise. Sub-components are further distinguished by the timing, type of output, etc. e.g. winter-spring rice enterprise or pig finishing enterprise.

ESTABLISHMENT COST: the initial costs of one-off activities. For example, the building of a shed for livestock; farmers do not need to re-build the shed once the cycle has been completed.

OPERATING COST: the on-going expense the farmer incurs for the activity to continue; for example, the cost of feed for animals.

ACTIVITY: processes practised to achieve the final output. For example, in a pig finishing enterprise where feeding, vaccinating, buying, selling, etc are all activities.

UNIT: a unit of measurement. For example, one sao is a unit of land area (1 sao = 500 m²).

AMOUNT: quantity per particular activity.

TOTAL COST: total expense of the activity, calculated by multiplying the 'Units' with the 'Amount'. For example, the cost of cultivating rice includes expenditure for seeds, fertiliser, herbicides, pesticides, labour, etc.

GROSS INCOME: value of the activities final product, resulting from the use of the input materials. This usually comes from the sale of the product.

NET INCOME: returns received by the farmer from each agricultural activity; the difference between Gross Income and Total Cost. A negative net income indicates farmers are experiencing a financial loss, therefore the analysis must identify the reasons for this. A positive net income indicates farmers are making a profit from the activities.

LABOUR CALENDAR

LABOUR INPUT: number of person hours and/or person days required to complete the activity. There are three types of labour: family labour (using HH members); hired labour (using payments); and exchange labour (using members from neighboring HHs to complete the work, and vice versa).

PERSON DAYS (Pday): calculates the amount of days to complete an activity. One standard person equals 8 hours. **Working days (Wday)** is the number of days taken to complete an activity. This is appropriate only when there is more than one person working. For example, if two people harvest the winter-spring rice crop in one day, there are 2 person days but only 1 working day.

CALENDARS

SEASONAL CALENDAR: timing of various input and output activities throughout the year.

LUNAR CALENDAR: calendar commonly used by local farmers. The lunar year typically begins in late January or early February. In this analysis, months are designated as lunar months, where T1 is February, T2 is March, etc. The prefix 'T' refers to the Vietnamese word 'thang' for month.

WHOLE FARM MODEL

MODEL: the entire farming system. Provides monthly details of labour use, gross income, total cost and net income.

- Labour Use: using the maximum person days available per HH as the baseline to determine whether HHs have a monthly labour surplus or deficit;
- Gross Income: total income from all components of the farming system before costs have been deducted;
- Total Cost: total cost for all inputs, to all components of the farming system;
- Net Income: the difference between Gross Income and Total Cost.

6. DISCUSSION: Farming Systems by AEZ

As discussed in Section 3, Quang Ngai Province has three main AEZs: upland, lowland and coastal. The communes in each category of AEZ, have similar agricultural activities, as the culture and behaviour of the farmers is similar.

6.1 Upland AEZ

Districts: Tu Nghia, Ba To, Son Tay, Tay Tra, Tra Bong, Son Ha and Minh Long,

Communes: Nghia Tho and Nghia Son, Ba Le, Ba Nam, Son Mua, Son Bua, Tra Trung, Tra Lanh, Tra Hiep, Tra Lam, Son Trung, Son Hai, Son Giang and Long Son

The two main FS identified in upland communes have the following components:

1. Crop production and Livestock production; and
2. Crop production, Livestock production and Forestry production.

The FSs are simple and the FS components do not vary as farmers tend to follow other farmers. Farmers in the upland communes are involved in a large number of agricultural enterprises, however the scale of production per HH is small.

Any agricultural improvements or new enterprises are challenging. The majority of poor ethnic farmers live in remote areas where resources are limited. Another constraint which prohibits the adoption of new farming techniques is the strong influences of cultural beliefs, such as ancestral worship which is not compatible with new farming techniques. For example, farmers believe in allowing animals to wander freely rather than house them and restrict their movements. HHs have a subsistence-based existence, where the output from enterprises are used for home consumption rather than for profit.

During FGDs the following constraints were raised:

- Lack of resource accessibility, especially water for irrigation where natural springs and rivers do not flow into the agricultural areas;
- Lack of market information and alternative options for selling products in upland communes. For example, after farmers harvest forest products they sell it to nearby factories as they do not know of other alternatives;
- Animal vaccinations and services vary within and across communes due to the limited number of paravets (commune/village veterinary officers) and the isolated nature of some hamlets/HHs. There are farmers who continue to use traditional medicine and are not convinced of adopting new approaches;
- Difficult road access usually means lower farm gate prices of commodities;
- Most production from enterprises (particularly crop enterprises) have no financial value, as is used for human consumption and livestock feed;
- Low (or zero) education level for adults. Majority of ethnic adults cannot speak Vietnamese but only their native language;
- Farmers continue to do what they have always done as it is related to their current lifestyle and any change in farming practice must consider lifestyle change;

- Livestock activities are not performed at specific times each year, as they are raised for home consumption and eaten when needed or sold when cash is required.

6.2. Lowland AEZ

Districts: Son Tinh, Nghia Hanh, Binh Son

Communes: Tinh Tho, Hanh Phuoc, Binh Minh

The main FS components identified in the lowland AEZ are:

1. Crop production and Livestock production (+/ off farm activity);
2. Crop production; Livestock production and Forestry production (+/ off farm activity);
and
3. Crop production; Livestock production and Aquaculture production (+/ off farm activity).

The lowland communes predominately consist of Kinh farmers who adapt more technologies. Most agricultural enterprises have financial value as farmers want to increase profits and develop more enterprises. Off farm income is of two main types: i) where HH members migrate to the larger cities such as HCMC to work; and ii) where HH members operate small local businesses.

During the FGDs the following constraints were raised:

- Limited land area which prevents further expansion, especially for cropping land, unless farmers rent land from HHs who no longer need it, i.e. families who have migrated to HCMC and no longer use their land;
- Limited market information where farmers rely on the same local traders every year or on particular farmers to help them sell products;
- Uneven distribution of irrigation water limits the number of crops grown per year where some areas receive sufficient water and others have limited access to water.

During the FGD the following advantages were raised:

- Farmers are willing to adapt to new activities and techniques as it will increase income levels;
- Traditional beliefs do not play such an important role in farming and lifestyle when compared with the upland.

Overall, lowland FSs are more diverse as the farmers have more resources to assist the expansion and development of agricultural enterprises.

6.3. Coastal AEZ

Districts: Mo Duc and Duc Phong

Communes: Duc Phong and Pho Chau

The main FS components identified in the coastal AEZ are:

1. Crop production and Livestock production (+/ off farm activity);

2. Crop production, Livestock production and Forestry production (+/ off farm activity); and
3. Crop production, Livestock production and Aquaculture production (+/ off farm activity).

Coastal AEZ farming systems are similar to those in the lowland AEZ however, aquaculture production plays a more important role in income generation.

7. DISCUSSION: Farming Systems by District

7.1 Tu Nghia District (Upland AEZ)

During the FGD, Nghia Son commune proved less challenging in comparison to Nghia Tho commune, as farmers from Nghia Son were able to learn and understand new concepts more rapidly than Nghia Tho farmers. The communes are close in proximity, and why one commune is able to grasp key concepts faster than the other is unknown.

7.1.1. Nghia Tho Commune (see Annex 1.1)

Main Farming Systems:

1. **FS1:** *winter spring rice crop - summer autumn rice crop – cassava – sugarcane – breeding cow - finishing pig – buffalo - acacia;*
2. **FS2:** *winter spring rice crop - summer autumn rice crop – cassava - sugarcane (plain) – sugarcane(mountain) – breeding cow – finishing pig - acacia*

There were difficulties in deriving data due to language barriers between farmers and facilitator. Consequently, a large portion of the data, such as labour inputs, are obtained from other communes.

Comments:

FARMING SYSTEM 1:

- Rice production: no financial value was derived as rice is an important food source and farmers had difficulties in quantifying the yield per sao;
- Breeding cow: female cows not considered sexually mature until three years of age;
- Annual labour input is 336.5 person days and HH labour is underutilised. However, sugarcane and cattle/buffalo enterprises require the most labour inputs;
- Gross Income is 14,305,000 VND where income generated is consistent annually and farmers rely primarily on sugarcane and cattle as their income sources;
- Total Cost is 3,275,568 VND where the winter-spring rice, summer-autumn rice, sugarcane production require the highest costs. However, the overall input cost for all activities is relatively low;
- Net income is 10,429,432 VND.

FARMING SYSTEM 2:

- FS2 is the same as FS1, excluding the additional activity of sugarcane grown on mountainous areas;
- Sugarcane: market price is dependent on road accessibility;
- Annual labour is 545.3 person days where HH labour is underutilised throughout the year with various peaks;
- Gross income is 15,322,000 VND where January and February have the highest income generated when cows, cassava and sugarcane are sold;
- Total cost is 4,029,318 VND and is relatively low;
- Net income is 11,292,682 VND.

7.1.2 Nghia Son Commune (see Annex 1.2)

Main Farming Systems:

1. **FS1:** *winter spring rice crop - summer autumn rice crop – cassava (plain area) – cassava (mountain) – sugarcane – breeding cow - finishing pig – raising chicken - acacia*

Comments:

FARMING SYSTEM 1:

- Rice production: winter-spring rice crops generally have a higher yield per sao, due to higher average rainfall;
- Cassava: location of the field determines the crop duration. For example, crops grown on an alluvial plain with good ground water (near a river). Growing period is seven months, or for crops grown in mountainous areas, the duration is twelve months;
- Sugarcane is a new activity, with increasing numbers of farmers growing sugercane.
- Buffalo: used for two purposes (i) to assist land preparation, and; (ii) status sign of wealth;
- Breeding cows: farmers buy cows that have already given birth;
- Chicken: farmers do not need to administer any medical treatment;
- Annual labour input is 208.6 person days where HH labour is underutilised throughout the year. February requires relatively high labour input as most of the cropping activities begin at this time;
- Gross income is 17,910,000 VND where January has the highest income due to increased demand for livestock, that being Tet;
- Total cost is 8,349,301 VND where winter-spring rice, summer-autumn rice, sugarcane and pig activities require relatively high input costs;
- Net income is 6,560,699 VND and has a similar pattern to gross income, except for June and December, when the cost of rice enterprises is high.

7.2 Ba To District (Upland AEZ)

There were difficulties in understanding the existing FS, as farmers were shy and reluctant to communicate with the facilitator. Consequently, Ba To DDO was relied upon to conduct the FGDs.

7.2.1. Ba Le Commune (see Annex 2.1)

Main Farming Systems:

1. **FS1:** *winter-spring rice - summer-autumn rice - third rice crop - sweet potato - banana - breeding cow - breeding pig - buffalo - acacia;*
2. **FS2:** *winter-spring rice - summer-autumn rice - third rice crop - banana - sweet potato - maize - breeding cow - breeding pig - buffalo - acacia - betel nut tree;*
3. **FS3:** *third rice crop - banana - sweet potato - maize - pineapple - breeding pig - buffalo - acacia - betel nut tree.*

FARMING SYSTEM 1:

- Banana and sweet potatoes: difficulties in quantifying the person hours per activity, as activities are usually done only when farmers have time;
- Breeding cow: farmers feed cows for 1.5 years prior to mating, and sell the calves at three years of age. Farmers generally do not vaccinate, however they will vaccinate in the event of an epidemic;
- Buffalo: there is no medical treatment for buffalo as the farmers indicated that the buffalo rarely become sick or suffered from any epidemic or outbreaks;
- Breeding pigs: (i) currently no veterinary treatments are being used; (ii) a large portion of farmers use the sow as a form of ancestral worship;
- Acacia: farmers could not quantify the person hours for the various activities;
- Annual labour is 282.5 person days where HH labour is underutilised throughout the year. Activities requiring more HH labour inputs when compared to other activities, include their third rice enterprise and livestock production;
- Gross income is 13,255,000 VND where farmers heavily rely on the selling of livestock for income, and most income is generated in the months of January and November;
- Total cost is 228,000 VND where the rice production enterprises are the only ones with any significant costs, as the rest of the enterprises rely on local materials;
- Net income is 13,027,000 VND and has similar patterns to gross income.

FARMING SYSTEM 2:

- FS2 is the same as FS1, excluding the additional enterprises of maize and betel nut tree;
- Maize: no financial value as it is used for HH consumption and feed for livestock;
- Labour inputs: similar to FS1, even with the introduction of new enterprises;
- Annual labour is 308 person days where HH labour is underutilised except for May as most of the cropping activities begin at this time;
- Gross income is 13,526,875 VND with income generated evenly throughout the year except for January where farmers sell livestock (before Tet);
- Total cost is 228,000 VND where rice production enterprises being the system with input costs as the rest of the enterprises rely on local materials;
- Net income is 13,298,875 VND, similar to the gross income.

FARMING SYSTEM 3:

- FS3 is a combination of FS1 and FS2 with the addition of a pineapple enterprise;
- Rice production: limited water/irrigable land area means that farmers have only one rice crop per year. Rice is primarily a food resource and is predominately used for HH consumption;
- Annual labour is 155.4 person days where HH labour is underutilised throughout the year;
- Gross income is 2,906,875 VND with income generated throughout the year;
- Total cost is 0 VND as all HHs use local resources for their agricultural enterprises;
- Net income is 2,906,875 VND, the same as gross income.

7.3 Tay Tra District (Upland AEZ)

7.3.1 Tra Lanh Commune (see Annex 3.1)

There are a number of farmers involved in livestock FS involving pigs and cattle. However, they have been excluded from the analysis as the animals continually die. Farmers will only continue livestock production if there is money in the HH, but many will discontinue livestock production as it is difficult to maintain financially.

Main Farming Systems:

1. **FS1:** *winter-spring rice crop - summer-autumn rice crop - third rice crop - cassava - maize - banana - acacia - cay dot - betel nut tree - cinnamon;*
2. **FS2:** *third rice crop - cassava - maize - banana – acacia - cay dot - betel nut tree - cinnamon - cay lo o.*

Comments:

For various FS components, data has been derived from neighboring communes, in particular, Tra Lam.

FARMING SYSTEM 1:

- Rice production: farmers are not aware of the market price for rice as it is an important household food source. However, there are some farmers that barter rice for other commodities with Kinh people, for example noodles. The market price for rice is an estimate.
- Cassava: no seasonal calendar as cassava is harvested throughout the year for HH consumption.
- Annual labour is 367.8 person days where HH labour usage varies throughout the year (i.e. strong and weak periods). Winter-spring rice, summer-autumn rice and the third rice crop require the most HH labour;
- Gross income is 1,800,000 VND where income is generated every 3-4 months;
- Total cost is 0 VND as all HHs use local resources for their agricultural activities;
- Net income is 1,800,000 VND which is the gross income.

FARMING SYSTEM 2:

- Agricultural activities in FS2 include all activities in FS1, excluding winter-spring rice and the summer-autumn rice crop;
- Annual labour is 184.8 person days where HH labour is underutilised throughout the year except for July and August, which is the sowing period;
- Gross income is 1,125,000 VND where from February to July there is no income generated;
- Total cost is 0 VND, where farmers uses local materials for their agricultural activities;
- Net income is 1,125,000 VND, the same as the gross income.

Recommendations:

- Livestock production: investigation into the reasons why animals continually die, even when farmers vaccinate. To understand these constraints, RUDEP and other service providers can assist in increased incomes for these farmers;
- Rice production: assist farmers towards increased productivity, especially in FS2 where there is only one rice crop per year;
- Cay Do: farmers should discontinue as the cycle is approximately 8 years where each tree is sold at 10,000 VND. There is no economic benefit for these farmers as farmers only have small number of trees and the return is very low;
- There are difficulties in initiating new activities for these farmers, as most agricultural activities are not directed towards financial gain, but subsistence agriculture to feed HHs and livestock. To understand these farmers and their reasoning behind certain activities would go a long way towards the successful introduction of new activities. Implementation or improvement of activities without understanding the behaviour of farmers can essentially be a waste of time.

7.3.2 Tra Trung Commune (see Annex 3.2)**Main Farming Systems:**

1. **FS1:** *winter-spring rice crop - summer-autumn rice crop - cassava - maize – banana - jack fruit - breeding pigs - breeding cow;*
2. **FS2:** *winter-spring rice crop - summer-autumn rice crop - cassava - maize - banana - jack fruit - breeding pigs - breeding cow – cinnamon –betel nut tree.*

Comments:

For various FS components data has been derived from neighbouring communes; Tra Lam and Tra Lanh. Thus a large portion of the analysis are only estimates.

FARMING SYSTEM 1:

- Annual labour is 441.8 person days where HH labour is underutilised except in January as farmers begin the jack fruit activity;
- Gross income is 11,765,000 VND where income is generated at the end of the year starting from July;
- Total cost is 20,000 VND where most activities use local resources as farmers can not afford to buy;
- Net income is 11,685,000 VND is similar to gross income.

FARMING SYSTEM 2:

- Annual labour is 445.8 person days where HH labour is underutilised throughout the year except for January. The activity that requires most labour is cattle due to daily feed and mustering;
- Gross income, total cost and net income is the same as FS1 because forestry activities have been excluded.

Recommendations:

- Breeding cow: to shorten the waiting period before mating, that is, farmers wait for only two years prior to mating.
- Most of the data collected was derived from Tra Lanh (closest commune) as the farmers had difficulties in providing data. These farmers believe in nature and activities are based on tradition. Thus, further understanding in cultural beliefs and activities is an important component to increased development.

7.4 Son Tay District (Upland AEZ)

7.4.1 Son Mua Commune (see Annex 4.1)

Main Farming Systems:

1. **FS1:** *spring-summer rice (irrigated) - summer-autumn rice (irrigated) - third rice - cassava - breeding pig - breeding cow - acacia - betel nut - cay lo o;*
2. **FS2:** *spring-summer rice (rainfed) - summer-autumn rice (rainfed) - third rice - cassava - breeding pig - breeding cow - acacia - betel nut - cay lo o*

Comments:

For various FS components data has been derived from neighbouring communes; Son Bua and Son Trung.

FARMING SYSTEM 1:

- Rice production: crops are grown in season when there is a shortage of water, for example, spring-summer and summer-autumn rice crops;
- Cropping production: Farmers use chemicals such as herbicides or pesticides but are unable to identify its purpose because it is in a foreign language;
- Cassava: an emerging pattern where farmers are using cassava to sell rather than consume. The current problem these farmers face is the high hiring cost for harvesting. However, farmers were optimistic that that this new activity would begin to make positive returns in the near future;
- Livestock production: there exists a large number of farmers who cannot afford the medical treatment and rely heavily on traditional medicine;
- Buffalo: The (ethnic) farmers are not able to differentiate between the activity finishing and exchange of the buffalos;
- Annual labour is 2114.3 person days where HH labour is exhausted throughout the year. There are high fluctuations;
- Gross income is 29,590,000 VND where farmers are able to generate (large) income levels excluding January, February, July and August;
- Total cost is 3,060,000 VND where most activities do not require input costs;
- Net income is 26,530,000 VND have similar patterns as gross income.

FARMING SYSTEM 2:

- The rainfed winter-spring rice and summer-autumn rice have been derived from Son Bua as total yield differs from irrigated winter-spring rice and summer-autumn rice.

Recommendations:

- Rice production: investigation as to why farmers plant crops during periods of low and limited water availability. It may increase total yield if grown during the autumn and winter period;
- Further understanding in the third rice crop. For example, land usage and allocation as farmers indicated that acacia is grown on the same plot;
-
- Changes to the current activities for these farmers can be extremely difficult as these farmers still perform activities in the traditional way. The contributing factor to the challenges for these farmers is the lack of interaction with Kinh people as road access is limited. Thus these farmers have a lack of resources.

7.4.2 Son Bua Commune (see Annex 4.2)

Main Farming Systems:

1. **FS1:** *spring-summer rice (irrigated) - summer-autumn rice(irrigated) - cassava - pig breeding – breeding cow - acacia - betel nut - cay lo o;*

2. **FS2:** *spring-summer rice (rainfed) - summer-autumn rice (rainfed) - cassava - pig breeding – breeding cow - acacia - betel nut - cay lo o.*

Comments:

FARMING SYSTEM 1:

- Rice production: approximately 50% of farmers are involved in irrigated rice while the remaining 50% are involved in rainfed rice;
- Labour input: the standard working day for farmers is longer as most activities are done on mountainous areas;
- Cassava: There has been a current decrease in the activity as farmers are receiving low market price while an emerging activity is sugarcane as it is more profitable;
- Maize: farmers tend to sell dry maize instead of fresh maize. Fresh maize is more profitable than dried maize;
- Breeding sow: farmers do not generally specialize in any particular type of pig activity; they will simply buy the sow to freely mate;
- Acacia production: approximately 60% of farmers are involved in the acacia production activity and 40% are involved in the labour of acacia harvesting;
- Annual labour is 1065.95 person days where HH labour is exhausted throughout the year particularly in April and September. Cattle and acacia require the most HH labour.;
- Gross income is 14,750,000 VND where there is income generated;
- Total cost is 0 VND where farmers use local materials for the activities;
- Net income is the same as gross income.

FARMING SYSTEM 2:

- Annual labour is 1198.8 person days where HH labour is exhausted throughout the year;
- Gross income is 12,590,000 VND where there is income generated throughout the year;
- Total cost is 0 VND where farmers use local materials for the activities;

- Net income is the same as gross income.

Recommendations:

- Maize: further investigation into the marketing of maize because farmers are selling dried maize which is less profitable than fresh maize;
- Breeding sow: assist farmers in understanding the difference between the breeding and finishing of pigs;
- Sugarcane: identify whether more farmers will become more active in this activity and to observe what happens to cassava.

7.5 Tra Bong District (Upland AEZ)

7.5.1 Tra Lam Commune (see Annex 5.1)

Main Farming Systems:

1. **FS1:** *Winter-spring rice crop - summer-autumn rice crop - third rice crop - banana - cassava - soybean - maize - breeding pig - breeding cow - cinnamon - acacia - cay lo;*
2. **FS2:** *winter-spring rice crop - summer-autumn rice crop - banana - cassava - soybean - maize - breeding pig - breeding cow - cinnamon - acacia - cay lo.*

Comments:

FARMING SYSTEM 1:

- Farmers are active in a number of agricultural enterprises but usually small scale i.e. small land area or small numbers of animals per HH;
- Limited access: poor access to water supply, limited numbers of traders and poor road;
- Breed pig: the cycle is relatively short as pigs constantly died throughout the year; especially in October;
- Breeding cow: farmers believe that nature will take its course and they have no specific breeding program;
- Livestock production: farmers rely heavily on traditional medicine;
- Annual labour is 872.9 person days where HH labour is underutilised except for May and July. Livestock activities requires most HH labour ;
- Gross income is 13,570,000 VND where January and August has high income. Farmers rely heavily on cattle and maize activity as an income generating source;
- Total cost is 40,000 VND where the majority of activities use local materials;
- Net income is 13,530,000 VND is similar to gross income.

FARMING SYSTEM 2:

- The only difference in FS2 from FS1 is that FS2 does not have a third rice crop, and therefore the issues and values are similar;
- Annual labour is 662.4 person days, where HH labour is underutilised throughout the year;
- Gross income is 11,570,000 VND where income generated is not consistent annually;
- Total cost is 40,000 VND where activities use local materials;

- Net income is 11,530,000 VND.

Recommendations:

- Rice production: investigate whether planting during periods where there is increased water availability is possible for the farmers as it may be an opportunity for farmers to increase total output;
- Third rice activity: increase total yield so that farmers may have to change their current production technique; instead of planting banana and soybeans the farmers should only plant third rice crop to increase output levels.
- Breeding pig: to further understand the activity as the cycle is only a maximum of two years;
- Recommendations to the current activities are challenging as these farmers are not willing to adapt to lifestyle changes. Thus there should be further investigation into how these farmers operate and subsequent new or improved recommendations can be made.

7.5.2 Tra Hiep Commune (see Annex 5.2)

Main Farming Systems:

1. **FS1:** *winter-spring rice crop - summer-autumn rice crop - third rice crop - autumn-winter maize - spring-summer maize - summer cassava - autumn cassava - breeding pig - acacia - cinnamon*

Comments:

FARMING SYSTEM 1:

- Cropping production: no financial value as it is used for HH consumption and feed for livestock. The main reason is that both the winter-spring and summer-autumn rice have low total output;
- Third rice crop: A labour constraint is that HH labour is utilised more in the irrigated rice crop despite having the lowest total yield per sao;
- Farmers are active in a number of agricultural enterprises but of small proportions; small land area or small numbers of animals per HH;
- Finishing pig: the enterprise is an income security source where farmers only sell if there is a shortage of money;
- Acacia: farmers are unaware of the market price and the processes involved, especially during harvesting time as factory staff take over the land for a temporary period to harvest the acacia. This is a production problem because the buyers can simply reject the acacia products and exploit the farmers;
- Annual labour is 221.2 person days where HH labour is underutilised;
- Gross income is 3,260,000 VND where there are two high peaks in April and October;
- Total cost is 1,054,000 VND where the only cost is in rice production;
- Net income is 2,206,000 VND which has similar patterns to gross income.

Recommendations:

- Third rice crop: find ways to increase total output as rice is a scarce resource and a large amount of person days are required for the activity;

- Making recommendations for these farmers is challenging as these farmers priority is to survive the year rather than generate profit. The areas that these farmers live in have little resource.

7.6 Son Ha District (Upland AEZ)

7.6.1 Son Trung Commune (see Annex 6.1)

Main Farming Systems:

1. **FS1:** *Winter spring rice crop - summer autumn rice crop - cassava – sugarcane - finishing pig;*
2. **FS2:** *Winter spring rice crop - summer autumn rice crop - cassava – sugarcane – finishing pig - breeding cow – acacia.*

Comments:

FARMING SYSTEM 1:

- Land area: farmers (and HHs) who have resided in commune for a longer period of time and have a large family commonly have more land;
- Rice and cassava activities: consider the location of HHs as HHs in areas with high rain fall will produce higher rice yield per sao. Cassava cycle will be shortened to seven months instead of one year;
- Livestock production: no seasonal calendar as activities are dependant on income;
- Cassava activity: there are red book allocations, therefore farmers continue to destroy new land to continue the activity;
- Sugarcane and cassava heavily influence the lifestyles of the farmers. For example, animal purchases are based on income generated from sugarcane and cassava;
- Labour output: amongst the Kinh and Ethnic farmers varies as Kinh tend to have more money and resources and therefore higher yield per sao;
- Annual labour is 619 person days where HH labour is underutilised except for February and November. The activity requiring most HH labour is sugarcane;
- Gross income is 19,900,000 VND and relatively low throughout the year except for November when sugarcane and pig are sold;
- Total cost is 12,337,600 VND where there are high fluctuations throughout the year. Sugarcane activity requires the highest input cost;
- Net income is 7,978,400 VND is similar to gross income where November has the highest income.

FARMING SYSTEM 2:

- The analysis for FS2 is the same as FS1 except for additional activities of breeding cow and acacia;
- Acacia – the results have been excluded from the analysis as it is a long term crop and the inclusion of its data will result in data distortion;
- Annual labour is 1256.5 person days where HH labour is exhausted. Cattle requires most HH labour;
- Gross income is 21,900,000 VND and relatively low throughout the year except in November when sugarcane and livestock are sold;

- Total cost is 12,367,600 VND and relatively low. The activities that require high cost are sugarcane and pigs;
- Net income is 7,548,000 VND where farmers rely heavily on sugarcane and pig activities for income generation.

Recommendations:

- Finishing pig: financial deficit for the farmers, therefore further understanding of the activity to assist these farmers in making positive returns;
- Net income from both farming systems is (mostly) positive however FS2 has a lower (total) net income than FS1.

7.6.2 Son Giang Commune (see Annex 6.2)

Main Farming Systems:

1. **FS1:** *winter-spring rice crop - summer-autumn rice crop - cassava - breeding sow;*
2. **FS2:** *winter-spring rice crop - summer-autumn rice crop - cassava - breeding sow - breeding cow - acacia.*

Comments:

FARMING SYSTEM 1

- Cropping production: no financial value as it is a heavily relied on food source for HHs and livestock;
- Finishing pig: There are no prevention strategies implemented because when the farmers sees a problem with the pig, the paravet is called. Farmers are unaware of the treatments paravet use, as there were too many and the names were in a foreign language;
- Annual labour is 594 person days where HH labour is underutilised except for March, June and November. The main activity requiring HH labour is cassava;
- Gross income is 3,910,000 VND where February and March have the highest income due to the selling of cassava and pigs;
- Total cost is 1,371,400 VND where main costs are derived from the winter-spring rice and summer-autumn rice. Total cost throughout the year is relatively low;
- Net income is 2,538,600 VND where the farmers are faced with limited income sources.

FARMING SYSTEM 2

- The analysis for FS2 is the same as FS1 except for additional activities of breeding cow and acacia;
- Breeding cow: Limited numbers of traders enter the commune, therefore the farmers have limited market choices to whom they can sell to and the value of market price;
- Acacia: a new activity where the farmers have not harvest yet and therefore the labour activity especially the harvesting is an estimate;
- Annual labour is 839 person days where HH labour is exhausted throughout the year;
- Gross income is 5,410,000 VND where there are high fluctuations between March to June and October to November;
- Total cost is 1,601,400 VND which is relatively low throughout the year;

- Net income is 3,808,600 VND where farmers rely heavily on cassava, pig and cow for income generation.

Recommendations:

- Livestock production: assist farmers in understanding the importance of prevention strategies in medical treatment rather than calling the paravet when the pig/cow is ill.
- Assist farmers in accessing market information on various traders in the local community and other areas.

7.6.3 Son Hai Commune (see Annex 6.3)

Main Farming Systems (Fs):

1. **FS1:** *Winter-spring rice crop - summer-autumn rice crop - cassava - breeding sow - breeding cow;*
2. **FS2:** *Winter- spring rice crop - summer-autumn rice crop - cassava - breeding sow - breeding cow - acacia.*

Comments:

FARMING SYSTEM 1:

- Rice production: there is a lack of water resources available for the summer-autumn rice as only 50% of land area is utilised;
- General enterprises: there is a difference between Kinh and Ethnic minority labour inputs, i. e. Kinh farmers usually hire at a rate of 30,000 VND/day and ethnic farmers rely heavily on exchange labour;
- Livestock production: (i) medical treatment is not consistent for all livestock, that is, there is vaccinations for pigs but not cattle; (ii) there is low input cost for livestock as most resources, such as feed are provided by the farmers;
- Annual labour is 2257.7 person days where HH labour is exhausted especially in December and January;
- Gross income 4,450,000 VND is relatively low throughout the year, however in January there is a high income peak as farmers sell livestock;
- Total cost 1,726,500 VND is low throughout the year;
- Net income is 2,723,500 VND where farmers rely heavily on livestock production for income generation.

FARMING SYSTEM 2:

- The analysis for FS2 is the same as FS1 except for the additional activity of acacia. Thus the issues in FS1 are the same as FS2;
- Annual labour is 2387.8 person days where HH labour is exhausted. The main activities requiring high HH labour includes winter-spring rice, cassava and acacia;
- Gross income is 8,190,000 VND where there are high income fluctuations throughout the year, especially in January and March due to the selling of animal and cassava;
- Total cost is 2,105,400 VND where cost is relatively low;
- Net income is 4,885,600 VND which is similar to the gross income patterns.

Recommendations:

- Acacia is a high profit activity where there exists a land usage limitation, therefore further investigation is required into any potential future expansion;
- Further understanding of the farmers' lifestyle is an important component in determining why farmers do activities in particular ways, especially in the medical treatment of livestock. It is noted that farmers are aware of the various vaccines and its purposes but still do not vaccinate the animal.

7.7 Son Tinh District (Lowland AEZ)

7.7.1. Tinh Tho Commune (see Annex 7.1)

Main Farming Systems:

1. **FS1:** *winter-spring rice - summer-autumn rice - third rice crop - cassava - sugarcane - breeding cow - breeding pigs;*
2. **FS2:** *winter-spring rice - summer-autumn rice - sugarcane - cassava - breeding cows - breeding pigs - acacia - eucalyptus;*
3. **FS3:** *winter-spring rice - summer-autumn rice - third rice crop - sugarcane - cassava - breeding cows - breeding pigs - acacia - eucalyptus;*
4. **FS4:** *winter-spring rice - summer-autumn rice - cassava - peanut - Breeding cow - Breeding pigs - off farm activities.*

Comments:

- HH labour is underutilised for all farming systems where sugarcane requires most labour. The gross income, total cost and net income have similar patterns. The only differences are the values of these farming systems.
- Majority of HHs rely on sugarcane as an income generating source.

FARMING SYSTEM 1:

- Rice production: farmers utilise small land plots for rice which is enough for HH consumption and feed for livestock (rice straw) only;
- Sugarcane enterprise: farmers are currently involved in cassava, however farmers are shifting from cassava to sugarcane as the return is higher;
- Annual labour is 278.6 person days where HH labour is underutilised and sugarcane requires most labour;
- Gross income is 17,835,000 VND where there are several peaks throughout the year;
- Total cost is 9,084,000 VND where there are several peaks throughout the year (similar to gross income);
- Net income is 11,027,000 VND where farmers are able to generate income throughout the year.

FARMING SYSTEM 2:

- The analysis for FS2 is similar to FS1 as forestry activities (including total cost, gross income and net income) have been excluded from the analysis. Thus it is difficult to determine the economics of FS2;
- Off farm activities: A growing number of women are going to HCMC (or other cities) to supplement income. The women commonly sell miscellaneous products such as

fruits. The absence of the women does not affect agricultural activities as the additional income generated assists farmers with expansion or improvement of agricultural activities;

- Annual labour is 3157.9 person days with the inclusion of females going to HCMC exhausting HH labour, however if excluded from model, HH labour is underutilised throughout the year;
- Gross income is 38,375,000 VND where farmers rely heavily on off farm income;
- Total cost is 8,830,500 VND where there is a combination of high and low fluctuations;
- Net income is 8,544,500 VND where farmers receive high income every two months and the women tend to return home and then go away again for work.

FARMING SYSTEM 3:

- The issues are a combination of FS1 and FS2;
- Annual labour is 284.6 person days where HH labour is underutilised;
- Gross income is 17,835,000 VND where income generated is variable;
- Total cost is 9,084,000 VND;
- Net income is 11,027,000 VND.

(Similar comments to other farming systems)

FARMING SYSTEM 4:

- Off farm activities: generated in the local area where farmers sell Vietnamese desserts or soybeans. Each day takes four hours;
- Annual labour is 278.6 person days where HH labour is underutilised;
- Gross income is 21,435,000 VND where there are high fluctuations;
- Total cost is 9,084,000 VND;
- Net income is 14,197,500 VND.

Recommendations:

- Encourage farmers to be more active in the finishing of livestock allowing for faster income generation throughout the year.
- Farmers cannot increase cropping activities any further and there should be opportunities for young people to be more active in off farm activities such as training courses for sewing or mechanics.

7.8 Nghia Hanh District (Lowland AEZ)

7.8.1 Hanh Phuoc Commune (see Annex 8.1)

Main Farming Systems:

1. **FS1:** *winter spring rice crop - summer autumn rice crop – winter-spring maize – summer-autumn maize- breeding cow – breeding sow;*
2. **FS2:** *winter spring rice crop - summer autumn rice crop – winter-spring maize – summer-autumn maize- finishing cow – finishing pig;*

3. **FS3:** *winter spring rice crop - summer autumn rice crop – vegetables - finishing cow – finishing pig.*

Comments:

The majority of labour activities are underutilised throughout the year, however farmers are able to efficiently make positive returns on most agricultural enterprises. Farmers want to expand agricultural enterprises, especially crops but land area is limited.

FARMING SYSTEM 1:

- Land usage: Farmers utilise small land plots for cropping, however there are a number of farmers who rent areas for further expansion. Land rented is from families who have migrated to HCMC for further employment and no longer use the land plots. This is applicable for all three farming systems;
- Annual labour is 125.5 person days where HH labour is underutilised;
- Gross income is 11,318,000 VND where income generated is relatively low throughout the year. Farmers tend to generate more income at the end and beginning of the year;
- Total cost 4,246,000 VND is low annually;
- Net income is 7,071,742 VND has similar patterns to gross income.

FARMING SYSTEM 2:

- Cropping activities: similar problems to FS1;
- Livestock production: Both finishing pig and cattle activities are approximately six months long and the farmers are able to make positive income;
- Annual labour is 120.5 person days where HH labour is underutilised;
- Gross income is 28,636,000 VND where farmers rely heavily on animal activities as an income source especially in March and September;
- Total cost is 12,371,000 VND which has similar patterns to gross income;
- Net income is 16,246,142 VND where there is high income generation between February to April and August to September.

FARMING SYSTEM 3:

- Land usage: similar to FS1 and FS2 as farmers are utilising only small land plots;
- Annual labour is 134.7 person days where HH labour is underutilised;
- Gross income is 32,000,000 VND where farmers are able to generate more income throughout the year;
- Total cost is 12,386,198 VND which has similar patterns to gross income;
- Net income is 16,264,142 VND where farmers have more income.

Recommendations:

- Farmers should attempt to grow different crops rather than following other farmers, i.e. farmers will not face over supply situations with low market price when selling the vegetables;
- Increase farmers' awareness of various marketing options rather than relying on local markets to sell final products;

- Increase the diversity of vegetables as farmers tend to grow the same crops and therefore sell at the one time.

7.9 Minh Long District (Upland AEZ)

7.9.1 Long Son Commune (see Annex 9.1)

Main Farming Systems:

1. **FS1:** *winter spring rice crop - summer autumn rice crop – third rice crop – cassava – buffalo – breeding cow – acacia – fish pond;*
2. **FS2:** *third rice crop – buffalo – breeding cow – acacia – fish pond;*
3. **FS3:** *winter spring rice crop - summer autumn rice crop – peanut -cassava – breeding pig – breeding cow – acacia – cay dao.*

Comments:

FARMING SYSTEM 1:

- Rice production: (i) chemicals used are written in foreign languages, therefore farmers do not know its purpose; (ii) farmers experience difficulties with the winter-spring rice crop due to continual rain;
- Acacia: farmers do not participate in the harvesting process and are not aware of activities when factory people are on the land;
- Fish pond: Farmers have a natural springs already provided which is suitable for the needs of the fish;
- Annual labour is 3280 person days where HH labour is exhausted throughout the year. The activities requiring high HH labour include cassava, acacia and cattle/buffalo;
- Gross income is 30,112,000 VND where August generates high income due to the simultaneous harvest of three crops;
- Total cost is 1,461,000 VND which is low throughout the year;
- Net income is 28,650,742 VND which have similar patterns as gross income.

FARMING SYSTEM 2:

- Agricultural activities in FS2 include all activities included in FS1 except for the winter-spring rice crop and the summer-autumn rice crop;
- Annual labour is 2899.9 person days where HH labour is exhausted especially from March to August;
- Gross income is 34,720,000 VND where farmers depend on animal and aquaculture activities. Farmers generate high income in August when pigs and fish are sold;
- Total cost is 738,000 VND which is relatively low throughout the year;
- Net income is 31,582,000 VND which has similar patterns to gross income.

FARMING SYSTEM 3:

- Rice production: there is a portion of land owned by the farmers and another portion of rented land. The land rents are usually HHs who have travelled to HCMC for off farm activities;

- Annual labour is 1824 person days where HH labour is exhausted;
- Gross income is 25,950,000 VND where income is generated throughout the year;
- Total cost is 3,586,000 VND which is low;
- Net income is 22,364,000 VND which have similar patterns to gross income.

Recommendations:

- For FS2 there should be further investigation into rice crop activities as these farmers have only one crop of rice throughout the year.
- Assist these farmers in introducing new cropping activities as the current main activities are livestock and forestry.

7.10 Binh Son District (Lowland AEZ)

7.10.1 Binh Minh Commune (see Annex 10.1)

Main Farming Systems (FS):

1. **FS1:** *winter-spring rice - summer-autumn rice - peanut - breeding cow*
2. **FS2:** *winter-spring rice - summer-autumn rice - maize - cassava - breeding cow - rubber tree - acacia tree;*
3. **FS3:** *winter-spring rice - summer-autumn rice - third rice - maize - breeding cow - rubber tree - acacia tree.*

Comments:

FARMING SYSTEM 1:

- Rice production: there is small land area allocated to the activity, however a large (unknown) number of farmers do not sell (that is no financial value);
- Maize: following the harvesting of the crop, land is unproductive as there is a lack of available water resources;
- Annual labour is 105.4 person days where HH labour is underutilised throughout the year;
- Gross income is 12,442,500 VND where there is no consistency in income generation. Income tends to be generated from the beginning to mid year, while at the end of the year there is no income;
- Total cost is 5,657,450 VND where it is distributed throughout the year and therefore cost for all activities is relatively low;
- Net income is 6,785,050 VND has similar patterns to gross income.

FARMING SYSTEM 2:

- Same as FS1 except for additional activities of peanut and finishing pigs (local);
- Farmers are able to utilise more of the land, rotating maize with peanut;
- Farmers indicated that finishing pig is high risk due to the high input feed cost;
- Annual labour is 109.3 person days where HH labour is underutilised (similar to FS1);
- Gross income is 12,712,500 VND where income generated is not consistent;

- Total cost is 5,538,000 VND where it is low throughout the year;
- Net income is 7,174,500 VND which is similar to gross income.

FARMING SYSTEM 3:

- The issues are similar for all three farming systems except for the additional activity of the third rice crop. Activity is only in areas where there is water available, that is, in the commune there is an approximate of 50% of farmers involved in third rice crop;
- Annual labour is 94.9 person days where HH labour is underutilised;
- Gross income is 12,292,500 VND where income generated is lower compared to other farming systems in Binh Minh;
- Total cost is 5,204,000 VND where there is little cost;
- Net income is 7,088,500 VND: Farmers are dependent on the income generated in January, as (generally) throughout the year income generated is limited.

7.11 Mo Duc District (Coastal AEZ)

7.11.1 Duc Phong Commune (see Annex 11.1)

Main Farming Systems:

1. **FS1:** *winter-spring rice - summer-autumn rice - cassava - sweet potatoes - breeding pig - breeding cow (yellow) - breeding cow (lai) - off farm;*
2. **FS2:** *winter-spring rice - summer-autumn rice - cassava - sweet potatoes - breeding pig - breeding cow (yellow) - breeding cow (lai) - prawn activity*

Comments:

FARMING SYSTEM 1:

- Rice production: There are periods throughout the year when flooding occurs;
- The absence of females does not affect labour activities. Farmers depend heavily on the additional income generated from HCMC;
- Input cost throughout the year is relatively low as farmers already have necessary resources;
- There is large area for Fi Lo production which is predominately owned by the government and the local farmers are not active in the activity;
- Annual labour is 211.5 person days where HH labour is underutilised;
- Gross income is 31,900,000 VND where there are fluctuations throughout the year;
- Total cost is 3,465,000 VND where it is low throughout the year;
- Net income is 28,434,244 VND which has similar patterns as gross income.

FARMING SYSTEM 2:

- FS2 is the same as FS1 excluding the winter-spring and the summer-autumn rice crops and (local) prawn production;
- Annual labour is 216.9 person days where HH labour is underutilised;
- Gross income is 781,900,000 VND where there are three main peaks generated by the prawn activity;

- Total cost is 291,465,756 VND where throughout the year cost is low. The prawn activity requires the highest cost. For example, feed and medicine;
- Net income is 490,434,244 VND where farmers are dependant on prawn activity.

Recommendations:

- There are difficulties in introducing new cropping activities as farmers are only allocated small land area plots.

7.12 Duc Pho District (Coastal AEZ)

7.12.1. Pho Chau Commune (see Annex 12.1)

Main Farming Systems (Fs):

1. **FS1:** *winter-spring rice crop – summer-autumn rice crop - maize – peanut - cassava – breeding cow – finishing pig – breeding goat;*
2. **FS2:** *winter-spring rice crop – summer-autumn rice crop - maize – peanut - cassava – breeding cow – finishing pig – breeding goat – sea finishing.*

Comments:

FARMING SYSTEM 1:

- There are a number of farmers involved in various cropping activities, however due to the small land area ownership, the analysis has excluded these crops;
- Annual labour is 67.2 person days where HH labour is extremely underutilised, i.e. all activities combined can not exhaust one adult labour;
- Gross income is 14,770,000 VND where farmers rely heavily on animal activities as a source of income because income generated throughout the year is relatively low;
- Total cost is 6,047,319 VND where it is consistent throughout the year;
- Net income is 11,027,000 VND where farmers face low income.

FARMING SYSTEM 2:

- The activities are the same as FS1 with additional activity of sea fishing and exclusion of goat;
- Off farm activity: Sea fishing is based on the location of HHs. That is if the HH lives near the coastal area there is a higher possibility the farmers will be involved in sea finishing. There is no quantifying information on the activity as there are large variations in operations. The model only has the total input cost and gross income;
- Annual labour is 1,267.2 person days where HH labour is exhausted from June to October when sea fishing requires most HH labour;
- Gross income is 25,270,000 VND where there are small peaks throughout the year except in August when there is income generated from animal activities and sea fishing;
- Total cost is 10,547,000 VND where all activities require some input cost except for eucalyptus;
- Net income is 11,027,000 VND where farmers tend to generate income mid year. The beginning and end of the year is when farmers are faced with low income.

ANNEXES

(see Volume 2)