

Possibilities and constraints for coffee and vegetable farmers in
Pampangan: A case study from a small village in West Lampung, Sumatra,
Indonesia.



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This report is part of the mandatory course in International Land Use and Natural Resource Management (ILUNRM) of the Agricultural Development programme at the Faculty of Life Science, University of Copenhagen. It is the result of a 10-days field trip to the village of Pampangan, West Lampung, Sumatra, Indonesia in March 2010. The research was conducted through an interdisciplinary approach with the purpose of using the different resources of the students to strengthen a comprehensive understanding of the issues investigated.

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ABSTRACT

This report was the result of the collaboration between the students of the University of Copenhagen, the Roskilde University and the University of Lampung for an investigation of the farming systems typical of an agricultural village in West Lampung, Indonesia. Three typologies have been developed to compare the Pampangan village farming systems – households farming mainly coffee, households farming mainly vegetables and households farming both coffee and vegetables – in terms of their possibilities and constraints.

Analysis of the data gathered showed that vegetable farming is the most lucrative followed by combined farming of coffee and vegetables. Coffee farming, however, although not paying much, is still the most abundant due to limiting factors to converting into vegetable farming such as the sloping topography of the area, frequent rain, high-labor requirement and specialized skills for vegetable farming, high-costing inputs due to dependence on chemicals for fertilizers and pesticides for vegetables, and poor access to infrastructures and market information.

Meanwhile, combined farming is a strategy for those who used to be mainly coffee farmers to cope with financial crises, particularly “paceclick”. Most of these farmers would convert to farming mainly vegetable if given the opportunity. Although the most labor-intensive, this type of farming also had the advantage of being more flexible in terms of having income and crops for consumption for most times within the year.

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Abstract by Joy

Introduction

Main Authors: Nadja and Morten

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Methodology

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Results and Discussions

Mainly Coffee

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Mixed

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Vegetables

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Discussion: Comparison of the production systems

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Conclusion: All

INTRODUCTION

Vegetable farming is an agricultural commodity with great economic potential for farmers in Indonesia due to high demand in domestic and international markets. Particularly in the upland areas of the rural regions, the climatic conditions are well suited for vegetable production (Arsanti & Böhme 2008:49). In this report we have investigated the possibilities and constraints of vegetable farming compared to the more widespread coffee farming in one of these upland areas in Indonesia.

More specifically our study took place in the village of Pampangan that is located in the district of Sekincau in West Lampung on the southern part of the island of Sumatra, Indonesia. The area lies in the mountain range of Bukit Barisan within the altitudes from 1000 m to 1200 m. The average temperature is between 20°C and 34°C and the annual rainfall for the district of Sekincau is 1500 to 2000 mm. Pampangan has 3003 inhabitants divided into 849 families.

Sumatra has long been a destination for migrants from Indonesia's inner islands of Java, Bali and Madura, and its diverse cultural ecologies are indicative of the influence of peoples from these islands, combined with the landscapes of local Lampungnese groups, now a minority as a whole. Historically, the district Sekincau was very sparsely populated in the beginning of 20th Century, and the first settlement was after World War II due to the rising of coffee prices. This brought about more Lampungnese, Semendo, Kenali pioneers to the area.

In Pampangan, the Javanese settled in 1970s and taking advantage of the high prices started to grow vegetables for sale in urban markets. The Lampungnese soon learned the practices and followed this new development. Until 1990 the transport of the crops, both coffee and vegetables, was very labour intensive since the main road was made of mud and the famers used manpower to transport their crops. But in 1990 a new asphalt road was built, which made it possible to use motorbikes and cars to transport the harvests.



Fig.1. Map of Bandar Lampung showing the indicative location of the study area, Pampangan Village.

Today coffee plantations cover 80 % of the total farmland in Pampangan and although the quantity of people growing vegetables has been growing during the last years the production still covers only 9% of the total farmland, see figure 2.

Many different vegetable crops are grown in Pampangan but the most common ones are cabbage, tomatoes and chilli, which are the ones we have focused on in our study. Cabbage covers 47% of the farmland used for vegetables, tomato covers 17% and chilli 15% (Figure 3). Apart from these crops green beans, *petsai*, long beans and eggplant are also grown. Besides coffee and vegetable cultivation, the village depends on other income earning activities including paddy fields, utilization of fishponds and livestock keeping. Paddy rice covers 3% of the area where as forest covers 3%, roads 3% and settlements 2% of the land of Pampangan (see figure 2).

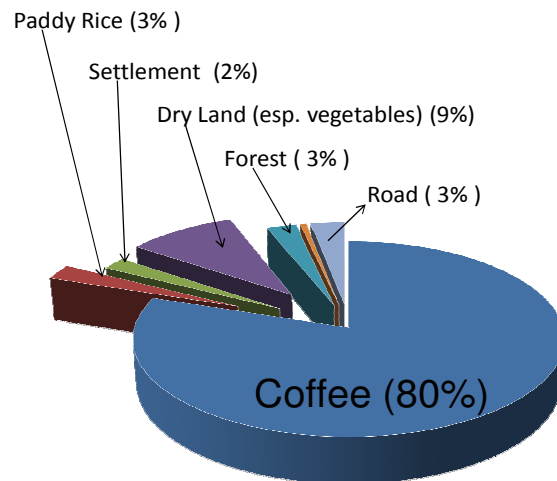


Fig. 2. Distribution of landuses in Pampangan Village.
(Source: Pampangan Profile, 2009)

The DFID sustainable livelihoods framework

We have chosen to use the DFID sustainable livelihoods framework (Figure 4) as a guide in our report. The framework was developed by the DFID sustainable rural livelihoods advisory committee as a tool, which can help to gain a better understanding of the livelihoods especially of the poor. It provides a way to analyze the main factors affecting people's livelihoods, and the typical relation between these.

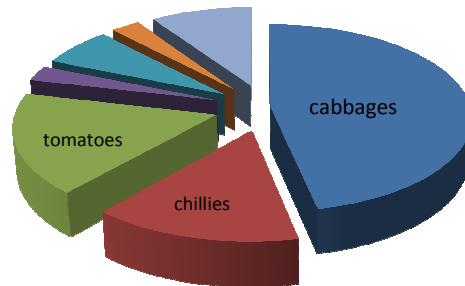
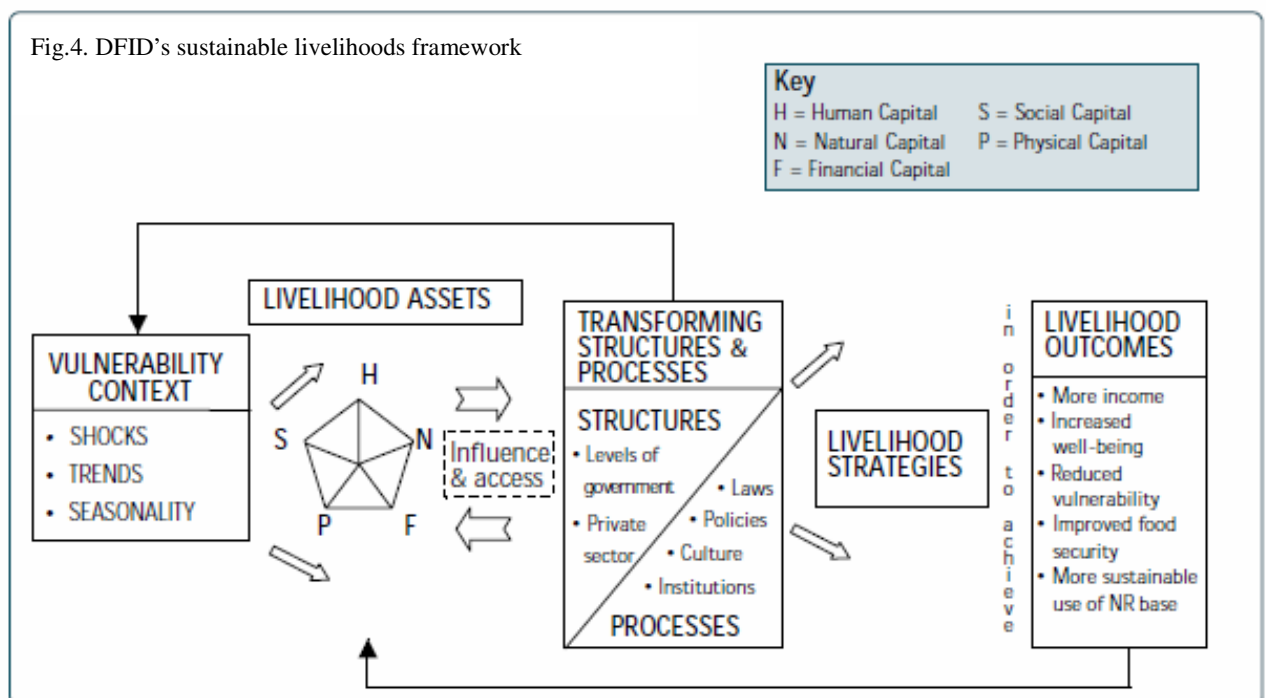


Fig. 3. Distribution of vegetables grown in Pampangan. (Source: Pampangan Profile, 2009)



Central to the framework is the so-called livelihood assets pentagon, which structures the access to livelihood assets under five different categories: Human, natural, financial, physical and social (DFID 1999:5). Human capital represents skills, knowledge and health etc. that affects a person possibilities to reach his or hers goals. Natural capital covers natural resources for instance the access to land and water etc. financial capital denotes the financial resources like money and savings. Physical capital comprises infrastructure, tools and

equipment, transport and access to information. Social capital is defined by having access to networks and concessions, membership groups or organisations and experience trust and reciprocity in the society (DFID 1999:8-15). The external environment, which affects peoples' livelihoods, is called the vulnerability context and it is divided into trends, shocks and seasonality (DFID 1999:1-3). By trends is meant as changes in population, resources, economic and trends of governance and politics. Shocks are referring to human health shocks, natural, economic and conflicts or crop/livestock shocks. In seasonality what is being look at is the seasonality of prices production, health and employment opportunities (DFID 1999:3).

Objectives

The objective of this report is to analyze vegetable production in comparison with coffee production. We have chosen to use the DFID framework because we think it is a useful tool that can help us get an overview of all the different factors influencing the livelihoods of the different farmers in Pampangan. In figure 5 we have tried to illustrate how we have used the DFID framework to guide our research. Each of the stick figures represents a farmer growing coffee and vegetables, respectively. It has been our aim to map the farmers' access to each of the five different capitals and at the same time try to assess the most important trends, shocks and seasonality, and the institutions and organizations which are influencing them. The arrow between the two models illustrates any possible interconnections between the two production systems. Based on this figure we formulated the following research question.

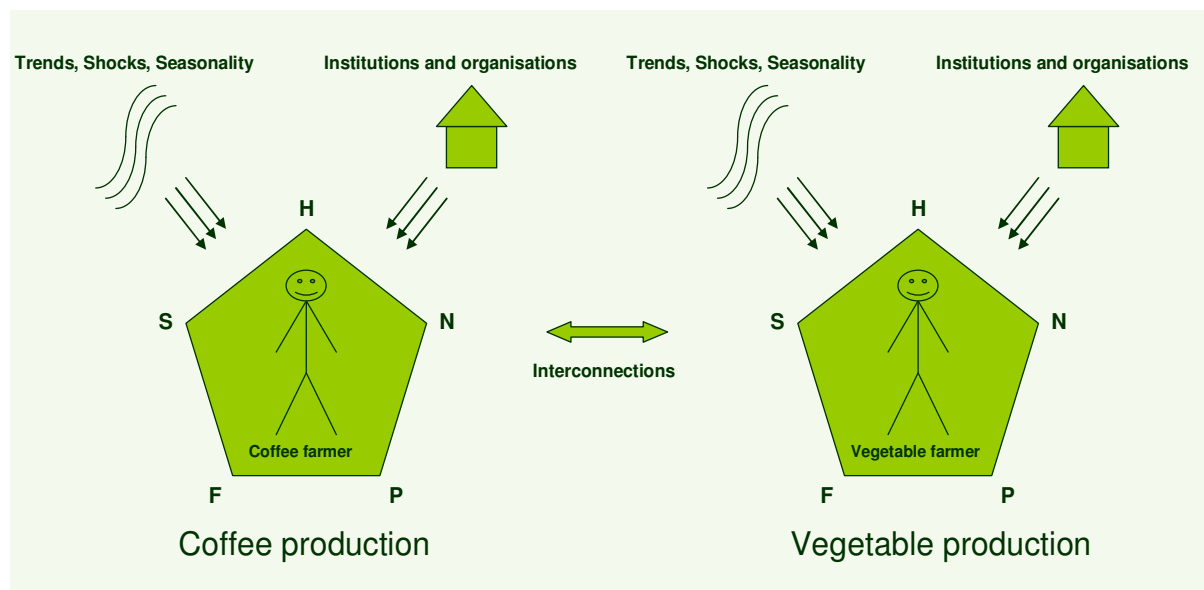


Fig. 5. Framework of the study based on DFID's sustainable livelihoods framework.

Research question:

What are the possibilities and constraints of coffee production and vegetable production in the Pampangan Village, and what are the interconnections between these two systems?

Sub-questions:

1. What are the livelihood assets for coffee and vegetable production, and what are the factors affecting the farmers' access to these livelihood assets?
2. In what way do the two production systems interconnect with each other, and what is the effect of the different ethnic specializations and expertise (if any), on the two systems?
3. What are the factors that have affected changes in land use?
4. What are the methods used to improve soil fertility for the two production systems?

Clarifications:

In line with the objectives of this report, the research question and sub-questions above relates to DFIDs sustainable livelihoods framework as follows:

Possibilities:

- The availability and access to the parameters/capitals as outlined in the framework (sub-question 1 above).
- Other related assets or factors that contribute positively in improving the farmers, production activities (e.g. income-generating non-farming activities, subsidies, donor contributions, other)
- Improvements as a result of the positive methods applied by the farmers in the production (e.g. production increase as a result of improved soil quality due to better farming systems)

Constraints:

- Refers to the trends, shocks and seasonal shifts as well as the internal and external factors/institutions that affect the farmers' access to livelihood assets (sub-questions 2 & 3 above).
- Affected natural resource base as a result of how the farmers utilize it, e.g. environmental degradation, soil erosion or degradation due to application of pesticides, etc. (sub-question 4 above).

METHODOLOGY

We based our data collection in the field on the approach illustrated in the model below (Figure 6). We developed a simple typology of farming systems: Households which got their income mainly or solely from coffee farming, households which got their income from both coffee and vegetable farming (also referred to in this report as mixed farming), and finally, households which got their income mainly or solely from vegetable farming.

As is illustrated in the model we did a seasonal calendar exercise with farmers from each category along with in-depth interviews, including field observation, with four farmers from each category. To supplement this data we used a number of additional methods which are also listed in the model. In the following sections we will discuss the methods we used in more detail and briefly evaluate the limitations of the data that was generated. We have divided the methods into traditional social science methods and PRA methods and these will be discussed separately.

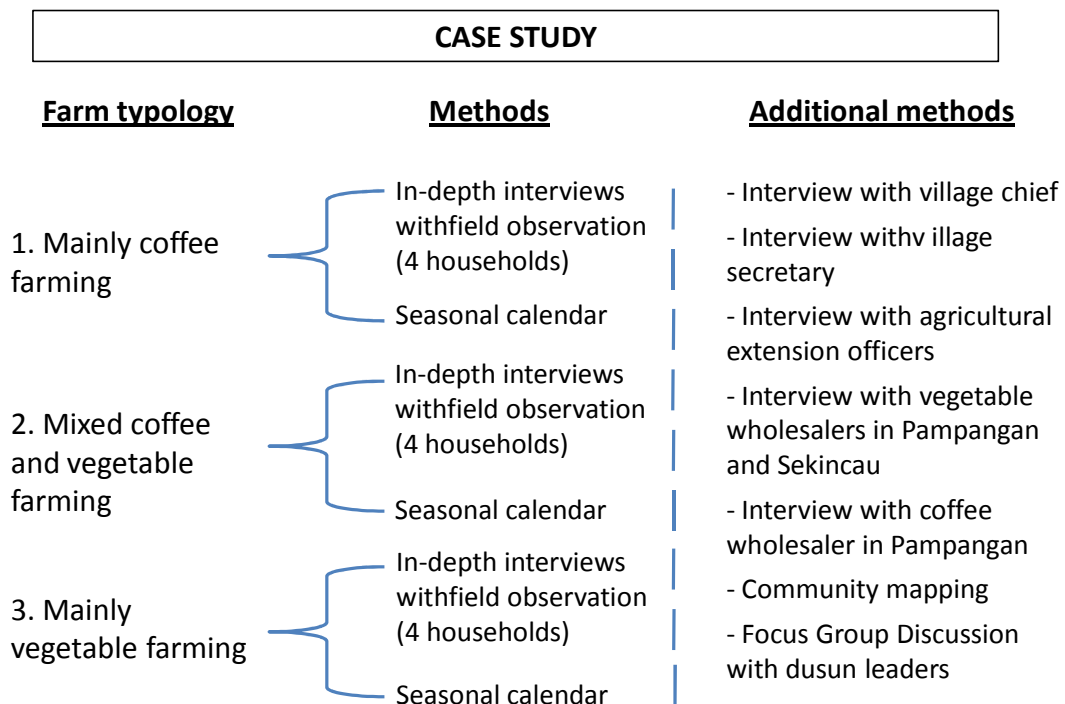


Fig. 6. Model of the methodology used in the study.

Semi-structured Interviews

As illustrated in Figure 6, we did 4 interviews with mainly coffee farmers, 4 interviews with mixed coffee and vegetable farmers and 4 interviews with mainly vegetable farmers. Apart from that we did some key informant interviews including one with the village chief, one with the village secretary, one with 3 extension officers, one with the coffee wholesaler in Pampangan, one with a vegetable wholesaler in Pampangan and, finally, one with a vegetable wholesaler in Sekincau.

When doing the farmer interviews we went to their house or fields to make the interview and did thereby also have the opportunity to see their houses and fields, take pictures and use this material in our analysis of the interviews.

We had from the beginning planned to do a questionnaire survey with the farmers, but after trying it out we realised that the questionnaire included way to many questions and we decided to 'recast' the questionnaire as a structured interview which was then supplemented with questions from our semi-structured question guide during the interviews with the farmers.

Key Informant Interviews

The key informant interviews was used to understand some main structures of the village and to get some overall knowledge about the village that might be difficult to get from an individual farmer. Furthermore it was also a way to triangulate all the information we got from the interviews with the farmers.

To some key informants we asked specific question which we thought they had the right knowledge to answer. For instance we asked the village secretary to go through the history of agricultural development and related events in Pampangan, and with his help we could make a timeline with all important events and changes in migration and land use in the last 50 years.

PRA

The aims of the participatory rural appraisal (PRA) is to empower the community and to

harness the local diversity in order to map, model, estimate and plan for themselves. Members of the research team have been facilitators and observers in the processes but the main objective of doing PRA is to integrate with the people being studied.

Seasonal Calendar

To gain a better insight on the details of the production systems, three kinds of seasonal calendars were produced: One for vegetable production, one for coffee production and one for mixed coffee and vegetable production. For each session we invited around seven famers and asked them to first identify which activities they did related to their farming system. These activities were then plotted into a calendar and the farmers calculated how much time they used for each activity and in which months the work was distributed. We tried to encourage the farmers to make a qualitative estimation of the work intensity, but in the end they seemed much more comfortable trying to calculate and quantify exactly how much time was used for each activity.

It turned out to be much more complicated to do the seasonal calendars for vegetable and mixed farming than for coffee. The coffee farmers could focus on just one crop with only one harvest per year, whereas both the vegetable farmers and the mixed farmers had multiple crops and multiple harvests per year. This, combined with the quantitative approach, made it very complicated to plan the activities during the year. Ultimately the final calendar produced by the coffee farmers ended up as a fairly good reflection of the workload for a single coffee farmer during a year, whereas the other two calendars represents only one way of planning a year with certain crops. While this is said we still think that the calendars generated useful data on labor intensity and distribution, and insights into the different challenges for the farmers during a year. More detail on each calendar will follow in the results part.

Community Mapping

To get an overview of the distribution of resources in the village we did a community map session with six out of the seven dusun chiefs. They were asked to draw a map of Pampangan focusing on certain aspects like topography and the location of the different types of farms in the area. With some help of the facilitator the participants decided on different signs symbolizing, natural resources like topography, coffee, vegetable and rice fields and social institutions like infrastructure and houses, mosques, the marketplace, and wholesalers. The

final map provided important information about the location of the different types of farms and their access to natural and physical resources.

Focus Group Discussion

After the completion and discussion of the community map we did a short focus group discussion with the dusun chiefs. We asked them to reflect on the main possibilities and constraints of coffee and vegetable production and to identify the challenges in changing from coffee to vegetable farming.

RESULTS AND DISCUSSIONS

In this part of the report we are going to present and analyze the main issues facing the farmers in Pampangan. The analysis is divided into the three categories from our farm typology: Coffee farming, vegetable farming and mixed farming. Each of these sections are structured according to the DFID sustainable livelihoods framework so what we look at specifically is the farmers' access to the different livelihood assets: Human capital, financial capital, Physical capital, Natural capital and Social capital. Next, based on information from one farmer from each category, we will do a simple input/output calculation to get an estimation of the profitability of each farming system. Finally we wish to discuss the main possibilities and constraints for the farmers within each farming system. Following the analysis of the three categories we will do a short comparison of the possibilities and constraints for each farming system and analyze the challenges in changing from coffee into vegetable farming.

Coffee Farming

Focusing on accessibility to the required assets, the possibilities and constraints for coffee farmers in Pampangan can be analysed, by drawing on the DFID Sustainable Livelihoods Framework as follows:

Access to Human Capital

In order to learn more about the different activities of the coffee farmers and the intensity and distribution of these activities over a year, we did a seasonal calendar exercise with seven coffee farmers. The final result of this exercise can be seen in figure 7. On the y-axis we have the amount of labor (in terms of man-day, equivalent to 8 hours) and on the x-axis we have listed the

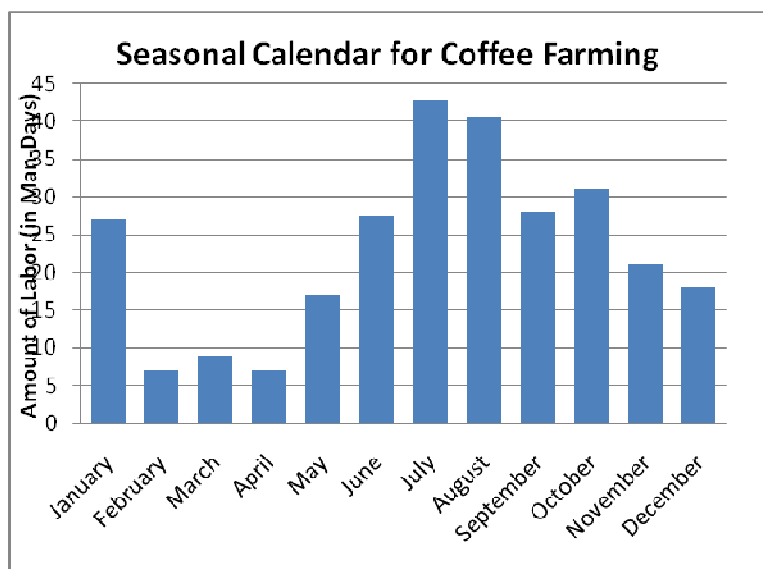


Fig. 7. Seasonal calendar showing the amount of labor needed each month for a one-hectare coffee farm.

months. The amount of labor corresponds to what is needed for a farm that comprises 1 hectare of land.

The rainy season is usually 9 months long spanning from September to May. The coffee harvest falls in July/August accounting for the peak in labor intensity. During these months the farmers often need to hire additional wage labor to be able to handle the workload. Additional wage labor can be hard to find during June to September, however, since all the farmers are in the same situation.

What is significant when you examine the calendar is the dip in labor intensity from February to May. In these months there is not much work to be done on the coffee farms and therefore the farmers have time to do wage labor. In fact they are often forced to do so in order to make ends meet in the household. This will be elaborated on under 'financial capital'. The farmers predominantly take on wage labor on other farms, for example they can be hired to help with the harvest on a vegetable farm, but some also gets jobs as drivers or as house repairmen depending on individual skills.

Training

Through the farmers groups, which were set up by the government, the farmers can receive training in different farming techniques from the agricultural extension officers. This training includes information about for example land maintenance and grafting. One of the coffee farmers we interviewed told us, however, that the extension officers never give advice about coffee. He suggested that the reason was that vegetable farming is somehow more important than coffee farming and that there are more diseases in vegetable farming claiming the extension officers' attention. Unfortunately the rest of our data is too limited to conclude if the extension officers do indeed focus more on vegetable farming compared to coffee farming. Even more than learning from the extension officers it seems that the farmers pick up new farming skills from their fellow farmers.

Access to Financial Capital

Through our interviews we were introduced to the Indonesian expression 'paceklik' which can be translated into 'financial household crisis'. Paceklik describes a state where the household is struggling to make ends meet financially. The phenomenon is more widespread

among coffee farmers than vegetable farmers since coffee farmers only have one harvest per year. This means that starting from around January/February the money from the last harvest in July/August is starting to be scarce. Paceklik coincides with the time where we have already noted that there is not much work to be done on the coffee farms so in order to cope with paceklik many of the farmers are forced to take on wage labor. Another way the coffee farmers deal with paceklik is to take on loans usually from one of the local wholesalers. These loans range between 200.000 – 500.000 Rp and can also take the form of rice, pesticides and fertilizer. The farmers pay back these loans after the next harvest and are not officially tied to the wholesaler but often they are grateful for the loan and therefore keep selling to the same wholesaler.

Profitability calculation

Based on information acquired through interviews with the farmers, we are going to present in tables 1 below some simple input/output calculations to get an overview of the total income of the coffee farmers and to find out how much they earn per hectare/rantai on average per year.

Table 1a. Sales for Mainly Coffee Farming (2009).

| Crop Type | Amount Sold (Kg) | Price Per Unit (Rp/Kg) | Size of Farm (Rantai) | Total Sales (Rp) | Sales Per Rantai (Rp/Rt) |
|------------------|-------------------------|-------------------------------|------------------------------|-------------------------|---------------------------------|
| Coffee | 2,500 | 10,000 | 50 | 25,000,000 | 500,000 |

Table 1b. Costs Per Type of Input for Mainly Coffee Farming (2009)

| Cost Type | Cost Per Year (Rp) | Size of Farm (Rantai) | Cost Per Rantai (Rp/Rt) |
|------------------|---------------------------|------------------------------|--------------------------------|
| Wage labour | 700,000 | 50 | 14000 |
| Pesticides | 7,880,000 | 50 | 157600 |
| Fertilizers | 720,000 | 50 | 14400 |
| TOTAL | 9,300,000 | | 186,000 |

Table 1c. Profitability of Coffee Farming (2009)

(Profitability = Sales - Costs)

| | Profitability (Rp) |
|---------------------------------|---------------------------|
| Total Profitability of the Farm | 15,700,000 |
| Profitability Per Rantai | 314,000 |

The two-hectare coffee farm used as the case representative was shown here to be spending

much on pesticides. The relatively low expense for wage labor, however, confirms that coffee farming is not much labor-intensive.

Access to Physical Capital

Almost all of the coffee farmers have to transport their harvest to the wholesaler themselves. One of our informants had an unusually big farm consisting of 21 hectares of land. He could therefore produce enough coffee that the wholesaler would come to him and pick it up. This was the exception rather than the rule however. The farmers have to transport their harvest on the back of their small motorbikes and are therefore extremely reliant on the conditions of the roads. And these were often not in good shape.

The coffee market

The external factor, which we found to have the most impact on the lives of the coffee farmers, was the fluctuations of the international coffee prices. The price that the farmers can get for their coffee is very dependent on the global market prices and right now that price is low. The current prize in Pampangan is about 12.000 Rp/kg. The village chief told us that the ideal prize, the prize that would make it worthwhile to be a coffee farmer, would be around 25.000 Rp/kg. Of course it is an open question when something is worthwhile but it was clear that the current coffee prizes made it difficult for the coffee farmers to earn enough to meet the daily needs without alternate sources of income. Several farmers said that they did not have access to any information about current market prices. They completely relied on the prices given by the wholesalers.

There are two coffee wholesalers in Pampangan. They mostly buy their products from smaller wholesalers around Pampangan because this lets them buy in bigger quantities. The farmers in Pampangan however can sell directly to one of the two wholesalers in the village. The one wholesaler we interviewed said that the competition between the two wholesalers was very limited. The price difference was only a few hundred rupiah. According to them they set their prices based on information they got from the international coffee corporations based in Bandar Lampung.

Access to Natural Capital

Because of the location relatively high in the mountains there is no problems with water

shortage for the coffee farmers. The rainy season is long and generous. Access to water is therefore not a big issue in the area.

Concerning access to land there did not appear to be any big issues either. According to the village chief everybody has certificates to their land. We did however interview a coffee farmer who only had a certificate in his own name for half of his land, but was planning on buying one for the other half when he had saved up the money. We had heard that farmers would get a lower price from wholesalers if they did not have a certificate but this farmer had never experienced this problem.

The main issue for the coffee farmers concerning natural capital appears to be related to land topography - most of the farmland in Pampangan is located on slopes, some steeper than others. Some farmers do experience problems with erosion but it does not seem to be a big problem, however. We were told that many farmers take measures to prevent erosion by building terraces and planting for example African trees on the steepest slopes. We did see examples of this in the landscape, but some places we also saw coffee trees planted on extremely steep slopes without any obvious measures being taken to prevent erosion. We pre-selected one of our informants on the basis that he allegedly had problems with erosion on his land. When he had initially bought the land he had used a plough to make the soil more fertile by mixing the topsoil and the manure with the rest of the soil. By using a plough he had also however exposed himself to more problems with erosion. He referred to an episode where he had lost about a hundred coffee trees because the soil had completely washed away leaving the trees exposed. Because of erosion the fertility of his land also went down and he sometimes had to plant elephant grass instead of coffee and leave the land for some years to increase the fertility. Only very recently a friend introduced him to the technique of making terraces. He started making terraces on the steepest parts of his land in order to stop erosion but he did not have the time and money to do it all at once. It is significant that our informant only found out about the technique of making terraces recently. This is the same farmer who claimed that the extension officers never gave any advice about coffee farming.

Access to Social Capital

There are no specific farmers groups or organizations only for coffee farmers in Pampangan. Some of the farmers are members of a farmers group, but these groups consist of both

vegetable and coffee farmers. The purpose of the farmers groups is to have a forum where the farmers can meet and share experiences and discuss their problems concerning farming. These groups are not restricted so everybody can be a member. Through the farmers groups it is also possible to make proposals to borrow money from Gapoktan, which is the name of the joint organization of farmers groups.

One of our informants said that he had been a member of a farmers group in the past, but the group had broken up because the farmers were not satisfied with the leader of the group. Apparently the leader never gave any information about government support. Therefore the farmer did not know anything about the possibilities of government support. We heard similar stories from other farmers.

Apart from the farmers groups, which only some farmers were members of, we did not identify any other important organizations. It is difficult to get sufficient insight into the state of the social networks in a community in only ten days but from what we could gather exclusion of specific groups did not seem to be an issue in Pampangan. In spite of our continuous probing into the matter everybody responded that there were no ethnic divisions or specializations of any kind in the village. We were told that what people farmed was not determined by their ethnicity but rather their access to capital. Unfortunately there was no official statistics available, which documented people's ethnicity in relation to what they farmed.

Interviewing one of the farmers we stumbled into an interesting example of cooperation between some of the coffee farmers whose farms were located some distance from the main road. Only three months earlier a road leading from the main road to their farms had been build with support from the government. Before the new road was build there had only been a simple dirt road that would turn into a mudslide when it rained, making it very difficult for the farmers to transport their harvest from the farms to the wholesaler. The farmers then went to the village chief who made a proposal and was granted money from a government development program. The government supplied the materials and paid salaries to the local farmers who then build the road themselves.

Possibilities and Constraints of Coffee Farming in Pampangan

In the table below we have summed up the possibilities and constraints for coffee farming in Pampangan.

Possibilities:

- Long storage period. Coffee can be stored longer than vegetables, which, in theory, makes it possible for the coffee farmers to wait for better prices if they are low when they harvest. In reality, however, it seemed that few farmers could afford to do this.
- Not as many diseases as vegetable. Although coffee farmers did list diseases as a challenge it did not seem to match the challenges facing the vegetable farmers.
- Compared to vegetable farming coffee farming is both less labor intensive and requires less capital for farm inputs.

Constraints:

- Only one harvest per year → paceklik
- The coffee prices are very dependent on the global prizes, which are low at the moment.
- The money that they get from coffee farming is not enough to meet their daily needs.
- They often have to borrow money from the wholesalers.
- The coffee farms are often located off the main road, which means it takes more money and time to transport the harvest and the roads are often in terrible condition.
- Lack of information about prices. The farmers do not have any access to information about the way the prizes are set.
- If the rain comes early and hard it will wash away the un-matured beans on the coffee trees resulting in reduced harvest.

Vegetable farming

Focusing on accessibility to the required assets, the possibilities and constraints for vegetable farmers in Pampangan can be analysed, by drawing on the DFID Sustainable Livelihoods Framework as follows:

Access to Human Capital

The majority of the population in Pampangan are Moslems, and this is also reflected in our sample of vegetable farmers. As observed in the field, the number of Javanese who migrated into the area from 1970s now forms the majority of the population. This is the group that introduced vegetable farming in the area, which proved more profitable than the earlier dominant coffee farming. Many of the households are today attracted to join, either by changing completely from coffee farming, or allocating part of their coffee farms for vegetable production. A total of 4 vegetable farmers were interviewed. These were all Javanese men between 35 to 49 years, married, have children. All are heads of their households, with elementary (basic) school representing their minimum education level. The information received show that, all household members participate in farm work, but this also depend on ability and availability, because of other household tasks and responsibilities. For some, household members include in-laws, which highlight the fact that a household unit in Pampangan can consist of more than just members of the nuclear family.

Training and Institutional Support

None of the vegetable farmers interviewed expressed satisfaction on the training, or support offered by the government (incentives, loans) through agricultural extension officers. Many depend on friends and other farmers for knowledge, and some even seek advice from related companies such as pesticide companies, or from other sellers of vegetable inputs.

Labour Intensity – Seasonal Calendar

One of the major challenges of vegetable farming is labour-intensity compared to coffee farming. Often it requires employment of extra labour, which is not always easy to get. In order to gain an insight, we carried out a seasonal calendar exercise with some of the vegetable farmers. The farmers were requested to draw on their real life experiences,

illustrate and distribute on a calendar the amount of time/days it takes to carry out different farming activities per season for each crop, with focus on tomatoes, chilli and cabbages.

Appendix 4 shows the related data for the results discussed below.

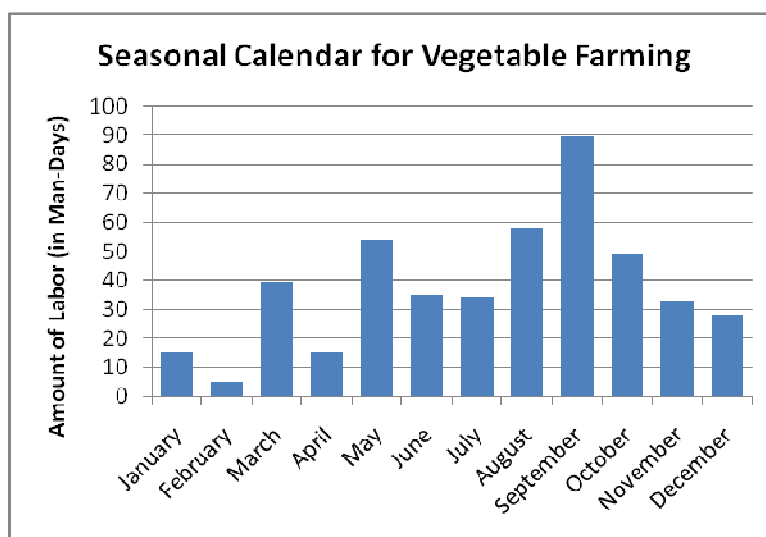


Fig 8. Seasonal calendar showing amount of labor needed per month in a 6-rantai vegetable farm growing chillies, tomatoes and cabbages.

The illustration above shows the vegetables farmers' workdays required for different activities throughout the year (=1 season). Since different vegetable crops can be grown both at the same time and in the same plot (intercropping), or at different times in separate plots, activity periods can differ from season to season, and some can be carried out simultaneously.

As can be seen, the busiest (peak) periods are March and September, and land and seed preparation¹, and harvesting (chilli) are the most time consuming activities. In these periods it is more difficult for farmers to find extra labour for hire, especially if the periods collide with coffee harvesting (June, July and August). This is because they mostly depend on coffee farmers for extra labour. Coffee farmers have only one harvest per year, and because of "paceklik" they often seek wage labour to earn extra income.

Access to Financial Capital

Household – Livelihoods activities

The vegetable farmers interviewed have lived in the community for about 30 years now. They migrated from Java with their families in search of a "better life" (capital, land). Vegetable

¹ Land preparation: Clearing/preparing land, fertilizing, spreading and making holes on plastic covers.
Seed preparation: Mixing fertilizers with soil, filling up and planting seeds in poly bags ready transplanting.

farming is today their major income generator, supplemented by farming of other crops such as rice, pumpkins, sweet potatoes, green beans and selling of wood trees. Other income generating activities include small regular jobs/wage labour in nearby factories or other farms. Those with more land also rent out part of it, for a monthly income, and other activities include livestock and poultry keeping (cows, chickens and ducks).

All of the farmers interviewed had to borrow money in order to purchase their lands. The majority depended on expected profits from vegetable harvests over time to be able to pay back. Only one was able to borrow from the bank, and could pay back fast from his first year harvests, a part time job and by depending on his family for labour. Purchase procedures and payment arrangements differ(ed) therefore from farmer to farmer, depending on the agreed individual arrangements at the time. Land size for all of them ranges from 1 to 2 hectares, most purchased as coffee farms, before changing to vegetable farming, for more harvests and increased profits. Compared to coffee, vegetable harvests are up to three times a year because they can be grown simultaneously. Another benefit mentioned is flexibility. With vegetable farming it is possible to change from one crop to another from season to season, depending on the benefits involved (e.g. chilli gives higher profits than cabbage and therefore preferred by many).

Investment and Coping

Because of more profitability, vegetable farmers have better possibility to save, invest, and cope in times of crisis. Their investments include savings in the bank, their lands and houses, and livestock (cows). One informed that he has a good economy now because of vegetable farming, also because of a steady monthly income from renting out part of his land.

Household economy crisis (“paceklik”), experienced by coffee farmers between harvest/selling periods, is not a problem for vegetable farmers because of the possibility to harvest/sell up to 3 times per year.

Profitability Calculation

We used one case vegetable farmer which stood out as a typical case for the calculation of profitability and the details are shown in the tables 2 which follow.

Table 2a. Sales Per Crop for Mainly Vegetables Farming (2009).

| Crop Type | Amount Sold (Kg) | Price Per Unit (Rp/Kg) | Size of Farm (Rantai or Rt) | Total Sales (Rp) | Sales Per Rantai (Rp/Rt) |
|------------------|-------------------------|-------------------------------|------------------------------------|-------------------------|---------------------------------|
| Chili | 5,400 | 5000 | 9 | 27,000,000 | |
| Tomato | 10,500 | 3200 | 7 | 33,600,000 | |
| Cabbage | 2,000 | 1500 | 2 | 3,000,000 | |
| TOTAL | | | 18 | 63,600,000 | 3,533,333 |

Table 2b. Costs Per Type of Input for Mainly Vegetables Farming (2009)

| Cost Type | Cost Per Year (Rp) | Size of Farm (Rantai) | Cost Per Rantai (Rp/Rt) |
|------------------|---------------------------|------------------------------|--------------------------------|
| Wage labour | 940,000 | 18 | 52,222 |
| Seeds | 185,000 | 18 | 10,278 |
| Pesticides | 1,280,000 | 18 | 71,111 |
| Fertilizers | 630,000 | 18 | 35,000 |
| TOTAL | 3,035,000 | | 168,611 |

Table 2c. Profitability of Vegetables Farming (2009)

(Profitability = Sales - Costs)

| | Profitability (Rp) |
|---------------------------------|---------------------------|
| Total Profitability of the Farm | 60,565,000 |
| Profitability Per Rantai | 3,364,722 |

The income from the different crops were shown in Table 2a to be a function of the price when sold and the size of the farm used. Although this particular farmer have a total of 18 rantis he did not use all of it when planting one kind of crop. Similarly, the tomato and cabbage were intercropped.

Among the prices of inputs in Table 2b, chemical pesticides ranged the highest followed by wage labor. The farmer however cannot diminish his usage of pesticides as the vegetable farms have been known to be besieged by pests and diseases.

Table 2c shows the profitability of vegetable farming as the total profitability of the case farm and on a per rantai basis for comparability between farming systems.

Access to Physical Capital

Vegetable production in Pampangan includes farming of different crops, among them tomatoes, chilli, cabbages, and sweet cabbages. These are the typical vegetables grown by the farmers, hence our decision to focus on them. The farmers grow them for both own consumption and for selling.

Marketing and Transport

Apart from the market, vegetable farmers sell their harvests to wholesalers. This is done as soon as possible after harvest because of the limited shelf life for vegetables. For small quantities, farmers rent or use their motorbikes. But mostly they sell to the big wholesalers in the city, about 7 km from the village, because the wholesalers in the village do not have enough purchasing capacity, given the large quantities of vegetables produced in the area. Generally no transportation costs are incurred because the wholesalers purchase directly from the farms.

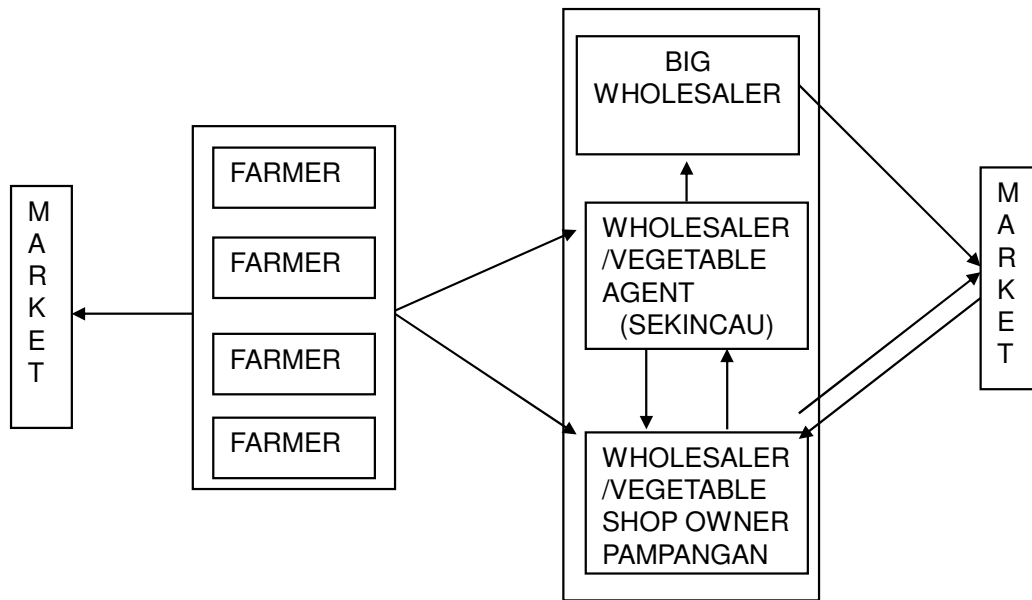
Wholesaler Interviews

To supplement the information received from the farmers, our research included an interview with two vegetable wholesalers. They informed that, there are 20 big vegetable wholesalers in the district (Sekincau). The two wholesalers interviewed are not among these big ones, but only part of the market chain, as vegetable agent and vegetable shop owner respectively. As wholesalers they buy in bulk from the farmers and other vegetable markets, including from each other, and as retailers they also do selling directly to customers. In Pampangan, there are only two wholesale/vegetable shops in the village. Therefore the demand for them is high. Beside the shop, one of the wholesalers has his own farm, and like other farmers, he sells most of his harvests to the vegetable agent in the city. Only small amounts left from his farm, and purchases from small farmers and markets are sold in the shop. The vegetable agent on the other hand sells to both big wholesalers (mainly), and to the vegetable shop(s) depending on the need. The wholesalers also informed that, they are the ones who decide on

prices, and that they do purchasing directly from the farms.

Wholesalers also offer credit/loans to farmers if needed, and payback is done either in cash or from harvests, depending on agreement. This can be said to weaken the farmers' negotiating position further, because it is again the wholesalers who decide on the borrowing terms. For the farmers, it may in some cases mean having to "pass up" better selling opportunities, because they first have to pay back their loans. One of the farmers informed that, wholesalers can also refuse payback in harvests if the quality is poor. The limited competition, credit/loan options for farmers, and lack of mechanisms or information on price levels therefore enhances to a large extent the negotiating power of the wholesalers.

Fig. 9. Market chain for vegetable farmers in Pampangan



The model illustrated in Figure 9 focuses on the sales possibilities for vegetable farmers in Pampangan. As observed in the field, farmers also sale to other buyers available, or on market days. Market as applied here refers to all potential buyers in the area, where the farmers and wholesalers can sell their vegetables, both in small or large quantities. The model is based on the information received from both the vegetable farmers and the wholesalers interviewed, and it shows that wholesalers are the main buyers of vegetables from the farmers in Pampangan.

Crop Management

Most farmers experience problems with pests and diseases of many types that affect the vegetables. To deal with this the farmers use herbicides, insecticides and fungicides. Other methods are manual uprooting of the affected crops, weeding and use of yellow traps to attract/catch the harmful insects. To increase soil fertility they use different kinds of fertilizers. The farmers interviewed were of the opinion that soil fertility is not a problem because they are able to deal with it. Changing or intercropping (chilli, cabbage and tomatoes) is also seen as a methods to maintain soil fertility, and the knowledge about this and other farming methods is to a large extent gained from own experience and from other farmers. In addition the farmers also use organic (cow and/or chicken manure, compost crop residues) mixed with soil before planting, and inorganic (artificial) fertilizers.

But the need for frequent use of fertilizers seems to be enhanced by the problem of soil erosion, especially for farmers in high slope areas (Figure 10) . High precipitation levels that often “wash away” the applied fertilizers also seem to increase this need. Use of plastic covers, terracing intercropping and crop rotation are some of the methods used to deal with the problem. Plastics are also used to prevent diseases (fungus) and transmission of diseases from other crops, to reduce weeds



Fig. 10. Plots for vegetables constructed across the slope.

and keep moisture in the soil during dry season, and plastic covers also help to preserve fertilizers from being washed away by rain. In addition, farmers plant trees in slope areas in order to prevent soil erosion. Because of frequent rainfalls in the area, farmers do not water their crops, but only use it for mixing of fertilizers and spraying of pesticides.

Access to Natural Capital

Land Ownership

Land acquisition and ownership in Pampangan is affected by various factors from availability and purchasing power, to certification (land tenure) procedures. Vegetable farmers informed

that they bought their lands from their friends. These could be the Lampungnese who were the original landowners, but with time other groups in the area also own land today, and therefore also in a position to sell or rent. Land acquisition is very capital intensive but, its' suitability and availability together with water resources needed is an advantage for the farmers in Pampangan.

Access to Social Capital

Of the 4 vegetable farmers interviewed only one had certificate for his land. Many do not have these certificates and the main reason is the high fees required as payment. It is difficult to say at this level, whether there would be implications in future for those without land certificates, but presently both traditional agreements between farmers or friends, and formal land certificates issued under government regulations are used.

Social Networks

The majority of the farmers have been members of the groups formed by the government in the village, but they are not active today. Lack of information sharing by the leaders and limited time due to work burden (busy) are among the explanations given for this.

Possibilities and Constraints for Vegetable farmers

Availability of suitable farmland is among the natural capitals necessary for vegetable farmers, and this part discusses some of the major related issues, as observed in Pampangan:

- Soil fertility: The high use of artificial fertilizers was noticed, as among the means used to increase soil fertility. According to Wild (2003), soil is considered fertile if it does not limit growth and yield of a particular crop, under prevailing climatic, economic and management conditions. Soil fertility has usually been maintained by the skill and experience of the farmer, but not all management practises have been good, taking into consideration the extensive degradation or loss of soils in the past, and at present. Wild (03) points out that there is evidence mainly *in vitro* studies that pesticides can affect the soil biota and its biological processes, some effects being

stimulatory and others depressive), even though there is no evidence of any long-term harmful effects on soil fertility, from pesticides applied at recommended rates. But basing on the observation in Pampangan, determining appropriate rates may prove a challenge, given the prolonged rainy seasons in the area. The high use of pesticides also increases the risk of contamination of surface waters and atmosphere, thus posing hazards to plants and animals.

- Loss of productive land due to population growth is another factor connected with soil fertility. Wild (03) points out that when crop yields fall, farmers may move to land, which is a habitat for wild plants and animals. In this way the habitat is lost to nature, and more degradation follows. The losses may be due to man's activities or to natural causes, with erosion, acidification, and salinization of soils, as among the adverse effects. Wild (03) suggests that, although these changes occur naturally, they have been accelerated by the activities of man such as the clear felling of forests, overgrazing of grasslands and cultivation of land using techniques that are not appropriate for the local conditions. The farmers in Pampangan seem to experience similar problems, because of population increase, which necessitate expansion of settlements and farming areas into protected forests.
- Soil erosion: Another issue as highlighted in the discussion is the problem of erosion. "Erosion leads to less retention of water in the soil and more sediment deposited in river beds, and together these cause more severe flooding" (Wild, 03 pp. 70). This argument is very much in line with what was observed in the field, where farmers use two types of terracing methods to deal with this: In order to reduce the amount of water in their farms, caused by too much rain, some of the farmers make vertical terraces to "gather and guide" the water down the slopes and away from their farms. This system apparently helps to "get rid of" the excess water, but it increases the problem of erosion especially in high slope areas. On the other hand some of the farmers make horizontal terraces, which help to prevent erosion, but this may means increase the amount of water retained in their farms, increase the risk of floods in lowland areas (e.g paddies). This seemed to be a dilemma for the farmers in Pampangan, because of the topographical features of their area.

Combined Coffee and Vegetables Farming

Another typology that we have developed is for a farming scheme that both have coffee and vegetables grown either in separate locations or adjacent to each other. Some of the issues we are presenting here in terms of the access to the different livelihood assets and the possibilities and constraints of farming are thus unique to this group of farmers while some issues are similar to those for farming mainly coffee and mainly vegetables.

Access to Human Capital

Intensity and Distribution of Labor

Similar to the other farming schemes, we used the seasonal calendar to analyze the intensity and distribution of labor for mixed farming. To be able to compare with that of the seasonal calendars for mainly coffee and mainly vegetables farming systems, the seasonal calendar for mixed coffee and vegetable farming was constructed based on the assumption that the farmer has both 6 rantai of vegetable farm and 1 hectare of mature coffee farm and that the vegetable crops grown are chili, tomato and cabbage. The crops are planted in rotation starting with tomato in September then replaced by cabbage (December) then chili (February). In reality, however, although those are the most common types of vegetables grown in Pampangan, this rotation is not commonly done to avoid proliferation of diseases. Tomato and chili are usually planted at different parts of the farm or at different rotation cycles. The typical intercropping of chili with cabbage or tomato with sweet cabbage was also barely done in this exercise. As aimed, the resulting calendar was however still able to depict the amount and distribution of labor required for this type of farming strategy.

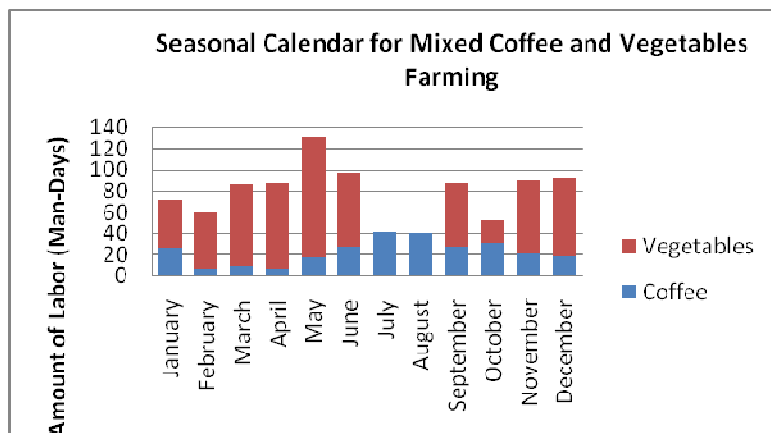


Figure 11a. Sesonal calendar showing amount of labor spent for vegetables and coffee farming in a year.

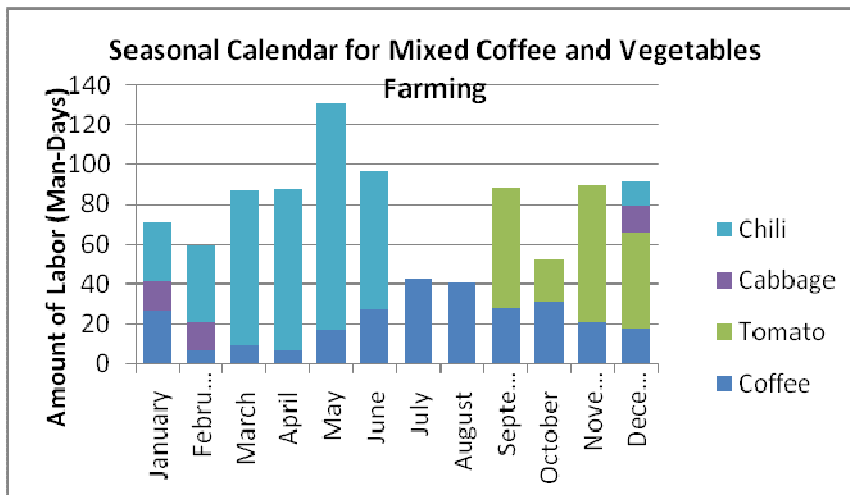


Figure 11b. Seasonal calendar showing amount of labor and crop types in a mixed farming system in a year.

The figures above show that the labor for mixed production is widely spread all throughout the year. As shown in figure 11a, the farmer schedules his activities in the vegetable farm based on his lenient time from working in the coffee farm. During the months that he is relatively not very busy with tending the coffee farm, he has a lot of other activities in the vegetable farm. In addition, based on the seasonal calendar, no activity for vegetables was done during the peak of coffee harvests in July and August. As typically practiced, tomato is planted in September, after the coffee beans have been harvested.

Both figures illustrate that the farmer needs most amount of labor in May, which is the peak of chili harvesting. During this month, the farmer has to hire more people to help him out in completing his farm activities. By comparing the total man-days for each month, the figures also show that the amount of work per month cannot be finished by one man alone. During July and August, the months which seem that he has the least amount of work, he still needs more than 40 man-days each month to be able to harvest the coffee. This indicates that mixed production is highly labor intensive and that the farmer will not have time to do wage labor in other farms or do other activities except when he decide to depend on hired laborers or his other family members to manage and tend to his farms. As a consequence, big farms hires people to manage either their vegetable or coffee farms while smaller farms use available family labor only.

Figure 11b demonstrates the shorter rotation cycle of the vegetable crops. Tomato is grown for just 4 months while chili needs about 7 months and cabbage, about 3 months. The 4

harvesting periods for the 4 crops are scattered throughout the year. This also suggests that the farmer will have income for most of the times within the year.

Based on the farmers' discussion after doing the seasonal calendar, the usual problem for this type of farming system is the tendency of the farmer to attend to his vegetables farm more often and spend less time to nurture the coffee. The quality and productivity of the coffee farm is thus affected. To avoid this, the farmer usually hires farm help and let him do less specialized manual jobs in both the vegetable and coffee farms. As an example, we have interviewed a farmer who said he do more complicated jobs like pesticide and fertilizer application by himself because he said these activities need trained skills and he do not want to compromise the quality of his plants by letting untrained others do this activity for him.

Trainings

All interviewed farmers have been recipient of training programs either from the government or from fertilizer and pesticide companies. Their trainings range from techniques on fertilizer and pesticides application to farming methods to livestock production. Most of the trainings are for vegetable farming. The village secretary however noted that there was training on terracing that had been introduced through the government agricultural extension program in 2002 but the farmers rarely apply these in their farms due to lack of manpower and financial resources. A few coffee farms which have been terraced were observed in some parts of the village.

Access to Natural Capital

The availability and quality of the agricultural land in terms of fertility and topography influence the farming strategy employed by the mixed farmer. Meanwhile, the rainy weather has both been an advantage and disadvantage to the farmers.

Acquisition of Land

Land in Pampangan is acquired through inheritance and buying. The farmers interviewed came from families who moved voluntarily to Pampangan because of the reactively cheap price and good quality of agricultural land here. Although the Lampungnese were original occupants of the area and started with mainly coffee farming in most of the lands, the ethnic

origin did not seem to affect the choice of agricultural land that was bought by the migrants. Javanese people and other migrants had access to both coffee and vegetable farmlands and bought whatever was available and affordable to them.

Another strategy presented for most mixed farmers was that they also rent land to use as vegetable farms. They have to do this because very limited vegetable lands are available for purchase. Although we have limited data to support this, it seemed also that the cost of vegetable lands is higher than coffee lands.

Weather Condition

Access to good weather is difficult for the farmers. The 9-month long period of rainy season had increased the incidence of pests and diseases in the farms. All interviewed farmers use herbicides, insecticides and fungicides to prevent and control pests and diseases for both their coffee farms and vegetable farms. Mulsa plastic is also used in most vegetable farms to control weeds and spread of diseases. Manual pulling out of weeds is also regularly done in both farms. Weeding and pruning are however more intensive during rainy season since weeds and unnecessary sprouts of coffee are more often during this time.

Another problem brought about by the rainy weather is the difficulty in drying up crops like coffee, cocoa and vanilla. Nutrients added up to the soil is also usually just washed away so fertilizing is done regularly.

The rainy weather also have an advantage however. Since there is almost 9 months of rainy season, the farmers only water their plants when applying pesticides and fertilizers, which were done once a week. During very dry months, watering was done once a week and manual pail-and-dipper method is used.

Topography

We have observed and was shown in the community map that most parts of Pampangan is hilly and farming on slopes is quite common. Farmers who have mixed production usually have both sloping and relatively flat lands and the choice of crops is often influenced by this topography. Vegetable farms are mostly in relatively flat areas while most coffee farms are in

sloping areas.

Effect on Soil Fertility. Although we do not have enough data to support our claim that flatter lands can hold more fertile soil, we have observed that vegetable lands are often with darker soil while coffee lands are more reddish and yellowish in appearance. One of the farmers mentioned that this is one indication of how to measure soil fertility. The undulating landform, coupled with the frequent rains, thus seem to necessitate fertilizing to improve soil fertility. All interviewed farmers use fertilizers, both organic and inorganic to supplement the soil fertility of their farms. Manure is usually added to the soil for vegetables while crop residue is used for enhancing fertility of soil for coffee trees.

When asked about conservation issues, we found out that most of the farmers were not fully aware of any conservation scheme from the government. One of the farmers interpreted conservation in terms of the need to improve soil fertility and prevent soil erosion. He realized that the soil in their farms were “not fertile enough” such that it was necessary to apply fertilizers, both organic and inorganic, and use erosion control measures to enhance soil fertility.

Effect on Soil Erodibility. Although the farmers mentioned that soil erosion is not a problem for them, we observed this as evidenced by the silted rivers and frequency of landslides in sloping areas (See figure 12 and 13). Methods employed by the farmers to control soil erosion ranges from terracing, use of soil piled up in zigzag or along contours, grass hedgerows like *gelaga* and *rumpul gadjah* (elephant grass), and planting of large trees such as Dadap (*Erythrina orientalis*) and African trees (Figure 14).

One of the farmers mentioned that they deliberately construct vegetable plots across the contour so that the water from the frequent rain will not be retained in the plots and not cause further diseases. Small gullies and canals were constructed around the plots to guide the flow of water downslope.



Fig. 12. The Village Secretary pointing to a recent landslide in his chili farm.



Fig. 13. The silted muddy creek down the slope of Mr. Sudiantoro's vegetable farm.

Access to Physical Capital

Institutional Support

We noted that advices from government extension officers are not well-received. The farmers said that most of these advices are not applicable to their real situation.

One of the farmers have received grant from the government through his farmer organization in 1995. He used this as capital for raising cows. Another farmer mentioned that the government support he had received was in the form of low-interest cash loan that he had received from the government bank. The other two farmers reported that they have not received any form of support from the government.

Marketing and Transport

Both coffee and vegetable crops were sold to wholesalers located in Pampangan and Sekincau. In most cases, the vegetable wholesalers come to their farms so they did not have to pay for transportation of their products. Coffee products were however usually transported using hired motorcycles.

For coffee, there are four wholesalers in



Fig. 14. Using *rumput gadjah* (elephant grass) to control erosion in a coffee farm.

Pampangan and they choose to sell to the one who pays for the best price. One of the farmers favors the coffee wholesaler in Sekincau who seemed to be a bigger wholesaler than the ones in Pampangan.

Access to Social Capital

Social Networks

Most of the mixed farmers are members of a farmer organization. Some of these organizations are inactive and some are newly-formed. Most of the organizations were formed in order to allow the farmers to share knowledge and resources (such as loans) for their agricultural activities. Training support and government extension services were also acquired through these organizations.

There seem to be no limitation on membership to these organization. All farmers who are interested were encouraged to join. However, most of these organizations do not seem to be active at all.

Access to Financial Capital

This type of farming scheme needs a lot of financial capital to start and nurture both their farms. We did four interviews of mixed farmers but ended up presenting here with just the case study of one typical mixed farmer and calculated his profitability for such scheme (See tables 3a, b, & c). The comparison of the three schemes in terms of profitability will be discussed in the next section.

Table 3a. Sales Per Crop for Mixed Coffee and Vegetables Farming (2009).

| Crop Type | Amount Sold (Kg) | Price Per Unit (Rp/Kg) | Size of Farm (Rantai or Rt) | Total Sales (Rp) | Sales Per Rantai (Rp/Rt) |
|---|-------------------------|-------------------------------|------------------------------------|-------------------------|---------------------------------|
| Coffee | 500 | 15,000 | 19 | 7,500,000 | 400,000 |
| Vegetables | 22,500 | 27,000 | 15 | 126,500,000 | 8,433,333 |
| <i>Chili</i> | 4,000 | 24,000 | 5 | 96,000,000 | |
| <i>Tomato</i> | 12,000 | 2,000 | 5 | 24,000,000 | |
| <i>Cabbage</i> | 6,500 | 1,000 | 5 | 6,500,000 | |
| TOTAL | | | | 134,000,000 | 8,833,333 |
| Average sales for 1 rantai of mixed farm | | | | | 4,416,667 |

Table 3b. Costs Per Crop for Mixed Coffee and Vegetables Farming (2009)

| Cost Type | Cost Per Year (Rp) | Size of Farm (Rantai) | Cost Per Rantai (Rp/Rt) |
|--|---------------------------|------------------------------|--------------------------------|
| Coffee | | | |
| Wage labour | 1,960,000 | 19 | 104,533 |
| Fertilizers | 1,000,000 | 19 | 53,333 |
| Splitting Machine Rental | 150,000 | 19 | 8,000 |
| Vegetables | | | |
| <i>Chili</i> | 17,500,000 | 5 | 3,500,000 |
| <i>Tomato</i> | 10,500,000 | 5 | 2,100,000 |
| <i>Cabbage</i> | 2,500,000 | 5 | 500,000 |
| Subtotals | | | |
| Coffee | 3,110,000 | | 165,866 |
| Vegetables | 30,500,000 | | 6,100,000 |
| TOTAL (1rt coffee & 1rt of vegetable farms) | 33,610,000 | | 6,265,867 |
| Average cost for 1 rantai of mixed farm | | | 3,132,933 |

Table 3c. Profitability of Mixed Farming (2009)
(Profitability = Sales - Costs)

| | Profitability (Rp) |
|--|---------------------------|
| Total Profitability (both farms) | 100,390,000 |
| Coffee part (19 rantai) | 4,390,000 |
| Vegetables part (15 rantai) | 96,000,000 |
| Profitability Per Rantai (1 rantai of mixed farm) | 1,283,733 |
| Coffee (1 rantai) | 234,133 |
| Vegetables (1 rantai) | 2,333,333 |

Although we were not able to gather complete data what we managed to gather from the four interviews indicated different profitability for farmers who grow both coffee and vegetables. Two cases seem to have very high profit, which is mainly from vegetable production. It was however noted that prices of crops vary within the year and there are farmers who had the opportunity of selling at the time when the price was very high while some have to sell even at very low prices.

The data for the sales also indicated that the farmers choose to grow different kinds of vegetables at different parts of the farm or at different times of the year. Sometimes, the farmers also have other crops such as caisin, long beans and rice but these were not reflected

in the tables for ease in comparison with the other farming systems. One of the farmers also raises livestock such as chickens and cows and uses these to supplement his farm income.

The costs of farm inputs depend on the type of crops grown and the availability of land and labour, as well as on the strategy of farm management- how intensive was their use of pesticides and fertilizers.

Other Sources of Income

A special case among the respondents is a farmer who shares his profit to his farm managers. These expenses are reflected in the profitability calculations as wage labour. Although he seems to have fewer earnings from his farm he gets additional income from his pesticide shop and from doing wage labour in other farms. He is one typical example of a farmer who doesn't rely on his farm for most part of his income. Other sources of income for the other farmers also include livestock production and the salary from being a Dusun chief.

Investments and Coping Mechanisms

Their investments were in the form of cash savings, properties, and stored crops. During crises, existing credit facilities include friends, farmer organizations, wholesalers and banks. It was mentioned that land certificates are usually required when borrowing money from banks. The farmers however do not mention problems relating to absence of these certificates.

Most of the mixed farmers experienced "Paceclick" when they are mainly cultivating coffee. This was dealt with by changing their farming system to include vegetables and changing the kind of vegetable crops from time to time. One of the farmers sells his cows in times of financial crisis. Others retained being mixed farmer but changed crops from season to season.

Possibilities and Constraints of Doing both Vegetable and Coffee Farming

Possibilities

- Income is available all year round. Harvesting is done more than three times a year depending on what crops have been planted.
- More crops can be used for own consumption.
- Farming strategy can be made suited to the topography. Vegetable farming usually done on flatter areas while coffee farming can be done on relatively steeper slopes.
- Rotating and mixing crops in the vegetable farms and sometimes intercropping in the coffee farms helps in preventing some of the pests and diseases and provide opportunities to cope with financial crisis.

Constraints

- Intensive labor requirement. It is necessary to hire additional labor.
- Financial resources need to be readied at every start of growing season. Four crops mean that they have to have financial capital four times each year.
- Need for means of transport. The separate locations of farms necessitate transportation. Most coffee farms are located in areas not accessible to cars and hiring of motorcycles was necessary for those who don't own a means of transport. In addition, although vegetable wholesalers go to the vegetable farms to buy from the farmers, coffee wholesalers do not often go to the coffee farms.

Discussion – Comparison of the Production Systems

The 3 case studies, coffee, mixed, and vegetable farming have in previous sections been analysed, by drawing from the DFID framework for Livelihood and Sustainability Framework. The time line and community map provided history and gave an overview of the typographical features of Pampangan, basing on the data gathered and our own observation during the research. In terms of production there is a clear tendency that, many farmers are attracted to change from coffee to vegetable farming, because of more income, due to the possibility of three harvests per year. But compared to coffee, vegetable farming requires much more care and attention, and extra investment is necessary for inputs (fertilizers and pesticides). The summary table below compares the profitability of the three systems.

Table 4. Comparison of Profitability between Farming Systems

| | Profitability (in Rp) | | | | |
|-----------------------------------|------------------------------|------------------------------------|--------------------|-----------------------|-----------------------|
| | Vegetable Farming | Mixed Farming | | | Coffee Farming |
| | | Both Coffee & Vegetable | Coffee part | Vegetable part | |
| Total Profitability Per Case Farm | 60,565,000 | 100,390,000 | 4,390,000 | 96,000,000 | 15,700,000 |
| Profitability Per Rantai | 3,364,722 | 1,283,733 | 234,133 | 2,333,333 | 314,000 |
| Profitability Per Hectare | 84,118,056 | 32,093,333 | 5,853,333 | 58,333,333 | 7,850,000 |

As shown in Table 4, the results of the profitability calculations verified the farmers' claim that vegetable farming is highly lucrative, so much more than farming mainly coffee. It should be noted however that it had been difficult to compare between farms, even though they might have the same crop (chilies, tomatoes and cabbages for the vegetable farms), since the price fluctuations affected the income from sales of crops and the costs of inputs. The profitability results shown here are also comparable to the estimate given by the agricultural extension officer (minimum of approx. 10,000,000Rp/ha for mainly coffee farming and approx. 40,000Rp/ha for mainly vegetable farming).

Table 4 also confirms one of the reasons for coffee farmers to change into vegetable farming. Mixed farmers seem to be in the transitional stage and based on the interviews they would also want to convert into mainly vegetable farming but constrained by many factors which

were discussed in the section about these challenges to converting. Mixed farming also provides fallback income to farmers who cannot leave coffee farms.

Furthermore price fluctuations of vegetables compared to coffee are very unpredictable. This is enhanced by limited market information on prices. Below is a summary of the challenges facing the farmers, if they choose to change from coffee to vegetable farming:

Human Capital

- New knowledge about farming techniques and the use of pesticides and fertilizers is needed. Vegetable farming may also require more planning if crops are to be rotated during the year. These new skills were often identified as among the challenges. But this does not seem to be a big problem, because farmers have the possibility to pick these skills from their other skilled farmers already in vegetable farming.
- Vegetable farming requires more usage of artificial fertilizers, which is a health risk for farmers. It was mentioned that, vegetable farmers are generally younger than coffee farmers, because they are able to cope better with diseases and sickness. Unfortunately, we did not have time to explore this last and quite alarming piece of information. It was also mentioned that vegetable farming requires more strength physically compared to coffee farming.
- Vegetable farming also requires more labour compared to coffee farming. This is as illustrated in the seasonal calendars for the three case studies. A comparison of the calendars show that, especially farmers for both vegetable and coffee farming (mixed) will have no or limited time for other activities, unless they hire extra labour to work on their own farms (see Figure 15.).

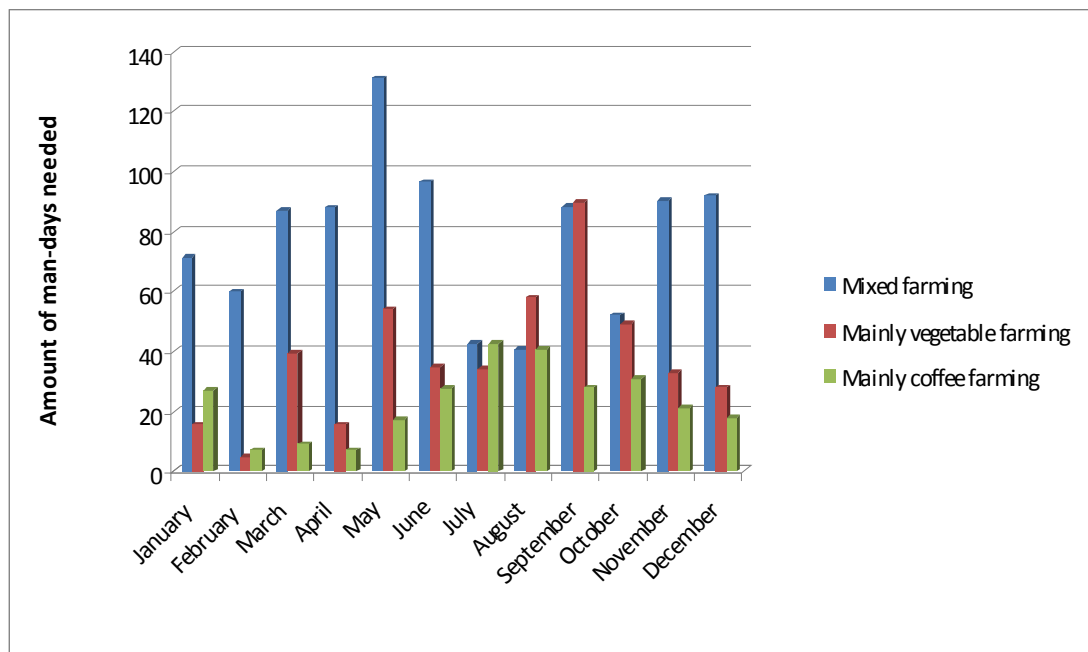


Fig.15. Comparison between the seasonal calendars for the three farming systems.

Physical Capital

- Good access to transportation is very important when growing vegetables, because the limited shelf life. Vegetables need to be sold and transported as quickly as possible after harvests. This relates well as among features from the community map illustration (Figure 16), whereby most of the vegetable farms are almost exclusively located next to - or very near to the main roads. Better infrastructure is therefore very crucial, and need to be considered as a precondition.
- Limited access to market information and prices is a challenge for vegetable farmers, and it reduces their bargaining power. In addition, sale in large quantities depend on wholesalers from far away because, the wholesalers in the village do not have enough capacity to purchase.
- Limited or no transportation cost is an advantage to farmers, because wholesalers purchase directly from the farms.



Fig. 16. Community map of Pampangan Village

Financial Capital

- Vegetable farming is potentially more lucrative, but it is also more capital intensive in terms of farm inputs. The farmers need therefore, to take this into consideration. The farmers identified this as a main obstacle if they wanted to change to vegetable farming. Coffee farm on the other hand, is seen by some as a security, should vegetable farming fail.
- Some of the farmers inherited their land from their families. This also increases access to land for farmers, but not all have this possibility.
- Apart from land certificates, traditional land purchase agreements (based on trust, reciprocity and exchange), which are also recognized for land ownership, reduce the costs (fees) needed for formal processing and documentation of land certificates. Traditional agreement can in this way be said to increase access to land for poor farmers. But lack of formal documentation may have implications in the future, if traditional agreements prove insufficient. Furthermore, these agreements may have limited clarity, which increases potential for future disagreements and conflicts (e.g. in case of change of ownership by one or both parties involved).

- From the profitability analysis which was standardized to a per rantai basis, it can be concluded that vegetable is the most profitable followed by the combined farming system.

Natural Capital

- Vegetable farming is best suited on flat land than coffee farming. One of the farmers informed that he simply had to buy a new farm in a flat area when he decided to change to vegetable farming. This is however not always possible because flat land is not widely available in the area today compared to earlier.
- Generally the land in Pampagan is suitable for both coffee and vegetable farming, but its' availability may prove a challenge in future for reasons of population increase.
- Pampangan area is blessed with abundant natural water resources, coupled with prolonged rainy periods. It was however mentioned that frequent rains are a cause for increased pests and diseases for vegetable crops.
- Erosion protection is widely practiced by the farmers, but this is still a major problem needing continued and correct preventive measures.

Social Capital

- The farmers groups formed by the government in the area provide access for farmers to join together in addressing their issues and problems. However, these groups are presently experienced as inactive and therefore not fully utilized by the farmers at the moment.
- Access to support networks and knowledge sharing for farmers is enhanced by the good relations and integration between the different ethnic groups, and this is an additional resource for farmers.

CONCLUSION

Through our research, we have been able to identify the challenges faced by both coffee and vegetable farmers in Pampangan. By comparing the two farming systems we have seen that many farmers are attracted to change from coffee to vegetable farming, because of the high profits involved. The different analyses show that, coffee and vegetable farming are among the main income generators for the farmers in this area. Consequently, our research uses the typology of the 3 case studies, namely coffee, mixed coffee and vegetable, and vegetable farming. In line with our research objectives, our aim has all along been to make a comparison of the possibilities and constraints for the farmers, and the challenges involved for those choosing to change from one system to another, or practice the mix of both. The DFIDs Sustainable Livelihood Framework has been used to discuss the accessibility of the assets necessary for the two production systems. These have been categorized focusing on the different capitals in the pentagon.

With reference to the research question, it can be concluded that the possibilities and constraints of coffee production and vegetable production in the village of Pampangan are affected by their accessibility to the different assets as outlined in the case studies, namely human, financial, physical, natural and social capitals.

Basing on the observation and experience gained, the farmers in Pampangan do have access to most of the assets needed for both coffee and vegetable farming, although not without setbacks. For example, there is still a high need for knowledge and skills/training required, while the government support in this area seems to be limited. Furthermore, soil erosion is still among the major problems that need continued and correct measures, in order to maintain soil fertility. This problem is enhanced by trends in population increase that may lead to excessive intensive farming.

All in all, the possibility of being able to conduct the research in the field, gained our insight into subject, and the reality on the ground for the farmers. Being able to try out the different methods, gave us a realistic picture on the relevance and suitability of research methods, taking into account the different contexts.

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APPENDIX 1

SYNOPSIS OF GROUP WORK

PAMPANGAN VILLAGE

Proposed Research Title:

Sustainable Livelihoods – Possibilities and Constraints of Coffee and Vegetable Production in Pampangan Village, Bandar Lampung, Indonesia

Group members:

| <i>Name</i> | <i>Background</i> | <i>Email Address</i> |
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Duration of Field Work: 7 - 21 March, 2010



Source: <http://www.seasite.niu.edu/indonesian/indonesian-map/indo-map-fs.htm>

1. INTRODUCTION

1.1 The Lampung Province - Migration, Resource Utilization & Conflicts

Lampung province in the island of Sumatra has long been a destination for migrants from Indonesia's inner islands of Java, Bali and Madura, and its diverse cultural ecologies are indicative of the influence of peoples from these islands, combined with the landscapes of local Lampungnese groups, now a minority as a whole. Since 1980, North Lampung has been a receiving area in the "local transmigration" or Translok programme for the resettlement of "squatters" from protected state forests. Through Translok the region has been transformed as what was once a sparsely settled area comprising groups practising "traditional" hillside agroforestry and shifting cultivation has given way to settled food crop farming by Javanese migrants and the rapid growth of large-scale agro-industrial plantations which have sprung up in tandem with the resettlement programme. As a result, conflicts over land are frequent and among small-scale farmers they often involve the expression of cultural difference, primarily between local Lampung people and Javanese migrants. One of the initiatives taken to address migration issues is the transmigration resettlement programme, which involves the resettlement of land-poor Javanese migrants into less populated "outer island" areas where they endeavour to forge a livelihood (with some state aid) alongside the original inhabitants of receiving areas. Local transmigration is today facilitated through province-level administrative mechanisms. In Lampung translok began in the 1970s.²



South Sumatra – Lampung Province³

² Elmhirst, R. (2001): Resource Struggles and the politics of place in North Lampung, Indonesia.

³ <http://www.baliwww.com/lampung/>

1.2 The Village Pampangan⁴

The village of Pampangan in the Lampung province is in the subdistrict of Sekincau located in the southern part of the mountain range Bukit Barisan. This area lies within the altitudes from 1000 m to 1200 m, humid with an average temperature between 20°C and 34°C. The annual rainfall for the whole province ranges between 2000 and 4000 mm per year, which is a bit higher compared to 1500 to 2000 mm in the subdistrict of Sekincau alone.

Most of the villages in Lampung have a very mixed population, but originally the population is Lampungnese. Since the 1950's there has been a continued settlement of farmers from other areas, either spontaneously or as a result of government settlement programs. An example of this is the above-mentioned "translok" program. North Lampung has since 1980 been a receiving area for resettlement of squatters from protected state forests. Today the transmigration is implemented at the local level, and spontaneous migrants are resettled in forest squatters, which pose a threat to forest protection in the area.

Historically, Sekincau was very sparsely populated in the beginning of 20th Century, and the first settlement was after World War II due to the rising of coffee prices. This brought about more Lampungnese, Semendo, Kenali pioneers to the area. The Javanese settled in 1970s and taking advantage of the high prices started to grow vegetables for sale in urban markets. The population of Pampangan also include some Chinese.

In terms of land use the Lampungnese (this being their area), were the first to open fields and cultivate the land and sold to Javanese settlers, who continued to clear new lands further into the forest. Today protection of forest is made in order to halt the negative impact of deforestation on watershed functions, and conflicts of interest regarding land status and land uses create problems to control the use of state forest land. While the efforts of the state aim at forest rehabilitation, for the farmers these measures mean reduced or total loss of land for coffee production.

Beside coffee the villagers in Pampangan depend on vegetable cultivation for income. Other income earning activities include paddy fields, utilization of fishponds and livestock keeping.

The above background information touches upon a number of important issues in their different contexts from political, economical, and social for the people in Lampung province. This is what has motivated us to investigate further basing on the objectives and research questions below.

⁴ Ref: Fact finding mission report (LIFE-ILUNRM, 2010)

2. OBJECTIVES OF THE REPORT

The objective of this report is to analyse the sustainability of vegetable production in comparison with coffee production. We have modelled our research design after DFID's (1999) sustainable livelihoods framework which, together with Redclift's (1991) sustainable development framework, will also be the basis of our data analysis. We have chosen the DFID framework because we think it is a useful tool that can help us get an overview of all the different factors influencing the livelihoods of the different farmers in Pampangan. Our main challenge, however, has been how to operationalise and adapt the framework to fit our research topic. Fortunately the framework is a flexible tool and the developers encourage users to shape it according to their needs: "A more important task than perfecting the framework itself is putting the ideas that it represents into practice. If that calls for adaptation of certain boxes or revision of certain definitions to make the framework more useful, all the better; the framework becomes a living tool" (DFID 1999:2).

By using the "asset pentagon" from DFID's framework as a guidance tool we will collect data that can help us to get an overview of the farmer's situation within each production system. In other words, we wish to assess or 'map' the assets of the average coffee farmer compared to the assets of the average vegetable farmer. Having done this we wish to analyze the vulnerability context (in the form of trends, shocks and seasonality), the influence of institutions, organisations and policies on the farmer's livelihoods, and finally the different strategies the farmers adopt to deal with these factors. While mapping the two different production systems we are going to keep an eye open for the way they interact, for example how they influence each other and if they integrate in any way. Finally, we are going to assess how sustainable each livelihood strategy is based on the following definition of sustainable livelihoods.

Livelihoods⁵ are sustainable when they:

- are resilient in the face of external shocks and stresses;
- are not dependent upon external support (or if they are, this support itself should be economically and institutionally sustainable);
- maintain the long-term productivity of natural resources; and
- do not undermine the livelihoods of, or compromise the livelihood options open to, others (DFID 1999:7)

3. RESEARCH QUESTION

What are the possibilities and constraints of coffee and vegetable production, and how sustainable is each system?

⁵ Livelihood in this context refers to coffee & vegetable production systems.

Sub-questions:

1. What are the livelihood assets for coffee and vegetable production?
2. What are the most important trends, shocks and seasonal shifts affecting the farmers' access to these livelihood assets?
3. What are the most important institutions and how do they affect the farmers' access to these livelihood assets?
4. How do the farmers' livelihood activities affect their natural resource base (land use and environment)?

3.1 Clarifications:

In line with the objectives of this report, the research question and sub-questions above relates to DFIDs sustainable livelihoods framework as follows:

Possibilities:

- The availability and access to the parameters/capitals as outlined in the framework and the attached data matrix (sub-question 1 above).
- Other related assets or factors that contribute positively in improving the farmers, production activities (e.g. income-generating non-farming activities, subsidies, donor contributions, other)
- Improvements as a result of the positive methods applied by the farmers in the production (e.g. production increase as a result of improved soil quality due to better farming systems)

Constraints:

- Refers to the trends, shocks and seasonal shifts as well as the internal and external factors/institutions that affect the farmers' access to livelihood assets (sub-questions 2 & 3 above).
- Affected natural resource base as a result of how the farmers utilize it, e.g. environmental degradation, soil erosion or degradation due to application of pesticides, etc. (sub-question 4 above).

4. METHODOLOGY

We will use a combination of Participatory Research Appraisal (PRA) and conventional social research methods. The PRA will aim to empower the community and harness the local diversity in order to map, model, rank, estimate and plan for themselves. Members of the research team will be facilitators and observers in the process (FAO a & b). PRA methods will include: community mapping, transect walk, Venn diagram, seasonal calendar, participant observation, life histories and focus group discussion. Other research

methods such as data gathering from secondary sources, key informant interviews, household survey, and GPS survey will also be conducted. These will supplement and triangulate the data that will be generated from the PRA.

4.1. Review of Literature and Secondary Information

Relevant literature and documents will be reviewed to gather statistical and historical data. Information sources will include libraries – from both Denmark and Indonesia, government offices, research institutions, NGOs and other local organizations.

4.2. Semi-structured Interviews or Key Informant Interviews (KII)

In the semi-structured interviews we expect to get an overview and general guidance and information regarding the area, subject of our research and advice on how best to go about it. We will also go more in depth with the results of the questionnaire survey by interviewing key persons in the community. Initially, expert interviews are expected from the farmers – at least two (2) coffee farmer representatives and two (2) vegetable farmer representatives, preferably those who have been pioneers in the area. The village chief, the agricultural extension officer and a representative of an external organization, if any, will also be target interviewees.

4.3. Questionnaire Survey

To identify and get an overview of who the coffee farmers and vegetable farmers are in the village, four (4) days will be devoted to structured interview of the households selected using a snowballed sampling. As much as possible, an equal number of vegetable farmers and coffee farmers, including households with female heads will be included in the sample.

4.4. Participant Observation

Following a farmer and making our own observation while he is at work will give us a broader insight of how the farmers do their work and how their routines are organized. If possible, this method will be done to at least one coffee and one vegetable farmer.

4.5. Life Histories

The narratives from well-informed respondents will enable us to enlarge on the farmers own perceptions and ideas based on their own experiences and methods. At least two life histories will be done. A representative for both production systems will be allowed to tell their life stories and discuss their rationale for the actions they had taken in the past as well as relevant events and processes which shaped their decision in the future.

4.6. Transect Walk

We will do the transect walk on the first day of field work with two or three community members who are authoritative on the key features of the community. While walking, the guides will be encouraged to discuss the importance of these features and their location. This will give a good overview of the natural and physical features of the village and provide an insight on what should be in the community map. A GPS will be carried around during the walk.

4.7. Community Mapping

An overview of the livelihood assets of the village is expected to be generated through community mapping. We will involve at least five (5) selected participants including those who have been guides in the transect walk. The participants will be as diverse as possible in terms of ethnicity, gender, age, social status, and authority. The map will be supplemented with location data gathered through a GPS survey of some of the relevant points in the area. Two kinds of information will be produced – the natural resources and the social resources of the village.

Village Natural Resources: The community map will show the community members' local perceptions of their natural resource base and will give an insight on the topography of the area. Locations and relative abundance of key natural resources, key farming practices, land use, development activities and possible barriers to production will be identified. Access to land, water and natural products will then be discussed.

Social Resources: The community map will also depict local social structures, institutions and relevant infrastructures. It will also help the researchers to learn about the social and economic differences between households. Indicators of economic status could be the materials from which the house are made of, size of farms, amount of livestock owned, and other factors which the community members might suggest as important. Key information that could be generated in the discussion of the social map will include an estimate of the population growth and from what sources (e.g. migration), location and relevance of the administrative boundaries, local markets, religious groups, and ethnic groups.

4.8. Timeline

We will do two timelines, one will represent the historical changes in migration and another will focus on the land use changes. The timeline on land use change will also include occurrence of shocks such as natural calamities, conflicts and financial crisis in the area and what the community have observed for the past 50 years or more. Community elders will be the preferred participants. In case they are not available, authoritative figures, such as historians or younger generations who have heard stories from their grandparents will do.

4.9. Seasonal Calendar

To gain a better insight on the details of the production systems, two kinds of seasonal calendar, one for vegetable production and another for coffee production, will be produced. At least 4 participants each, and having an equal number of men and women, will be invited. The participants farmers will be invited to draw a calendar that will depict the monthly amount of rain received within a 12-month period. Based on the rainy periods, the lean months and plentiful months (food scarcity) will be identified. We also expect to generate data on cropping seasons, availability of capable labour, labour inputs from male and female workers, number of holidays (if applicable), and availability of water for human, crops and for livestock consumption.

4.10. Venn Diagram on Institutions

If time will permit, we will do two kinds of stakeholder analysis, one for each of the production systems. The output Venn diagram will show the institutions, organizations, groups and important individuals found in the village based on local perceptions. The villagers' view of the roles, influences, interrelationships, importance in the community and on who participates in these groups in terms of gender and wealth will also be generated. A good mix of at least five (4) community representatives, for both the vegetable and coffee farmers group, will be chosen to do the diagram. Another short session which will then discuss the relationship between the two output diagrams will be done afterwards.

4.11. Focus Group Discussion

The Focus Group Discussion will be one of the last methods to be done. As much as possible, a good number and mix of representatives of the community will be involved in discussing the agricultural challenges faced by the community and how they coped with them. A list of the issues and coping strategies that will be identified in the household survey and key informant interviews will be presented to the group. We will then invite them to validate and/or suggest additions to this list and then discuss its implications to their community.

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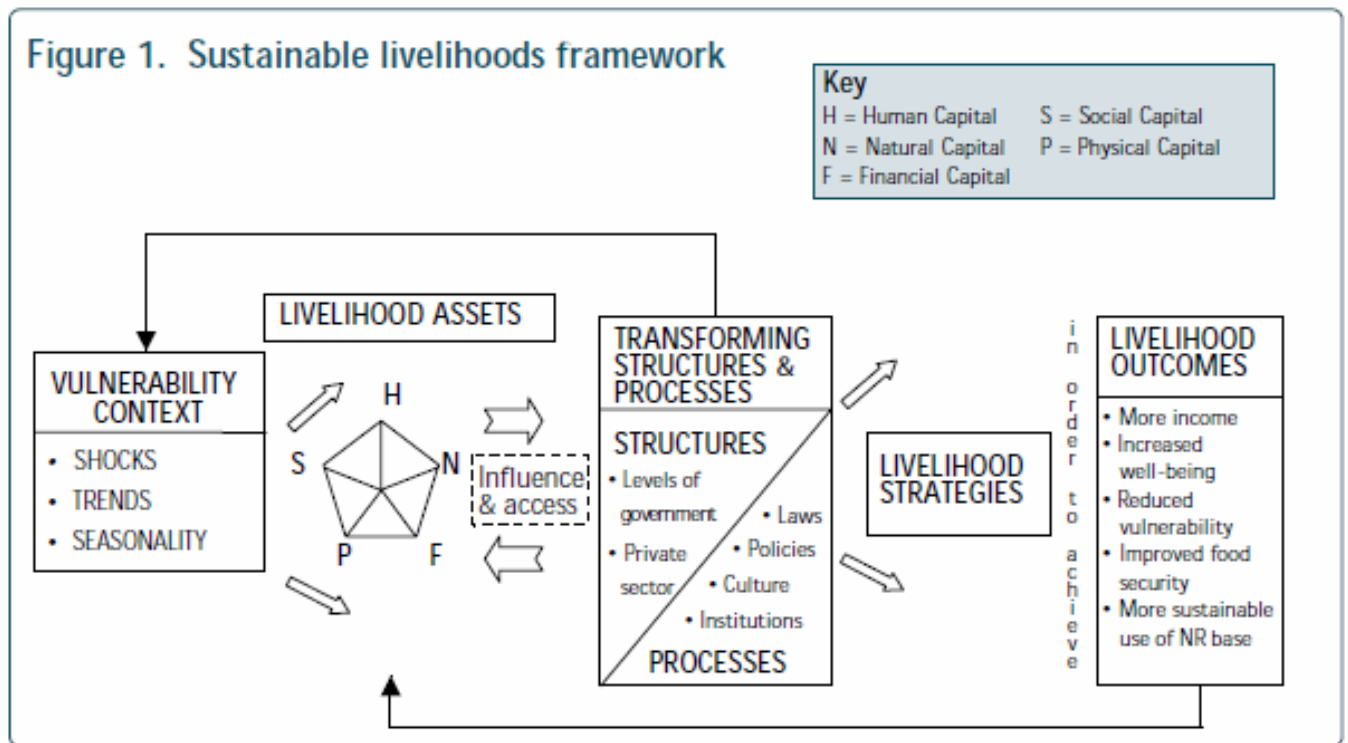
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APPENDICES:

1. DFID Sustainable Livelihood Analysis Framework
2. Proposed Work Plan
3. Data Matrix
4. Household survey/questionnaire
5. Interview guide (Key informants/semi-structure interview, Village chief)
6. Interview guide (Key informant/semi-structured interview, Agricultural extension officer)
7. Interview guide (Semi-structured interviews/Farmers)
8. Interview guide, Focus group discussion (to be made basing on result from above methods)
9. Respondents' overview/Who to ask

APPENDICES

1.



Source: DFID (1999). Sustainable Livelihoods Guidance sheets

2. PROPOSED WORKPLAN

| <i>Day & Date</i> | <i>Activities</i> | | |
|-----------------------|--|--|--|
| | <i>Morning</i> | <i>Afternoon</i> | <i>Evening</i> |
| Sunday 7 - 9 March | <ul style="list-style-type: none"> Rendezvous in Bandar Lampung. Preparation with Indonesian students to synchronize our research outlines. | | |
| Wednesday 10 March | <ul style="list-style-type: none"> Departure to Pampangan. | <ul style="list-style-type: none"> Settling in. Initial observations of the surroundings. | Group meeting: <ul style="list-style-type: none"> Discussing first impressions and arranging tasks for the following day. |
| Thursday 11 March | <ul style="list-style-type: none"> Semi-structured Interview with village head Visit to local government office to conduct semi-structured interviews with officials and acquire statistical information if available. | <ul style="list-style-type: none"> Transect walk with GPS. Semi-structured Interview with agricultural officer | Group meeting: <ul style="list-style-type: none"> Work out sampling strategy. Planning of household visits |
| Friday 12 March | Household visits, coffee farmers : <ul style="list-style-type: none"> Household surveys Semi-structured interview with a coffee farmer. | Household visits, coffee farmers : <ul style="list-style-type: none"> Household surveys Participant-observation | Group meeting: <ul style="list-style-type: none"> Discussion of the days findings. Reevaluate research question and methods. |
| Saturday 13 March | Household visits, coffee farmers : <ul style="list-style-type: none"> Household surveys Semi-structured interview with a coffee farmer. | Household visits, coffee farmers : <ul style="list-style-type: none"> Household surveys. Life Histories | Group meeting: <ul style="list-style-type: none"> Discussion of the days findings. |
| Sunday 14 March | Household visits, vegetable farmers : <ul style="list-style-type: none"> Household surveys Semi-structured interview with a vegetable farmer. | Household visits, vegetable farmers : <ul style="list-style-type: none"> Household surveys Participant-observation. | Group meeting: <ul style="list-style-type: none"> Discussion of the days findings. |
| Monday 15 March | Household visits, vegetable farmers : <ul style="list-style-type: none"> Household surveys Semi-structured interview with a vegetable farmer. | Household visits, vegetables farmers : <ul style="list-style-type: none"> Household surveys Life Histories | Group meeting: <ul style="list-style-type: none"> Discussion of the days findings Planning of PRA methods. |

| <i>Day & Date</i> | <i>Activities</i> | | |
|-----------------------|--|---|--|
| | <i>Morning</i> | <i>Afternoon</i> | <i>Evening</i> |
| Tuesday 16 March | <ul style="list-style-type: none"> Community mapping. History-timeline interviews | <ul style="list-style-type: none"> Seasonal calendar (one for vegetable farmers and one for coffee farmers). | Group meeting: <ul style="list-style-type: none"> Evaluation of findings from participatory methods. |
| Wednesday 17 March | <ul style="list-style-type: none"> Venn-diagram (One for vegetable farmers and one for coffee farmers). | <ul style="list-style-type: none"> Focus Group Discussion | Group meeting: <ul style="list-style-type: none"> Evaluation of findings from participatory methods. |
| Thursday 18 March | <ul style="list-style-type: none"> Buffer-time. | <ul style="list-style-type: none"> Buffer-time. | Group meeting: <ul style="list-style-type: none"> Analysis of data generated Preparation of presentation for the community |
| Friday 19 March | Community Presentation | Finalize presentation for the authorities incorporating comments from the community presentation | |
| Saturday 20 March | <ul style="list-style-type: none"> Final presentation to authorities in Sambar Jaya. | | |
| Sunday 21 March | <ul style="list-style-type: none"> Departure from Bandar Lampung | | |

3. VILLAGE PAMPANGAN – DATA MATRIX

RESEARCH QUESTION

What are the possibilities and constraints of Coffee production and Vegetable production, and how sustainable is each system?

| No. | SUB-QUESTIONS | PARAMETERS/DATA NEEDED | METHODS |
|-----|---|---|---|
| 1. | What are the livelihood assets for coffee and vegetable production? | Human Capital: <ul style="list-style-type: none"> - Capable labor - Skilled labor - Available labor | <ul style="list-style-type: none"> - Semi-structured Interview with key informants (incl. farmers) - Household survey/questionnaires – 20 households (10 for each production system) - Seasonal calendar |
| | | Natural Capital: <ul style="list-style-type: none"> - Climatic conditions - Topography - Soil/land availability - Water | <ul style="list-style-type: none"> - Semi-structured interviews (as above) - Household survey/questionnaires (as above) - Seasonal calendar - Transect walk/PRA - Community mapping |
| | | Physical Capital: <ul style="list-style-type: none"> - Transport/Infrastructure - Tools & Equipments - Access to information | <ul style="list-style-type: none"> - Semi-structured interviews (as above) - Household survey/questionnaires (as above) - Transect walk (transport/infrastructure) |
| | | Social Capital: <ul style="list-style-type: none"> - Power relations - Ethnicity/social networks (inclusion & access to formal forums) - Land tenure/property rights | <ul style="list-style-type: none"> - Semi-structured interviews (as above) - Household survey/questionnaires (as above) |
| | | Financial capital: <ul style="list-style-type: none"> - Income/Savings - Own land/property | <ul style="list-style-type: none"> - Household survey/questionnaires (as above) - Semi-structured interviews (as above) - Community mapping (incl. social mapping) |

| | | | |
|----|--|--|--|
| | | - Other Investment | |
| 2. | What are the most important trends, shocks and seasonal shifts affecting the farmers' access to these livelihood assets? | <p>Trends:</p> <ul style="list-style-type: none"> - Population - Governance - Economics <p>Shocks:</p> <ul style="list-style-type: none"> - Natural calamities - Climate change - Conflicts - Financial crisis <p>Seasonal shifts:</p> <ul style="list-style-type: none"> - Price fluctuations - Employment opportunities, labour migration | <ul style="list-style-type: none"> - Semi-structured interviews (as above) - Household survey/questionnaires (as above) - Time line - Seasonal calendars - Participant observation - Focus Group Discussions - Life history |
| 3. | What are the most important institutions and how do they affect the farmers' access to these livelihood assets? | <p>Institutions:</p> <ul style="list-style-type: none"> - Local & national/government institutions - Donors & International institutions or agencies | <ul style="list-style-type: none"> - Semi-structured interviews (as above) - Household survey/questionnaires (as above) - Venn Diagram |
| 4. | How do the farmers' livelihood activities affect their natural resource base (environment)? | <p>Livelihood activities:</p> <ul style="list-style-type: none"> - Coffee and Vegetable production - Other livelihood activities (farming and non-farming) | <ul style="list-style-type: none"> - Semi-structured interviews (as above) - Household survey/questionnaires (as above) - Participant observation - Life history |

4.

Date: _____ Interviewer: _____ Questionnaire Code: _____

Household questionnaire

A. Respondent information:

1. Name of respondent: _____
2. Age: _____
3. Gender: _____
4. Level of Education: _____
5. Religion: _____
6. Ethnicity: _____

B. Household Information:

7. For how long have you and your family been living in the community? _____ yrs.

8. Where did your family originally come from? _____

9. Which activity is your major income generator?

- ☐ Coffee Production
☐ Vegetable Production
☐ Livestock Production
☐ Others (Specify): _____

10. What are your other sources of income? _____

11. What crops do you grow?

| | |
|------------|------------|
| Crop _____ | area _____ |
| Crop _____ | area _____ |
| Crop _____ | area _____ |

12. What kind of livestock do you own?

| | |
|------------|--------------|
| Type _____ | number _____ |
| Type _____ | number _____ |
| Type _____ | number _____ |

Subsistence and surplus

13. Which among your farm products are mainly for own consumption? _____

14. Which among your farm products are mainly for selling? _____

Land

15. How much land do you have? _____ hectares

16. How much is used for coffee? _____ hectares

17. How much is used for vegetables _____ hectares

18. What is your right over the land?

- ☐ Do you own it
- ☐ Rent it
- ☐ Own the crops
- ☐ Manage it
- ☐ Other (specify): _____

19. How many hours do you and your family works in the field per week?

Men Rainy season_____hrs.
 Dry season_____hrs.

Women Rainy season_____hrs.
 Dry season_____hrs.

Children Rainy season_____hrs.
 Dry season_____hrs.

20. How much do you spend on the following things per months?

Wage labour_____

Rent of land_____

Seeds_____

Pesticides_____

Fertilizers_____

Tools and equipment (rent)_____

Own consumption (own produce or buy from market?)_____

Transportation of goods and inputs_____

21. How much do you sell per months?

Crop_____

Crop_____

Crop_____

22. What is the sell price_____

Crop Managements

23. Do you apply fertilizers? ☐ YES ☐ NO

24. If yes, which type of fertilizers?

- ☐ Manure
- ☐ Artificial fertilizer
- ☐ Compost
- ☐ Crop residue
- ☐ Other(s)_____

25. Do you irrigate your crops? ☐ YES ☐ NO

26. If yes,

Which crops?_____

During which months?_____

Trainings and Institutional support

27. Did any in the household members receive any training in their occupation?

☐ YES ☐ NO

28. If yes, whom? _____

29. What kind of training/s? _____

30. Do you receive any institutional support (*incentives, loans, farm equipment, fertilizer, etc.*)? ☐ Yes ☐ No

31. If yes, what are they? _____

Marketing and transport

32. Where do you sell your products?

☐ Local market

☐ Wholesalers

☐ Individual buyers (*along the road or right at home or at the farm*)

☐ Cooperative unions

☐ Other means (specify): _____

33. How do you transport your products? _____

34. How far is the market from your farm/fields? _____

Social networks

35. Are you a member of any organization in the community? ☐ YES ☐ NO

36. If yes, what are they?

Investment

37. Do you have any investment for your family's future? ☐ YES ☐ NO

38. If yes, by what means (*savings, trees etc.*)? _____

Conservation Issues

39. Are you aware of any conservation scheme in your area? ☐ YES ☐ NO

40. Are you affected by it? ☐ YES ☐ NO

41. If yes, how? _____

Family information

42. Family Members

| Relationship to | Age | Gender | Level of | Occupation | Seasonal labor |
|-----------------|-----|--------|----------|------------|----------------|
|-----------------|-----|--------|----------|------------|----------------|

| | | | | | |
|--|--|--|-----------|-------------------|----------------|
| respondent (wife, husband, aunt, grandma, 1 st child...) | | | Education | (e.g. student, | migration ???? |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

43. List the three (3) main problems of the household?

1. _____

2. _____

3. _____

5. Question-guide for semi-structured interview with village chief

Life stories

How long have you and your family lived here?

Do you have relatives living here in the village?

How did you become the village chief?

What are your general roles and responsibilities as village chief?

Land use

Do you own land here?

How large is your land?

How do you cultivate your land?

Based on your observations and experience of the farming systems in the village, what do you think are the main differences between growing coffee and growing vegetables?

Do you observe whether the farmers that grow coffee produce anything else other than coffee?

Do you observe whether the farmers that grow vegetable produce anything else other than vegetables?

Do you observe whether the fact that somebody belongs to a particular ethnic group influence their way of farming the land?

Have you noticed any change in the farming practices since you became the village chief in this area?

What are these, if any?

Why do you think this is so?

Do you observe whether the farmers learn new practices or methods from the other farmers in the area?

Have you been instrumental in bringing any of these changes in the farming practices?

If yes, How?

Is there a difference between the type of soil used for vegetable farming and the type used for coffee farming? If yes, how would you describe this difference?

What kinds of soil are most suitable for vegetable production?

What kinds of soil are most suitable for coffee production?

What do you think of the fertility of the land here in Pampangan?

What is your indicator for fertility?

What will you recommend if the farmer's land is not fertile?

Do you see any erosion or similar situation in fields of Pampangan?

What do you think is the cause? (are the causes?)

What do you think is the best way to solve or prevent these situations? (or best ways?)

Do you think the vegetable farmers have enough water for farming?

Do you think the coffee farmers have enough water for farming?

Do you know whether the village have an irrigation system?

If yes, how is the irrigation water distributed among the farms?

Ethnicity and power

Do you experience any differences between the different ethnicities in the village in terms of

what they grow, practises, traditions ways to live etc., if yes which?
Does the different ethnicity live and work separated or do they integrate?
Do you experience any difference in terms of power between the different ethnicities?
How is the general relationship between the different ethnicities in Pampangan?

Organisation

Is the farmers integrated in the organisation of the village, if yes how?
How are they presented in decision-making processes?
Are some ethnicities more represented than others?
Are the population general interested in participating in the organisation of the village?

Land rights

How did the farmers acquire their land?
Has there been any change in the land acquisition or land tenure system in Pampangan since you have been village chief?
If there is, do you think this change affect the way in which the farmers farm their lands?

Infrastructure

How do the farmers sell their products?
Has there been any problem in the transportation of coffee or vegetables to the market or where it needs to go?
How far is the market from the farms?
Do you think the existing farm-to-market roads are enough to bring the products safely and in time to the market?
Can you suggest of any other infrastructure or improvement to existing infrastructures that the village farmers might need?

Sustainability Implications

Based on your observations and experiences, do the vegetable farmers use pesticides on their farms? or fertilizers?
Based on your observations and experiences, do the coffee farmers use pesticides on their farms? or fertilizers?
Do you think that this affects the environment (water, soil, air) and how?
Do you think this affects the health of the farmer's families?
Are you aware of any pesticide-related illness that occurred in the village? If yes, what are these?
Are you aware of any fertilizer-related illness that occurred in the village? If yes, what are these?
Has the government done any measure to prevent these illnesses, if any? If yes, what are these?

Do you think coffee production could keep supporting a family in the future?
Do you think vegetable production could keep supporting a family in the future?
Do you think these farmers would shift from one production system to another in the future?
What factors do you think will bring about this shift?

Which production system do you think is more profitable, coffee production or vegetable production?
Which of the two production systems do you think is more capable at coping with shocks and external stresses?

*Which of the two production systems do you think is more dependent on external support?
Which of the two production systems do you think can maintain the productivity of the land longer?*

*Generally, which of the two production systems do you think is more sustainable?
What are your bases for saying this?*

Marketing

*When are vegetables most in demand in the market?
When are coffee products most in demand in the market?
In what months does the people mostly sold their crops? (Probably needs to enumerate the crops)*

Institutional Services

*Does the government provide training to the farmers?
What kind of training?
Who can participate in these training?
Who usually participates in these trainings? (in terms of age, gender, type of production, social status)*

*Does the government provide or subsidize farm inputs to vegetable farmers? To coffee farmers?
What kind of farm inputs do they subsidize, if any? (such as seeds, equipment, irrigation etc.)*

*Does the government provide credit facilities and other agricultural services to the vegetable farmers? To the coffee farmers?
If not, then who or what kind of institutions provide these services?*

*Are there any other existing institutions that are relevant to the agricultural production systems in the area?
If yes, what are these?
How does each of these institutions affect or influence the production systems?*

Can you suggest of any other agricultural services or improvement to existing services that the village farmers might need?

Coping

*Have you noticed whether the farmers have been affected by changes in the environment and nature around them?
How does each kind of farmer cope with these changes?*

*Have you noticed whether the farmers are been affected by financial and similar crises?
How does each kind of farmer cope with these crises?*

*What does each kind of farmer usually do if their harvest is bad one year?
Do you think they have any alternative ways to make money and get food?
What do you think they do to secure their families' future?*

Interactions/Integrations

Do you observe any interaction between the two production systems in Pampangan?

If yes, how do they interact?

Do you think the two production systems can be integrated?

Would there be any advantage to the farmer if he can integrate these two systems? If yes, what are these advantages?

Would there be any disadvantage to the farmer if he can integrate the two systems? If yes, what are these disadvantages?

6. Question-guide for semi-structured interview with the agricultural extension officer

Life stories

Are you living in Pampangan?

If yes, how long have you and your family lived here?

Do you have relatives living here in the village?

How did you become the agricultural officer for the village?

What are your general roles and responsibilities as agricultural extension officer?

Land use

Do you own a land here?

How large is your land?

How do you cultivate your land?

Based on your observations (and probably also based on your own experience) of the farming systems in the village, what do you think are the main differences between growing coffee and growing vegetables?

Based on your observations, what kind of households usually go into vegetable farming? Into coffee farming?

Do you observe whether the farmers that grow mainly coffee produce anything else other than coffee?

Do you observe whether the farmers that grow mainly vegetable produce anything else other than vegetables?

Do you observe whether the fact that somebody belongs to a particular ethnic group influence their way of farming the land?

Have you noticed any change in the farming practices since you became the agricultural officer in this area?

What are these, if any?

Why do you think this is so?

Do you observe whether the farmers learn new practices or methods from the other farmers in the area?

Have you been instrumental in bringing any of these changes in the farming practices?

If yes, How?

Is there a difference between the type of soil used for vegetable farming and the type used for coffee farming? If yes, how would you describe this difference?

What kinds of soil are most suitable for vegetable production?

What kinds of soil are most suitable for coffee production?

What do you think of the fertility of the land here in Pampangan?

What is your indicator for fertility?

What will you recommend if the farmer's land is not fertile?

Do you see any erosion or similar situation in fields of Pampangan?

What do you think is the cause? (are the causes?)

What do you think is the best way to solve or prevent these situations? (or best ways?)

Do you think the vegetable farmers have enough water for farming?

Do you think the coffee farmers have enough water for farming?

*Do you know whether the village have an irrigation system?
If yes, how is the irrigation water distributed among the farms?*

*When are vegetables most in demand in the market?
When are coffee products most in demand in the market?
In what months does the people mostly sold their crops? (Probably needs to enumerate the crops)*

Land rights

*How did the farmers acquire their land?
Has there been any change in the land acquisition or land tenure system in Pampangan since your office was established?
If there is, do you think this change affect the way in which the farmers farm their lands?*

Institutional Services

*Does the government (or your office) provide training to the farmers?
What kind of training?
Who can participate in these training?
Who usually participates in these trainings? (in terms of age, gender, type of production, social status)*

*Does the government (or your office) provide or subsidize farm inputs to vegetable farmers?
To coffee farmers?
What kind of farm inputs do they subsidize, if any? (such as seeds, equipment, irrigation etc.)*

*Does the government (or your office) provide credit facilities and other agricultural services to the vegetable farmers? To the coffee farmers?
If not, then who or what kind of institutions provide these services?*

*Are there any other existing institutions that are relevant to the agricultural production systems in the area?
If yes, what are these?
How does each of these institutions affect or influence the production systems?*

Can you suggest of any other agricultural services or improvement to existing services that the village farmers might need?

*How does your office link up with intuitions providing services like education or health?
Are your roles and responsibilities affected by forest conservation? If yes, how?*

Infrastructure

*How do the farmers sell their products?
Has there been any problem in the transportation of coffee or vegetables to the market or where it needs to go?
How far is the market from the farms?
Do you think the existing farm-to-market roads are enough to bring the products safely and n time to the market?
Can you suggest of any other infrastructure or improvement to existing infrastructures that the village farmers might need?*

Coping

Have you noticed whether the farmers have been affected by changes in the environment and nature around them?

How does each kind of farmer cope with these changes?

Have you noticed whether the farmers are been affected by financial and similar crises?

How does each kind of farmer cope with these crises?

What does each kind of farmer usually do if their harvest is bad one year?

Do you think they have any alternative ways to make money and get food?

What do you think they do to secure their families' future?

Sustainability Implications

Based on your observations, do the vegetable farmers use pesticides on their farms? or fertilizers?

Based on your observations, do the coffee farmers use pesticides on their farms? or fertilizers?

Do you think that this affects the environment (water, soil, air) and how?

Do you think this affects the health of the farmer's families?

Are you aware of any pesticide-related illness that occurred in the village? If yes, what are these?

Are you aware of any fertilizer-related illness that occurred in the village? If yes, what are these?

Has the government done any measure to prevent these illnesses, if any? If yes, what are these?

Do you think coffee production could keep supporting a family in the future?

Do you think vegetable production could keep supporting a family in the future?

Do you think these farmers would shift from one production system to another in the future?

What factors do you think will bring about this shift?

Which production system do you think is more profitable, coffee production or vegetable production?

Which of the two production systems do you think is more capable at coping with shocks and external stresses?

Which of the two production systems do you think is more dependent on external support?

Which of the two production systems do you think can maintain the productivity of the land longer?

Generally, which of the two production systems do you think is more sustainable?

What are your bases for saying this?

Interactions/Integrations

Do you observe any interaction between these two production systems in Pampangan?

If yes, how do they interact?

Do you think these two production systems can be integrated?

Would there be any advantage to the farmer if he can integrate these two systems? If yes, what are these advantages? Would there be any disadvantage to the farmer if he can integrate these two systems? If yes, what are these disadvantages?

7. Question-guide for semi-structured interviews with farmers

Life stories

How long have you and your family lived here? (transmigration...)

Do you have relatives living here in the village?

Do you like being a farmer? (Why?)

Ethnicity

Does the fact that you are from this _____ ethnic group influence your way of farming the land?

Do you learn new practices or methods from the other farmers in the area?

Have you changed your practices since you moved to this area?

Is there a division between the different ethnic groups in the area?

Do the different ethnic groups participate in the same activities together?

Land use

How large is your land?

How do you cultivate your land?

Why do you grow coffee/vegetables and not something else?

What is the most difficult/challenging thing about growing coffee/vegetables?

(What is the difference between growing coffee and growing vegetables?)

Do you grow anything else that coffee/vegetable?

What do you call the soil on your field or land?

What is the difference between this type of soil and the soil used for vegetable farming?

What do you think of the fertility of your land?

What is your indicator for fertility?

What will you do if your land is not fertile?

Do you see any erosion or similar situation in your field or surrounding?

What do you think is the cause?

What do you think is the best way to solve or prevent the problem?

Do you have enough water for your family (consumption) and the farming?

Do you produce some of the food for your own consumption, and how much?

How often do you go to the market to buy food?

Land rights

How did you or your family acquire this land?

Can you keep it forever?

Will your children inherit it when you pass away?

Infrastructure

How do you transport your crops to the market or where it needs to go?

Intuitions

Do you have contact to intuitions providing services like education or health?

Are you affected by forest conservation?

Coping

Have you been affected by changes in the environment and nature around you, and how do you cope with it?

Have you been affected by the financial crises or similar crises, and how do you cope with it?

What do you do if the harvest is bad one year?

Do you have any alternative ways to make money and get food?

What do you do to secure your and families future?

Future expectations/Sustainability

Can coffee production keep supporting you and your family in the future?

Do you think you will grow something else in the future?

Do you use pesticides or fertilizers?

Do you think that this affects the environment (water, soil, air) and how?

Do they affect you or your family in terms health?

8. Respondents/Who to ask?

| Method | Respondent/Participant |
|----------------------------|--|
| Household Interviews | at least 10 coffee farmers + 10 vegetable farmers (depends on how many could be interviewed in 4 days) |
| Semi structured interviews | 2 coffee farmers + 2 veg farmers village head agricultural extension officer representative of external organization |
| Transect walk | 2 local guides who know the area very well |
| Community mapping | at least 5 people incl. the local guides |
| Venn Diagram | 2 groups (one for coffee farmers and one for veg farmers) with at least 4 people (equal number of men and women) and preferably incl. the key informants who have been interviewed |
| Focus Group Discussion | at least 5 people (incl. vegetable farmers and coffee farmers; probably the same people who will do the Venn Diagrams) |
| Seasonal Calendar | 2 groups (one for coffee farmers and one for veg farmers) with at least 4 people (equal number of men and women) and preferably incl. the key informants who have been interviewed |
| Timeline | at least 5 people but preferably the village elders |
| Participant Observation | at least 1 coffee farmer and 1 vegetable farmer |
| Life Histories | at least 1 coffee farmer and 1 vegetable farmer |

List of Methods Used

Semi-structured interviews

- 4 interviews with farmers growing mainly coffee.
- 4 interviews with farmers growing mainly vegetables.
- 4 interviews with farmers growing both coffee and vegetables.

Key informant interviews

- 1 with village chief
- 1 with village secretary
- 1 with agricultural extension officers
- 1 with coffee wholesaler in Pampangan
- 1 with vegetable wholesaler in Pampangan
- 1 with vegetable wholesaler in Sekincau

PRA

- 1 seasonal calendar for coffee
- 1 seasonal calendar for vegetable
- 1 seasonal calendar for mixed coffee and vegetable
- 1 community map
- 1 focus group discussion with the dusun leaders

APPENDIX 3.

SEASONAL CALENDAR FOR MAINLY COFFEE FARMING

| ACTIVITY | Amount of Labor (in Man-Days)* | | | | | | | | | | | |
|------------------------|--------------------------------|----------|----------|----------|-----------|-------------|--------------|--------------|--------------|-----------|-----------|-----------|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Weeding | 10 | | 2 | | 10 | | 2 | | 10 | | 2 | |
| Prunning | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Fertilizing | | | | | | 4 | | | | | | 4 |
| Prunning - Shade trees | | | | | | | | | | | 5 | |
| Digging compost holes | | | | | | | | | | 24 | | |
| Pest Controlling | 3 | | | | | | | | | | | |
| Grafting | 7 | | | | | | | | | | 7 | 7 |
| Harvesting | | | | | | 15 | 30 | 30 | 10 | | | |
| Drying up | | | | | | 1.2 | 2.9 | 2.9 | 0.83 | | | |
| Splitting the seeds | | | | | | 0.3 | 0.75 | 0.75 | 0.2 | | | |
| <i>Total</i> | <i>27</i> | <i>7</i> | <i>9</i> | <i>7</i> | <i>17</i> | <i>27.5</i> | <i>42.65</i> | <i>40.65</i> | <i>28.03</i> | <i>31</i> | <i>21</i> | <i>18</i> |

| | Jan | Feb | Mar | Apr | Maj | Jun | Jul | Aug | Sep | Okt | Nov | Dec |
|----------------------------------|-----|-----|-----|-----|-----|------|-------|-------|-------|-----|-----|-----|
| Amount of Labor (in Man-Days) | 27 | 7 | 9 | 7 | 17 | 27.5 | 42.65 | 40.65 | 28.03 | 31 | 21 | 18 |

* Workdays (labor) was computed for one hectare of coffee farm

APPENDIX 4

SEASONAL CALENDAR - VEGETABLES

25 rantai = 1 hectare (6 rantai = 0,24 h)

Computed for 1 person per 6 rantai of farmland

| | Amount of Labor (in Man-Days) | | | | | | | | | | | |
|-------------------------------|-------------------------------|----------|-------------|-------------|-------------|-------------|-------------|-----------|-------------|-------------|-----------|-----------|
| ACTIVITY | Jan | Feb | Mar | Apr | Maj | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
| CHILI | | | | | | | | | | | | |
| Land & Seed Preparation | | | 39,5 | | | | | | | | | |
| Planting | | | | 6 | | | | | | | | |
| Pests & Disease controlling | | | | 3,5 | 9 | 12 | 12 | 12 | 12 | 4 | | |
| Fertilizing (+ water) | | | | 6 | 6 | 6 | 6 | 6 | 6 | 3 | | |
| Tying ropes on support sticks | | | | | 6 | 1,5 | 1,5 | | | | | |
| Weeding | | | | | 4 | 4 | 4 | | | | | |
| Harvesting | | | | | | | 4 | 37 | 32 | 4,5 | | |
| <i>sub-total</i> | <i>0</i> | <i>0</i> | <i>39,5</i> | <i>15,5</i> | <i>25</i> | <i>23,5</i> | <i>27,5</i> | <i>55</i> | <i>50</i> | <i>11,5</i> | <i>0</i> | <i>0</i> |
| TOMATO | | | | | | | | | | | | |
| Land & Seed Preparation | | | | | | | | | 39,5 | | | |
| Transplanting from poly bags | | | | | | | | | | 4 | | |
| Putting support sticks | | | | | | | | | | 4 | | |
| Pests & Disease controlling | | | | | | | | | | 3,5 | 10 | 12 |
| Fertilizing (+ water) | | | | | | | | | | 6 | 6 | 6 |
| Tying ropes on support sticks | | | | | | | | | | 14 | 14 | |
| Pruning | | | | | | | | | | 2 | 3 | 3 |
| Weeding | | | | | | | | | | 4 | | 4 |
| Harvesting | 15,5 | 5 | | | | | | | | | | 3 |
| <i>sub-total</i> | <i>15,5</i> | <i>5</i> | <i>0</i> | <i>0</i> | <i>0</i> | <i>0</i> | <i>0</i> | <i>0</i> | <i>39,5</i> | <i>37,5</i> | <i>33</i> | <i>28</i> |
| CABBAGE | | | | | | | | | | | | |
| Land & Seed Preparation | | | 26 | | | | | | | | | |
| Transplanting from poly bags | | | | 8,5 | 6 | | | | | | | |
| Pests & Disease controlling | | | | | 2 | 2 | 1,5 | | | | | |
| Fertilizing (+ water) | | | | | 2,5 | 2,5 | | | | | | |
| Weeding | | | | | 6 | 4 | 2 | | | | | |
| Harvesting | | | | | | | 3 | 3 | | | | |
| <i>sub-total</i> | | | <i>26</i> | <i>8,5</i> | <i>16,5</i> | <i>8,5</i> | <i>6,5</i> | <i>3</i> | <i>0</i> | <i>0</i> | <i>0</i> | <i>0</i> |
| GRAND TOTAL | 15,5 | 5 | 65,5 | 24 | 41,5 | 32 | 34 | 58 | 89,5 | 49 | 33 | 28 |

*Amount of Labor
(in Man-Days)*

| Jan | Feb | Mar | Apr | Maj | Jun | Jul | Aug | Sep | Okt | Nov | Dec |
|------|-----|------|-----|------|-----|-----|-----|------|-----|-----|-----|
| 15,5 | 5 | 65,5 | 24 | 41,5 | 32 | 34 | 58 | 89,5 | 49 | 33 | 28 |

APPENDIX 5.

SEASONAL CALENDAR FOR MIXED COFFEE AND VEGETABLES FARMING

| | Amount of Labor (in Man-Days)* | | | | | | | | | | | |
|------------------------------|--------------------------------|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| MONTH | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
| ACTIVITY | | | | | | | | | | | | |
| Tomato | | | | | | | | | | | | |
| Seed preparation | | | | | | | | | 8 | | | |
| Land Preparation | | | | | | | | | 2 | 2 | | |
| Transplanting | | | | | | | | | | 1 | 0.5 | |
| Tying support ropes | | | | | | | | | | | 4 | |
| Fertilizing | | | | | | | | | | | 4 | 4 |
| Pruning | | | | | | | | | | | 2 | 2 |
| Pest & Diseases Controlling | | | | | | | | | | | 1 | 2 |
| Harvesting | | | | | | | | | | 0.5 | | |
| subtotal x6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 21 | 69 | 48 |
| Cabbage | | | | | | | | | | | | |
| Mixing the soil with compost | | | | | | | | | | | | 1 |
| Transplanting | | | | | | | | | | | | 1 |
| Pest & Diseases Controlling | 0.4 | 0.3 | | | | | | | | | | 0.3 |
| Harvesting | 2 | 2 | | | | | | | | | | |
| subtotal x6 | 14 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| Chili | | | | | | | | | | | | |
| Seed Preparation | | | | | | | | | | | | 2 |
| Making holes in the plastic | 1 | | | | | | | | | | | |
| Tying support ropes | 3 | | | | | | | | | | | |
| Fertilizing | 1 | 4 | 5 | 5 | 5 | 5 | | | | | | |
| Pruning | | 1 | 2 | | | | | | | | | |
| Pest & Diseases Controlling | | 1 | 2 | 2 | 2 | 1 | | | | | | |
| Weeding | | 0.5 | | 0.5 | | 0.5 | | | | | | |
| Harvesting | | | 4 | 6 | 12 | 5 | | | | | | |
| subtotal x6 | 30 | 39 | 78 | 81 | 114 | 69 | 0 | 0 | 0 | 0 | 0 | 0 |
| subtotal for all vegetables | 44 | 53 | 78 | 81 | 114 | 69 | 0 | 0 | 60 | 21 | 69 | 62 |
| Coffee | | | | | | | | | | | | |
| Weeding | 10 | | 2 | | 10 | | 2 | | 10 | | 2 | |
| Pruning | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Fertilizing | | | | | | 4 | | | | | | 4 |

| | | | | | | | | | | | | |
|------------------------|----|----|----|----|-----|-----|-----|-----|-----|----|----|----|
| Prunning - Shade trees | | | | | | | | | | | 5 | |
| Digging compost holes | | | | | | | | | | 24 | | |
| Pest Controlling | 3 | | | | | | | | | | | |
| Grafting | 7 | | | | | | | | | | 7 | 7 |
| Harvesting | | | | | | 15 | 30 | 30 | 10 | | | |
| Drying up | | | | | | 1.2 | 2.9 | 2.9 | 0.8 | | | |
| Splitting the seeds | | | | | | 0.3 | 0.8 | 0.8 | 0.2 | | | |
| subtotal | 27 | 7 | 9 | 7 | 17 | 28 | 43 | 41 | 28 | 31 | 21 | 18 |
| GRANDTOTAL | 71 | 60 | 87 | 88 | 131 | 97 | 43 | 41 | 88 | 52 | 90 | 80 |

** Notes:*

- Workdays were computed for 1 person per hectare of coffee farm and a rantai of vegetable farm. Subtotal for vegetables were then multiplied by 6 rantais to be able to compare with the mainly vegetable farming system

- 1 man-day = 8 hours

Summary Table

| Crops | Amount of Labor (in Man-Days)* | | | | | | | | | | | |
|-----------------------|--------------------------------|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
| Coffee | 27 | 7 | 9 | 7 | 17 | 28 | 43 | 41 | 28 | 31 | 21 | 18 |
| Vegetables | 44 | 53 | 78 | 81 | 114 | 69 | 0 | 0 | 60 | 21 | 69 | 74 |
| Tomato | | | | | | | | | 60 | 21 | 69 | 48 |
| Cabbage | 14 | 14 | | | | | | | | | | 14 |
| Chili | 30 | 39 | 78 | 81 | 114 | 69 | | | | | | 12 |
| Total amount of labor | 71 | 60 | 87 | 88 | 131 | 97 | 43 | 41 | 88 | 52 | 90 | 92 |

** computed for one hectare of coffee farm and 6 rantais of vegetable farm*