

# **Study of land use dynamics and paddy land loss due to urbanisation and industrialization in Vietnam**

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## Summary

This report is focused on the changes taking place to land use patterns in modern, industrialising Viet Nam, and is specifically focusing on former agricultural land being developed into industrial land and the problems that go with it.

Viet Nam has been rapidly industrialising since the late 1990s and in some areas even earlier. This change is seen as necessary by the government and is also strongly supported by local people who in most cases, if indirectly, have benefited greatly from it. The former rice paddy land is drained and turned into industrial parks or other urban areas and are often set up by foreign and private investors.

The displaced land owners are compensated for the loss of their land with offers of re-training programs and cash payments. This compensation is intended to get the ex-land owners back on their feet and to find new sources of income. Some ex-land owners have bought other land and invested in the profitable animal husbandry market, raising animals such as pigs, using their waste to grow crops, using the crops to feed the animals and then selling some of the animals to generate even more income. Unfortunately not all displaced land owners are capable of moving to a new area or purchasing more land. Many of them are offered training to work in the factories that are built in the industrial areas. Although it is still fairly low standard of work it is on par if not better than the work they were doing on the rice paddies and is certainly a lot more secure.

Problems arise when the ex-land owners can neither purchase new land nor re-train to work somewhere else. Many people do not wish to re-train as they have spent their whole life farming and the factory work on offer is very different and would require learning a new trade. This mainly applies to older workers who have worked the land for long periods of time. Younger workers often get training in higher profile jobs such as computing; this again leaves many out of work as the jobs they are trained for are not as available as the more menial trades. Another problem that has arisen is that many ex-land owners on receiving a lump sum of compensation, instead of using it to reinvest or re-train, are using it to buy consumer items not necessarily useful in securing a new source of income.

To solve, or at least manage these problems, a good level of organisation is key. Many of the problems arise due to lack of information in the rural areas. Stronger links between new land owners, villages and programs aimed at placing local people in work would eliminate many of the complications that arise when an area's economic balance changes drastically. Locals aiming at re-training can be advised of the job opportunities in the area, and the factory owners can offer improved information on requirements of work.

Improved information also can lead to the remaining agricultural land owners and people not able to retrain or find new sources of income to better support each other within the community. Craft villages are being set up that involve a whole community in production of the same product or agricultural process; this means that there is a safe source of employment for locals without having to relocate. This means that, with less land available for agriculture, more people can benefit from it and it can be used more productively. It also strengthens a village as a whole and leads to healthy dynamics and good social support for the people living in it.

## 1. INTRODUCTION

Eastern and South East Asian countries are urbanising and industrialising extremely quickly including in the Mekong region. In China, the upper stream of Mekong region, Pan and Zhao (2007) reported that urban areas grew more than three-fold during the last 15 years and the loss of paddy field land accounted for 82.9% of all land loss. In Thailand there has been 32 km<sup>2</sup> of cropland lost per year to urban sprawl (Sundquist, 2007). In Vietnam, agriculture has developed well in the last few decades going from a purely agricultural country with serious food shortage problems, to a well developed and established agricultural country, with not only a self-sufficient food supply but also becoming the second-largest rice exporter in the world. However, a large proportion of the Vietnamese population still lives in rural areas and works in agriculture. The Vietnamese Government started a campaign of industrialization and modernization and finding investors to back this project. These strategies gave favourable conditions and were met with support from the local people involved throughout the provinces and investors were encouraged to establish industrial and processing zones. Massive projects and industrial and processing zones have since been established. According to MONRE (2007) from 2001 to 2005 a total of 366.4 ha of agricultural lands (3.89% of total agricultural lands) have been changed to non-agricultural lands. The rate of changes was 73.29 ha year<sup>-1</sup>. The changed areas in some regions accounted for up to 80% of total area. However there have been some unforeseen consequences of this rapid development. Unstable workers (workers with no job security) account for about 25% of workers in some areas and up to 40000 people were affected by the land loss (Vietnamnet, 2006; NCEIF, 2007). The loss of agricultural lands, especially paddy lands are predicted to rapidly increase in the next few years according to the current rate of urbanization and industrialization. In addition, the agricultural growth rate has been slowing down in recent years (GSO, 2007), while pest and diseases in both Red River and Mekong Deltas, the main regions producing rice and grain cereal in Vietnam (MARD, 2007) are rapidly increasing, reducing agricultural production.

As reported by general and provincial statistical data, Vinh Phuc is one of the provinces to have a very high speed of urbanization and industrialization in northern Vietnam. Research was done in Binh Xuyen, representative for hilly land, and Me Linh district, representative for flat land in the province. Also, the main large industrial parks of the province are located in these districts. Research includes two tasks; studying spatial dynamic of land use and livelihoods of land losers in the surveyed area.

The goal of the project is to identify measures to assist policy makers and planners to develop a sustainable economic development of the province, with increasing of urbanization, industrialization and modernization of agriculture and rural areas, ensuring food security. This project proposes to establish objective determination of land use change and paddy land loss, with aims to contribute to land use planning of province and district levels to have sustainable and balance development. Spatial dynamic study will discover the rate and the trend of land use changes in studied areas while the survey results exposure the impacts of land loss. It helps to find out the measures of socio-economic development at grassroots and micro levels.

The specific objectives of the project are: i) to identify the trends of land use change in studied areas in both spatial and temporal terms; ii) to study farmers' livelihoods who are land losers in study areas; and iii) to study the interaction between agricultural paddy lands reduction and food security in study areas currently and in the future.

## **2. LITERATURE REVIEW**

Land use refers to human manipulation of the land to fulfill a need or want (Turner and Meyer 1991.) Land use change may involve: (1) Shift to a different use such as from rice paddy to built-up land, or (2) expansion or intensification of an existing one (Matson et al. 1997). Traditionally, statistical methods were used to analyze the change of agricultural land use. The other approach was to spatially map the land use and quantify the changes (Himiyama et al., 2001). It is clear that population growth is not the only driving force of agricultural land use change, but also due to people's response to changes in economic opportunities and policies, with biophysical and socio-economic triggered events. (Geist and Lambin, 2002).

Studying food security in Indonesia, Anderson and Slater (2005) reported that the Indonesian economy grew very strong between 1960s and mid-1990s. However, rapid urbanization and industrialization with less attention in balancing industry-agriculture caused some problems in food security after 1997 crisis, therefore, Indonesia's food security is now challenging with restoring of macroeconomic growth and for stable society. Urbanization in China is considered as one of the most driving forces for farm land loss, as it stimulates non-agricultural construction and readjustment of the agriculture structure (Lu et al., 2005). In Thailand grain area dropped 10% since 1985 (Sundquist, 2007).

To study the structure of the land use changes in a mesh in an urbanization control area, Kajita et al. (2002) developed a land use forecasting system using a discriminate model and neural network. The results showed that 2/3 of the urbanization control area are occupied by forest; thus much land use was related to nature. Land use is greatly changed by development projects. These development projects are carried out on natural land uses such as forest, unused, rice fields and fields. Especially, forests and rivers are changed into parks, rice fields are changed into vacant, and unused are changed into residence, public use and vacant. Land use change is influenced by various factors. Land use changes can be predicted using this system; however, the precision of temporal transferability is not always high. This model can help to control development projects in an urbanization control area.

Pan and Zhao (2007) used GIS technology, remote sensing images of 1949, 1966, 1981, 1984, 1988, 1992, 1996 and 2000, to analyze the spatial process of urbanization and its impact on the soil resources in Yixing city, southeast China. The results showed that the urban area grew more than three-fold during 51 years and the loss of paddy soil accounted for 82.9% of all soil loss. The urban expansion process in Yixing could be divided into four steps, the initial step (1949–1966), the almost standstill step (1966–1981), the preparation step (1981–1984) and the rapid growing step (after 1984). The study also indicated that the urban expansion was encouraged by the transportation system, however, restricted by the rivers, lakes and hills. The local government's decision also affected the spatial process of urban expansion.

In Asia, rice-produced areas occupied most of the agriculture land use in the plain area. Due to the economic development and urbanization, paddy fields were decreased in some high economic developed areas over the past few decades. The change of paddy field should play an important role in the shifting of land use.

Sathiamurthy et al. (2007) statistical analysis examined the change in potential peak stages resulting from the present and future conversion of upper Rambai River paddy land to urban surfaces. Simulation results indicated that extensive loss of the paddy fields could lead to higher flood peaks to the immediate downstream sections, i.e. between 9% to 22% for 50% and 100% losses of storage area. The results also indicated that for the same percentage of storage area losses, flood peak stage increases 2.5 to 3.25 times higher for stream point located immediately downstream of the target area (i.e. 500 m away) compared to further downstream points (i.e. 3 to 6 km away) that showed no significant changes. As a whole, the results implied that the increase and propagation of peak stages downstream is not proportional (rational) to the percentage of urbanization and loss of storage areas. The impact of urbanization on peak stage is declines with increasing distance from the target areas.

In Vietnam, agriculture has been changing and growing thanks to three important events. Firstly, 'Khoán 100' (Directive 100) was released by the Government at the end of the 1970s as a new contract of production with households in certain regions. Secondly, 'Khoán 10' was launched in 1988, regulating land redistribution to households, at market prices. Farmers were free in crop selection and in purchase of inputs and sale of products to private traders. Collective contracts were abolished and farmers had to pay taxes directly. Thirdly, land was allocated to the farmers (20-year lease for agricultural land and 50-year for forestry land) which encouraged them to invest in land improvements to increase production potential. As a result, Vietnam has become the largest cashew nut exporter, and the second largest rice exporter in the world. Considering the key for economic growing are industries and commercial. With the current agricultural population accounted up to 73%, The Ministry of Agriculture and Rural Development (MARD) decided and encouraged to change land use objectives from low effective land use types including non-cultivated and unfertile and low crop yield lands to high value economic sectors. Along with economic development, new urban and industry areas growing very fast replacing both non-agricultural and agricultural land use types. As MARD's objectives, industrial and processing zones would have been established on the areas of bare lands and low efficient agriculture lands. In practice, they have been placed at intensive agriculture lands because they near the road systems and easy for construction. Urbanization and industrialization cause not only agricultural land loss and food security but also impact to livelihoods. The main goal of the study is to find recommendations to Vietnamese policy makers and planners to have sustainable campaign, especially to have balanced agriculture and industry development

### **3. METHODOLOGIES**

#### Spatial land use dynamics

Using remote sensing for studying land use change in the study area is the main method applied among the other sources of information. The dynamics of land use change were observed through using multi-date satellite images LANDSAT TM recognition in 1996, LANDSAT TM recognition in 2000, SPOT 5 recognition in 2004 and AVNIR-2, recognition in 2007 to delineate and classify land use at each date.

Firstly, AVNIR-2 bands were used to create Colour Composite map (CC), NDVI map (Normalization Different Vegetation Index), in which CC help to visualized image interpretation, to recognized objects in the overall study area and to regionalized the expected/interested areas, NDVI help for further calculation and image interpretations.

Secondly, NDVI map was used for image interpretation by supervised classification methods with help from CC. Land use in the area was classified to 9 land use types, they are: bare land, forest land, urban land, industrial land, paddy rice land double crop, paddy land triple crop, water, upland crop and rural village.

Thirdly, 35 ground truth points were selected for field interpretation of current land use types

Fourthly, Image classification was calibrated by ground truth points and classified land use map was created for 2007.

Fifthly, image classification was repeatedly done for each date and classified land use maps were created for 2004, 2000 and 1996 as well.

After image classification, all classified map were overlaid to see changes of land use in time. Urban and industrial area were also drawn and calculated based on classified maps for different dates to see trends of land use change over time.

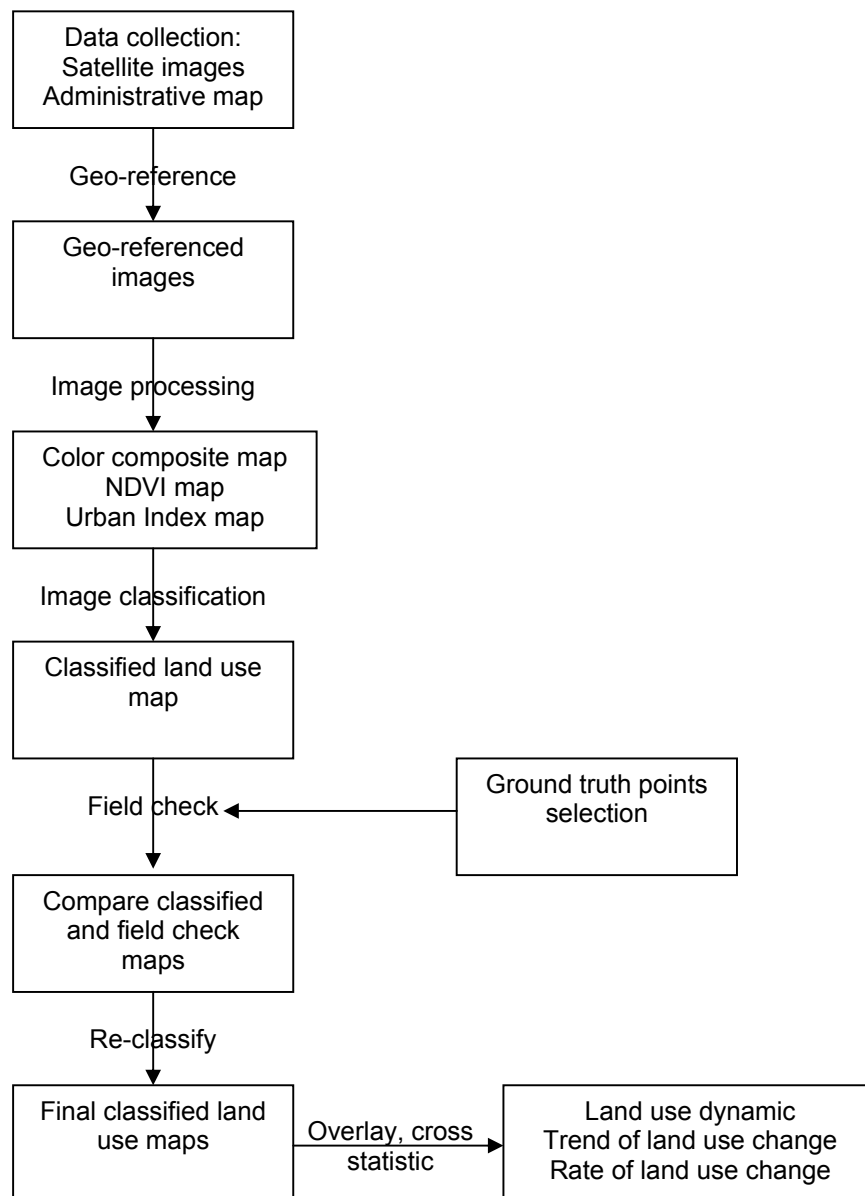


**Figure 1: Use of remote sensing for studying land use dynamics**

- Farmer livelihoods

Social variables include community organizations and institutions, population size, food security and incidence of hunger, education levels, rates of school attendance and literacy rates, sources and levels of household income and incidence of households living in poverty, access to land and other productive resources, quality of housing and household

possessions, occurrence of social problems, and people's self perceptions of their development situation. Data on social conditions were collected using three techniques:

Household interviews: Structured interviews about the social composition and economic situation of individual households were conducted using standardized questionnaires with the heads of about 40 households which were randomly selected from a comprehensive list of all households in each commune. In the event that a household could not be located for interviewing, a substitute was drawn at random from the remaining pool.

Self-anchoring Striving Scale Questionnaire (SAS): Approximately equal numbers of male and female respondents belonging to households included in the sample survey were interviewed using the SAS survey instrument. The SAS was designed to measure, on a cross-cultural basis, the concerns, attitudes, and aspirations of different groups of people. It is a relatively straightforward questionnaire to administer and is especially well suited for use with illiterate informants. The respondent is shown a picture of a ten rung ladder and is told that the space above the top rung represents the best possible life and the space below the bottom rung represents the worst possible life. He is asked to point to the rung that shows where his own current life situation fits on the "ladder of life." He is then asked to show where he thinks his life was five years ago and asked to explain why any change may have occurred if he assigns it a higher or lower rank than the present. Finally he is asked to indicate where he expects he will stand on the ladder five years in the future and to explain why he thinks his position on the ladder will change.

Key informant interviewing of community leaders: Semi-structured interviews were conducted with hamlet and village leaders, including the chairman of the people's committee. These interviews are the source of information about the social organization of each community.

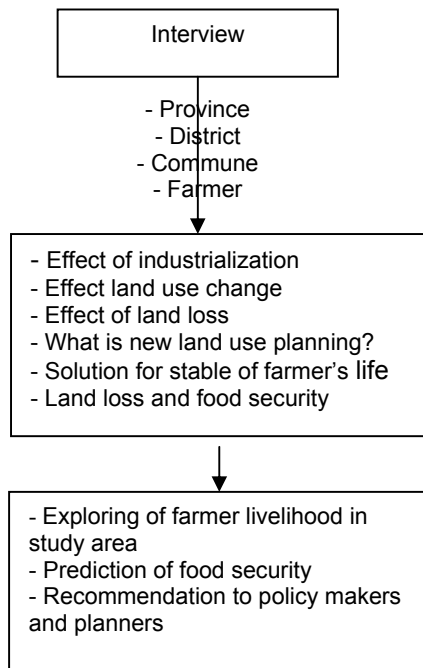


**Figure 2: Activities for farmers livelihood study**

- Policy influences

Method to achieve this product was mostly information from *key informant interviews*. Interview started from getting information in the village to commune committee. The interview was continued with department of agriculture and extension station at district level. At provincial level, departments of agriculture and labour were interviewed with a cross check to district, commune and village levels. Interview was also done with experts of land management (Department of Land, Ministry of Natural Resources and Environment, MONRE) and land use right (Rural Regulation department, Institute of Policy and Strategy for Agriculture and Rural Development, IPSARD)

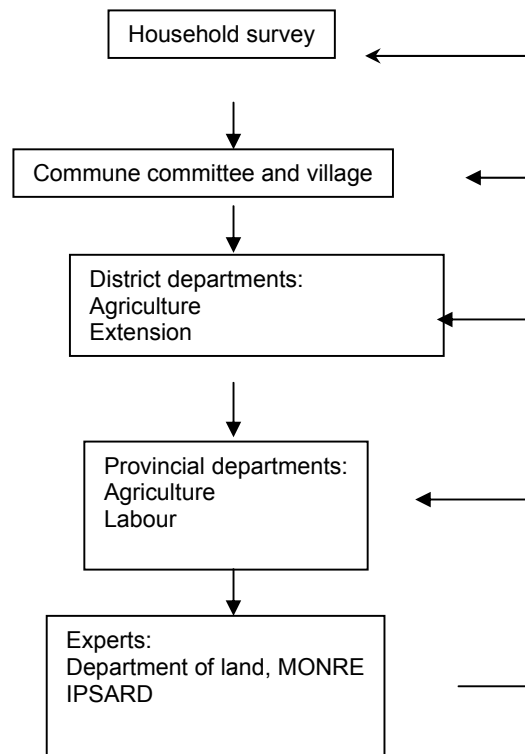


**Figure 3: Work plan of surveying stakeholders**

## **4. RESULTS AND DISCUSSIONS**

### **4.1. Exploring of land use changes**

Image classification analysis results showed that the rates of land use change are different for periods. For example, there was little change during the period of 1996-2000. The change was clearer in the period between 2000-04 with the appearance of more new industrial and urban areas. The rate of change was rapid in the last period of 2004-07 when Quang Minh industrial park was almost in use in 2007, Binh Xuyen 1 park was extending and more built up areas near the centres as well as along the roads.

Results also show clearly that the growth of urbanisation and industries in Tien Phong and Quang Minh communes were very fast. Comparing with reported surveyed data about industrial and some model urban areas started since 1999.

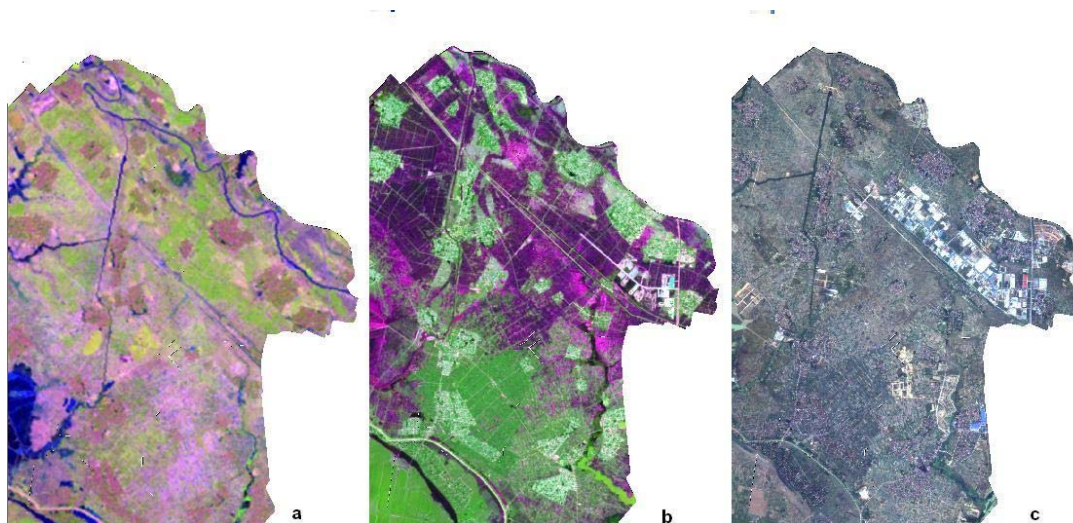


**Figure 4: Industrial parks and urban areas in different times of recognition in 2000, 2004 and 2007 in the Quang Minh-Tien Phong project.**

#### *The other side of industrialization*

Results from field checks also showed that many companies were given land since the project started. After allocated land was either fenced or left fallow waiting for next step of investment, the time from decision point until company/factory were built and ready to use ranges from 2 to 10 years depending on investors. Consequently, hundreds of hectares of land were not in use. The farmers, who are the former owners of the land parcels, regret wasting the land on which they cultivated crops, such as rice and vegetables but unfortunately, the crop yields were unstable because all irrigation systems had broken down.



**Figure 5: Farmers have to change crop from paddy rice to upland crops such as peanut and soybean in spring season because of faulty irrigation systems.**

## Land use change trends

**Table 1: New and old land use types**

| District | New Land use | Previous land use | Area (ha) | %     |
|----------|--------------|-------------------|-----------|-------|
| BX       | Industrial   | Paddy land        | 190.0     | 43.6  |
| BX       | Industrial   | Forest            | 0.9       | 0.4   |
| BX       | Industrial   | Village           | 139.9     | 56.0  |
| BX       | Industrial   | Water             | 0.2       | 0.1   |
| Total    |              |                   | 250.0     | 100.0 |
| BX       | Residential  | Paddy land        | 379.0     | 98.8  |
| BX       | Residential  | Forest            | 1.8       | 0.5   |
| BX       | Residential  | Bare land         | 2.7       | 0.7   |
| BX       | Residential  | Water             | 0.1       | 0.0   |
| Total    |              |                   | 383.6     | 100.0 |
| ML       | Industrial   | Paddy land        | 191.3     | 80.1  |
| ML       | Industrial   | Forest            | 0.4       | 0.2   |
| ML       | Industrial   | Village           | 44.4      | 18.6  |
| ML       | Industrial   | Water             | 0.2       | 0.1   |
| ML       | Industrial   | Bare land         | 2.5       | 1.0   |
| Total    |              |                   | 238.8     | 100.0 |
| ML       | Residential  | Paddy land        | 389.3     | 96.1  |
| ML       | Residential  | Forest            | 1.3       | 0.3   |
| ML       | Residential  | Industrial        | 4.7       | 1.2   |
| ML       | Residential  | Water             | 7.1       | 1.7   |
| ML       | Residential  | Bare land         | 7.6       | 1.9   |
| Total    |              |                   | 405.3     | 100.0 |

Calculation of the extension of industrial and residential areas (Table 1) showed that 43.6% of extended industrial areas and 98.8% of extended residential areas in Binh Xuyen were from paddy rice fields. While in Me Linh district 80.1 % of extended industrial areas and 96.1% of extended residential areas were from paddy rice fields. Extension of industrial and residential areas from bare land was very small in both districts.

### *Cost benefit was not considered*

The first task for establishing industrial parks is to have a good foundation. In Me Linh, the district is almost flat with paddy lands. Therefore, foundation of the industrial park was laid using alluvial deposits extracted from Red River nearby.

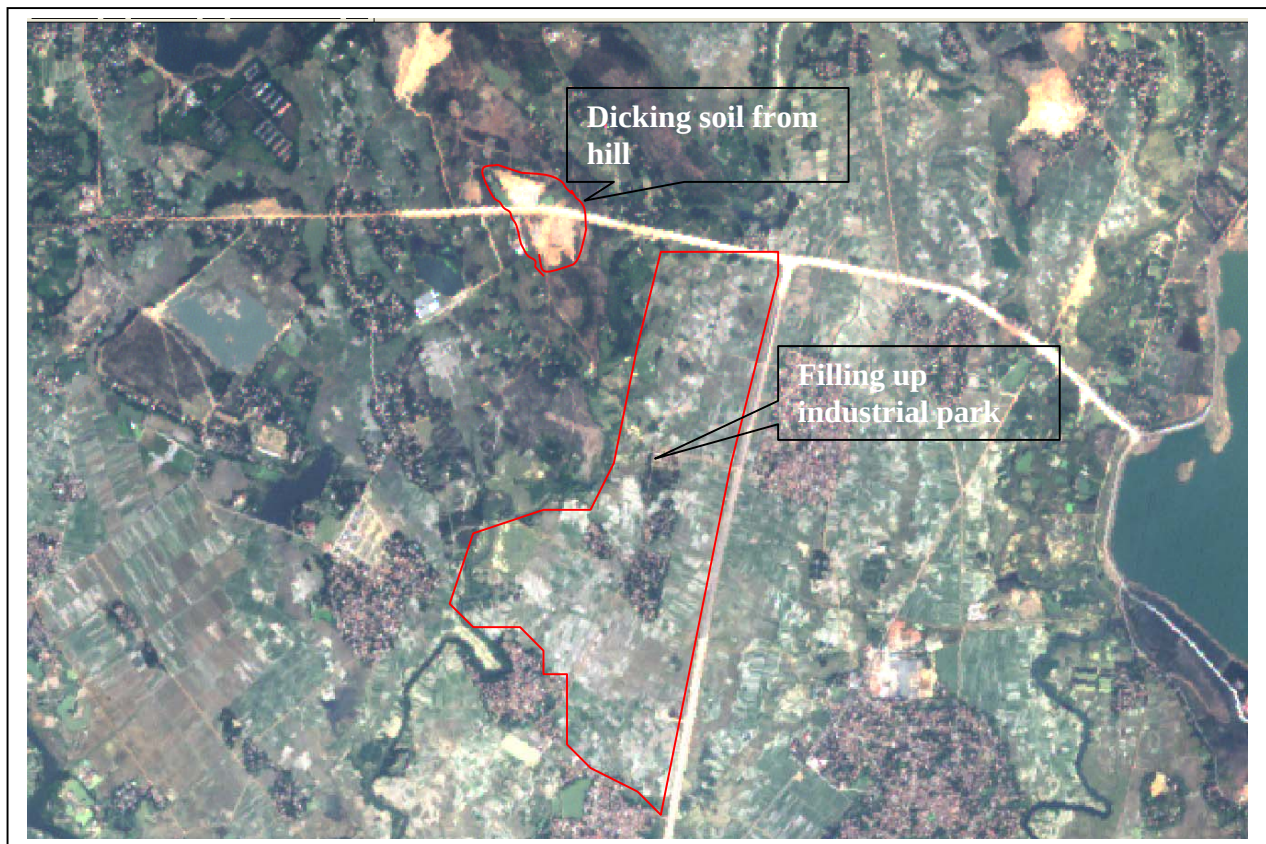


**Figure 6: Soil has been transported from hills to fill paddy fields (1m average) for the establishment of the industrial basement at the new industrial park in Binh Xuyen district.**

In Binh Xuyen, where more than half of the district area is hilly land and mountainous, the industrial developments were also allocated on the paddy land. Establishment of foundation areas are more complicated and provide more difficulties than in Me Linh because of the unavailable alluvial sources for plot levelling and earth filling. The solution for that is to dig soil from hills and bring to fill the allocated industrial area by trucks as shown in Figure 3. Thus, if the industrial area is about 700 ha and the average foundation depth is 1m, the total soil for levelling is about 7,000,000 m<sup>3</sup>, which is a very large investment as opposed to allocating it on hilly land where there is no need for this.

## 4.2. Changing of farmers' livelihoods after industrialization

### *Peoples' lives improved*

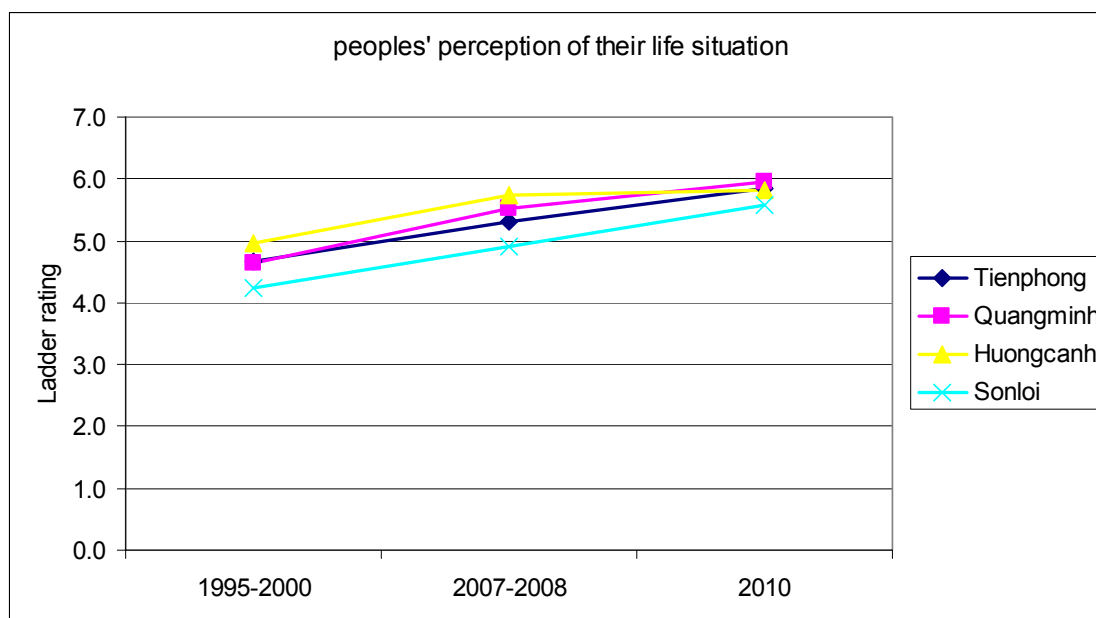


**Figure 7: People's self perceptions of their development situation**

Most people in the four communes see their present situation as being better than it has been in the past and say that they expect that their future situation will improve even more (Figure 7). Currently, the farmers have many sources of income. Former land owners have money they received from companies or factories from the sale of their land. There are more services and small businesses in the area, and the market for property rental has increased. Many farmers have become richer due to this. People in all the communities expect to see further improvements in the future.

### *Farmers become unemployed*

According to reports from communes of Binh Xuyen and Me Linh district, up to 25-30% of farmers who have lost land haven't found jobs or have unstable jobs. Industrial zones established on alienated land areas have attracted thousands of investment projects from local and foreign investors worth billions of US dollars and created jobs for millions of people. This policy also provides an opportunity for transferring parts of the rural labour force, the sector with low labour productivity, to industrial and service production. However, many farmers have become unemployed since their land was reclaimed because some employers broke their promises (farmers' interview). According to commune report, the common reason that farmers change their jobs and seek new jobs is that they could not meet employers' requirements for skills. In addition, the number of rural labourers over 35 is high and people over this age especially have difficulties finding jobs. Many farmers rely on state programmes and compensation and they are not actively seeking jobs. So far, the Ministry of

Agriculture and Rural Development has introduced some solutions to deal with this situation and one of them is establishing an assistance fund. However, to effectively implement the land reclamation policy while ensuring jobs for displaced farmers, the cooperation of local governments in developing suitable vocational training models for farmers is needed.

#### *Using compensation and symbolic household production*

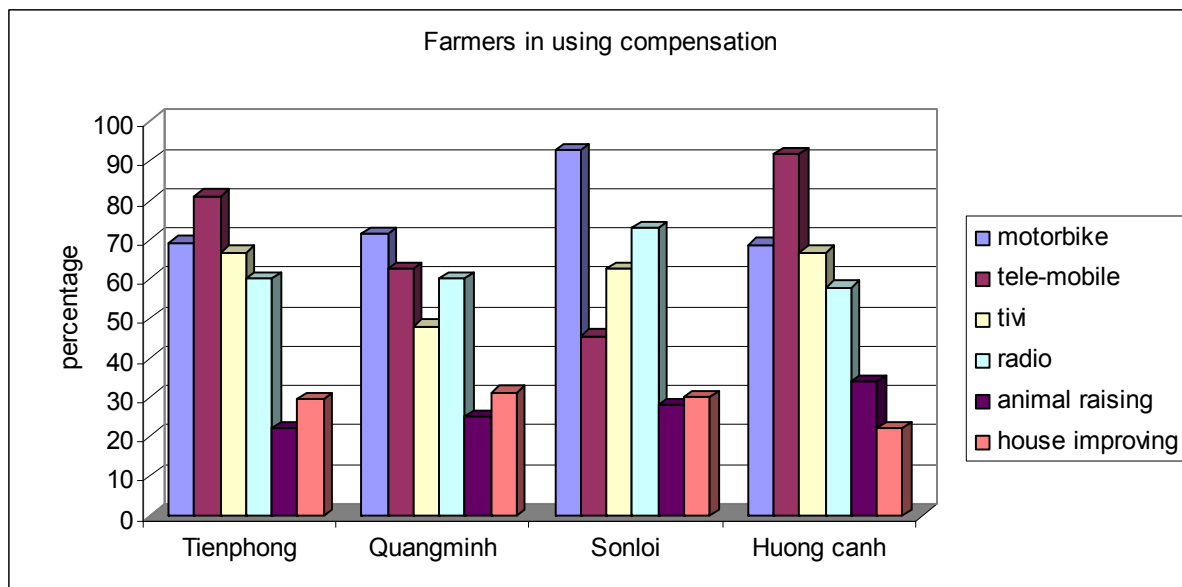


**Figure 8: Farmers' use of compensation**

Farmers those who lost their land due to urbanization and industrialization had received an amount of money for compensation, they used this money for several purposes such as: television, motorbike, telephone, home improvements, etc. (Figure 8). Many people used the money to buy items not beneficial to helping them create and income. In the Huong Canh commune for instance, people used the compensation money to buy motorbikes and televisions. Mobile phones were owned by almost 91.7% of people. Nevertheless, each community has its some exceptions, some families used the money to buy land to raise animals, and this land can also be used by other families. These examples below can give more information:

The household's name is Mr. Nguyen Van Thanh in Tien Phong commune. He has 1000-m<sup>2</sup> rice (2 crops each year), 240 m<sup>2</sup> of potato, and 1000 m<sup>2</sup> of vegetable. He is breeding two sows and making wine. By this way, he can feed his pigs on wine dregs and using the manure on the rice, potato and vegetables. He is planting vegetables such as: cabbage, cauliflower and earns 4-5 million VND during 2 years, the cost expense accounting for 30% of the total. The main income is from cultivation and animal husbandry. His family wealth is average for households in his village.

Ms. Nguyen Thi Hat's family in Son Loi commune has three buffaloes for drawing and gardening. She has more than 20 cows. In 2000 she sold some cows because her household did not have sufficient workers to raise the cattle. Cow raising is a very profitable business, if a mother cow delivers one calf, she will earn a profit of 1 million VND. She is raising two sow pigs. When sow pigs deliver piglets, she does not sell them but keeps them

and raises them (she does not sell sow pigs either). Sow pigs give delivery every 3 months with a total weight of piglets of more than 900 kilos, sold at a price of 30,000 VND per kg. At present, she has 2 sow pigs and 19 piglets. When piglets grow up and are ready for sale, sow pigs give birth again. The dung of pigs is composted and mixed up with NPK fertilizer for fertilizing crops like rice and vegetables.

### *Changing income structure and occupation*

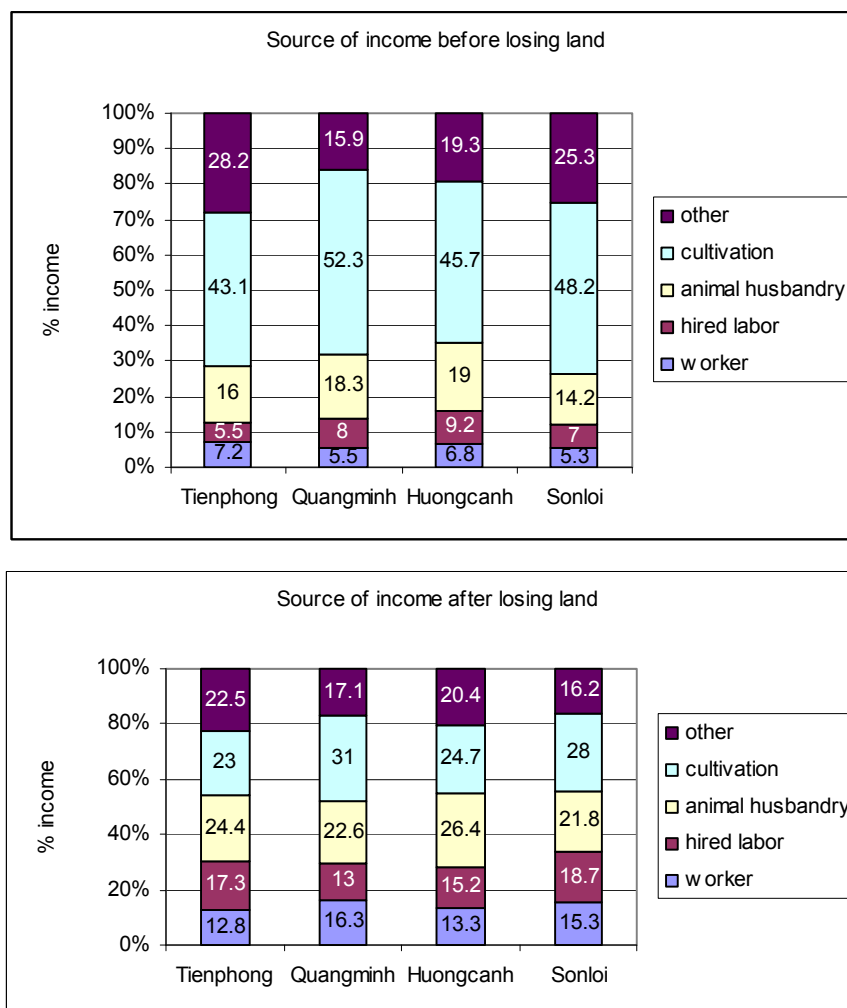


**Figure 9: Ratio of income source of households before and after losing land**

The result from Figure 9 showed that before losing land, the main income of households came from cultivation activities (from 43.1% to 52.3%). However, after losing land, this proportion was reduced significantly (from 23% to 31%). Instead of that, the income from animal husbandry is increasing. The income ratio from hired labour increased remarkably after losing land, especially in Tien Phong commune and Son Loi commune (increased by 11% to 12%). It is clearly that before losing land, the income from cultivation was the most important to households but after losing land, it became of minor importance. In contrast, the income from hired labour that was considered less important formerly, nowadays it is

becoming the one of the most important sources of income to the farmers. We can see the changing in scale of animal husbandry from small scale, which based on cultivation to larger scale with semi-industry and industrial style. The farmers can buy bran on credit for foodstuff from livestock agencies (they can repay money to the lenders afterward).

#### *Unemployment among older agricultural workers*

**Table 2: Population structure of surveyed house holds**

| Terms        | Me Linh district |            | Binh Xuyen district |            |
|--------------|------------------|------------|---------------------|------------|
|              | Tien Phong       | Quang Minh | Huong Canh          | Son Loi    |
| Total people | 190              | 214        | 169                 | 131        |
| Male         | 107              | 74         | 82                  | 70         |
| Female       | 83               | 140        | 87                  | 61         |
| Age          |                  |            |                     |            |
| <15          | 24               | 28         | 33                  | 28         |
| 15-35        | 98               | 149        | 90                  | 65         |
| >35          | 68 (35.7%)       | 37 (17.3%) | 46 (27.2%)          | 38 (29.0%) |

The main population group of age above 35 is shown in Table 2 ranging from 17% to 35% of the total population. This group is the main labours, who are the owners, wives taking care all family maintenance and economic activities, in agricultural production. However, in the new situation (after converting land to urban/industrial lands) family has very small or no agricultural lands, very little labour is needed for farming. Younger ages are more flexible to adapt to new challenges and willing to look for new jobs, while older people find it harder to adapt and have many difficulties to look for new jobs. They can do daily works, such as construction workers, open market sellers etc. but not in the companies and factories.

### **4.3. Policies for former landowners and vulnerable people**

#### *Description of land transfers*

There were 5 groups of stakeholders involved to this issue that are province, district, commune, farmers and businesses.

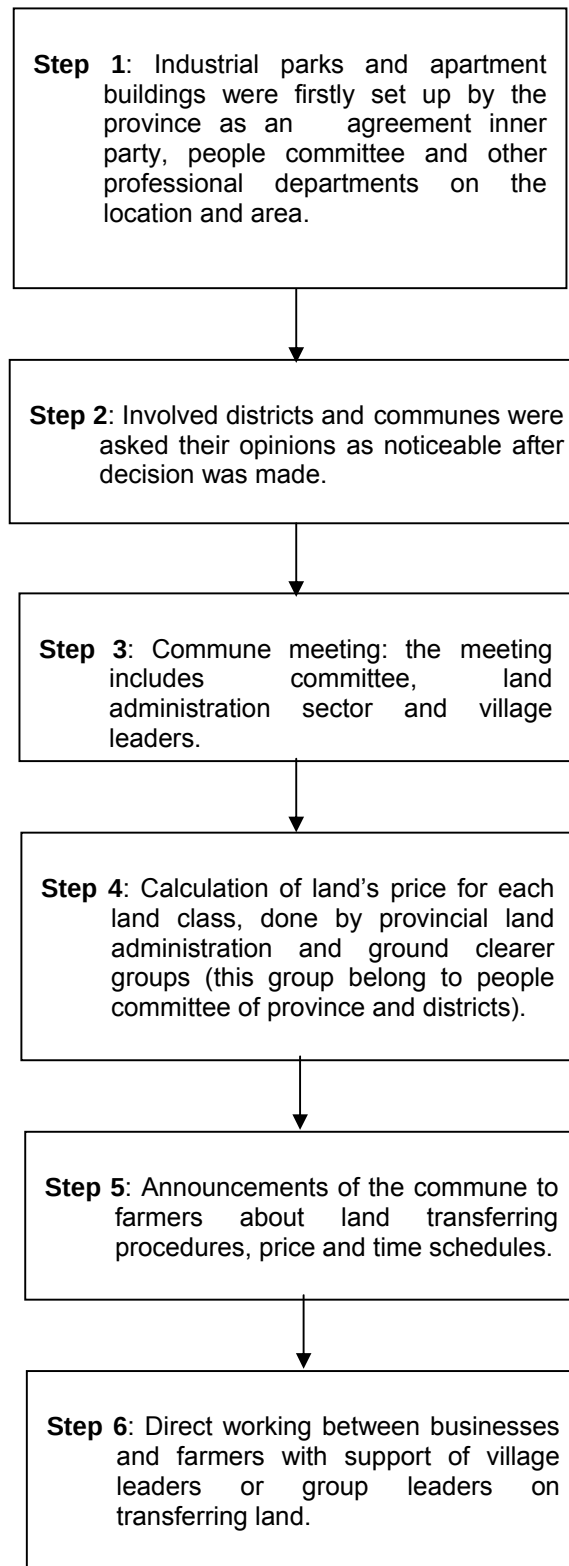


**Figure 10: Steps on land use planning and land transferring between farmer and businesses**

### *Functions of administrative stakeholders:*

There are different roles and activities of each partner in these processes

The functions of province:

- General land use planning
- Establish project location and area
- Decide budget and stakeholder for projects of infrastructure construction, land use right, investment permission etc.
- Decide levels for compensation
- Decide contribution for local infrastructure construction
- Decide support regimes to project local people and land losers, for instance:
  - o Vocational training
  - o To revive traditional craft villages
  - o Build and send services place (kiosks) for land losers

The functions of districts:

- Land use planning for district inner of provincial master plans
- Organise ground clear committee, transfer information and policies from province to communes and farmers
- Facilitate progresses of ground clearing, compensation and resettlements
- Link and monitor farmer trainings and supporting
- Formulate land use change, extension and changing of rural economic components
- Guide communes, businesses and farmer to follow procedures of land transferring, land use change and monitor and evaluation those programs

The functions of commune:

- Receive land use planning from province and district
- Implement activities related to land use planning and economic development planning
- Representative to businesses or link to businesses to negotiate with farmers about the way of land use right transferring for example the time, area and price.
- Answer the farmer's question or forward farmer's questions to the businesses
- Facilitate the land transferring
- Certify and send farmer to technology colleges/high schools for training
- Monitor and evaluate the infrastructure and building constructions in the communes
- Find the way to develop for social economic of the commune
- Ensure the security in the commune and projects

### *Implementing policies:*

Most of the big projects (e. g. industry, modern urbanisation with large areas) were decided at a provincial level. Projects in Binh Xuyen and Me Linh were also decided by Vinh Phuc province. Focus on land transfer process, the policies includes during land transfer policies and post land transfer policies.

During land transfer policies are agreement on land price and are prescribed as:

Land price = Real land price (the separate price for each land use type, urban, rural residential, paddy, hilly...) + farm product price + infrastructure reconstruction + training for new jobs.

Look directly at the land price, it showed that the price was quite high at some villages and farmers suddenly get a big amount of money. The rapid changes make some farmers, who are not very well educated or not very active, embarrass with new situation after land transfer.

However, according to Le Duc Thinh and Dao Trung Chinh (2008, communication) land prices should be viewed in terms of market prices ("tangible price") and integral value ("intangible price"). In view of integral values, market prices should be considered quite low in view of the costs to farmers in terms of disturbances, risk and extra expenses. For example, farmers have to go further to hospital, their children have to go further to another village for some activities; and their remaining fields have little harvest because of broken irrigation systems. These kinds of costs have not been calculated.

Post land transfer policies are related to the livelihoods of farmers (Nang and Ga, 2008) who have lost land to industrialization, which answer the questions: How to keep and improve livelihood of the farmers? How they live? What is their new job? And how do they look for a job? To resolve these problems Vinh Phuc province is deploying some policies in the following areas:

- Re-establish and established craft-villages to use available labour in the rural area

Craft villages have a long history. The works have already been done there with a typical trade mark for specific use or quality, but the scale of production is small and just for a minor demand because of inherited small industry or rural production. Increasing production in these villages in both scale and productivities will not only uphold the village's stability but also give more work to land losers and increase their income.

**Table 3: Craft villages planned to be re-established and established in Binh Xuyen district**

| Producing                                                     | Area | Expected productivity                                                                                               | Expected production value | Labour requirement |       |
|---------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------|-------|
|                                                               | ha   | product                                                                                                             | US\$                      | Total              | Local |
| Civil and handmade pottery, tile                              | 3    | Handmade potteries: 500,000 - 700,000; Tiles: 6,000,000                                                             | 700,000                   | 2000               | 800   |
| Woodwork, wooden furniture, mushroom, silkworm and others     | 8    | High class woodwork: 450 – 500 m <sup>3</sup> ; Haft-product wood: 1,500 – 2,000 m <sup>3</sup> ; Mushroom: 40 tons | 700,000                   | 2,500              | 700   |
| Bamboo and rattan processing for exporting and multi-services | 8    | Exporting bamboo and rattan products: 400,000-500,000                                                               | 250,000                   | 1,200              | 400   |
| Construction materials                                        | 8    | Brick: 20,000,000                                                                                                   | 400,000                   | 1,000              | 500   |
| Cultivate and process mushroom                                | 2    | Mushroom: 20 tons                                                                                                   | 150,000                   | 500                | 200   |
| Multi-services e.g. tea, instant noodle, incense              | 6    | Tea, instant noodle, incense, and others                                                                            | 1,400,000                 | 1,200              | 250   |

However, the craft villages existing and continuing with small scale production, and information in Table 3 is still relevant as they still use the same methods. Completing a plan and sticking to it is a quite long and complicated process because craft villages using the plans are very scatter and poorly organised. Establishing or re-establishing the villages needs lots of work, such as choosing the new site, constructing infrastructure, moving house/producing shop and most difficult are people agreement and budget. Feasibility of the project strongly depends on the effort of all stakeholders from province, district, communes and farmers.

- Training of former landowners

The policy of the province is whoever loses land will be supported by skills training so they can look for a new job or change their job. Department of Labour is responsible for coordinating of training of former landowners in the province through the colleges and schools. Proceeding of training and coordination is shown in Figure 11.

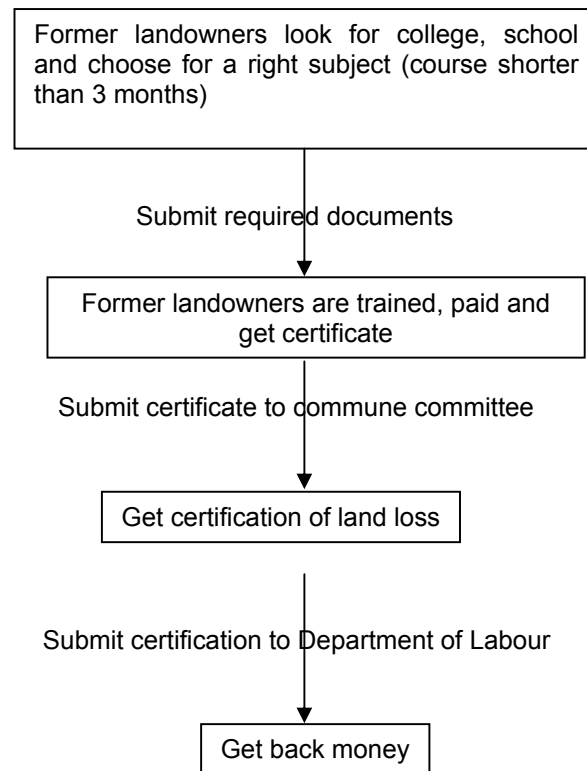


**Figure 11: Process of training former landowners in Vinh Phuc province**

### *Solutions for vulnerable people*

Skills training of former landowners is one of the post land transfer policies of the province, showing how to invest in having a more, stable farmer livelihood. However, the training program is not very efficient, for the following reasons.

Firstly, there are very weak links between the donor (Department of Labour), former landowners (labour supply) and businesses (labour recruitment). After training, a very low percentage of trained labour was accepted to work for companies/factories in the industrial zone. Some others were accepted but they soon resigned because of unsuitable jobs or not meeting requirements. To solve this problem there should be a very good link between stakeholders, for instance, Department of Labour can play a role of donor and coordinator to invest labour consumption and associate requirement in companies/factories. From that the Department can select a participant from land losers to send to school for training with a title of conditions and pre-test (if needed) of companies/factories. At the end of the training course the companies/factories will be happy to received new labourers with the expected requirements and qualifications.

Secondly, there was no orientation to enable trainees to make appropriate choices. Farmers have very little information about the course, school and job market because they live in the rural area. The most information they got is from word of mouth, not from official sources.

For example a lot of young people chose office IT while the companies/factories need workers in the production line, to cook and so on. Choosing wrong subjects associated with low training quality and learning motivation leads them to be half-labour that cannot stand in the industrialized companies or low competence to look for a job outside. To solve this problem, cooperation, again should, be emphasized, in which, Department is coordinator to evaluate labour demand and supply. Department can also ask and pay companies to training participant with a tile condition of receiving trained student after training, so the balance of labour can be solved.

#### 4.4. Food security

There were quite big changes of socio-economic, including population, labour forces, land budget and crop production during 2002-2007 in these four communes (Figure 12, Appendix 5):

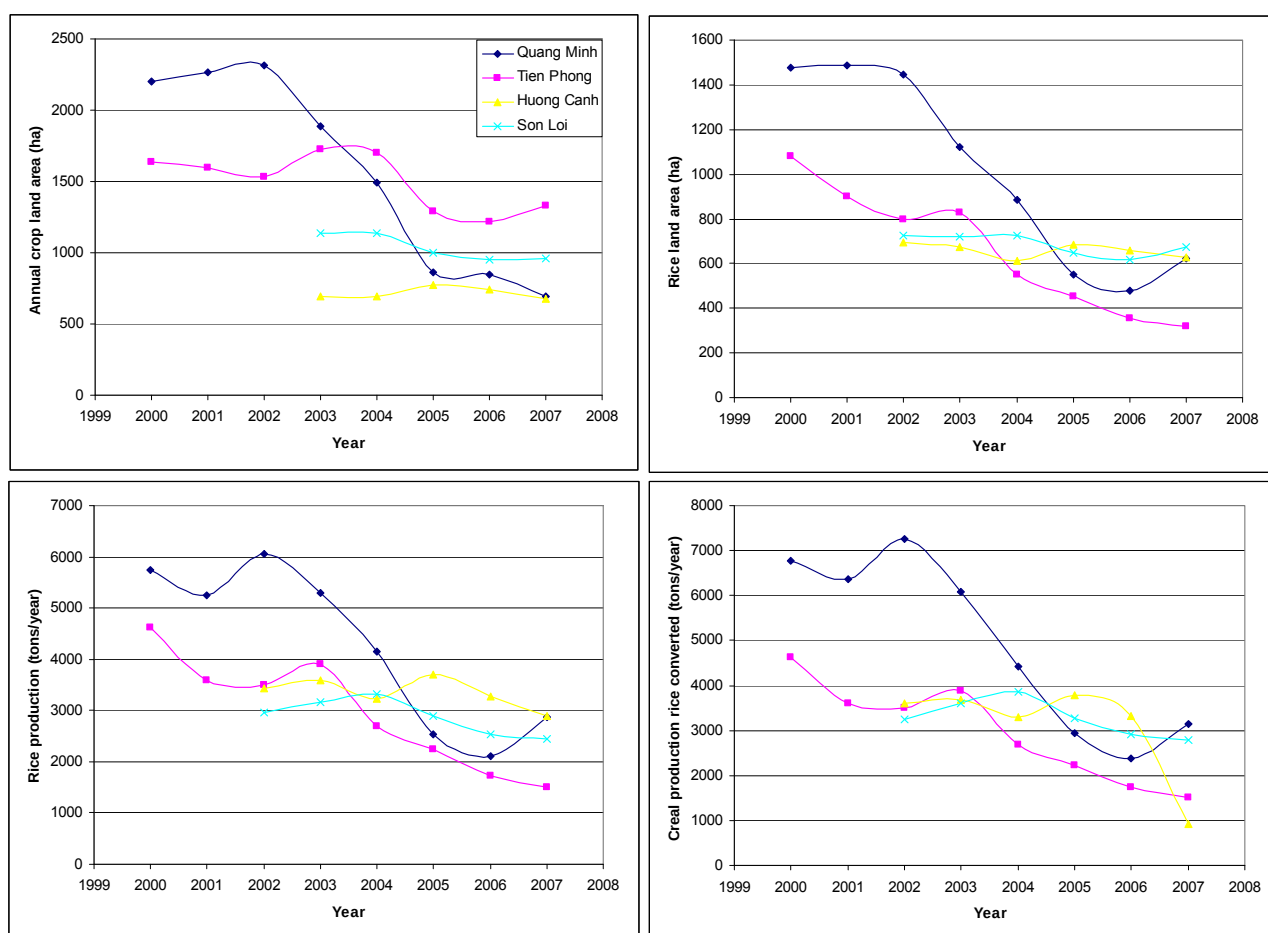


**Figure 12: Annual crops and rice lands, yearly rice production and yearly cereal production (converted to rice) in Quang Minh, Tien Phong, Son Loi communes and Huong Canh town, from 2000 to 2007.**

Source: Annual report of socio-economic in Quang Minh, Tien Phong, Huong Canh and Son Loi.

Figure 12 shows very clearly the decrease of cultivated lands, especially annual crops and rice, which are a very important crop, ensuring food security in Vietnam in the long term. Because cultivated lands were decreased the production of cereal crops in general and rice in particular were also reduced. Reduction was sharp for Quang Minh and Tien Phong where industrialization and urbanization started earlier, in 1999, while it was later in Huong Canh and Son Loi. However, industrializations are expected as quicker now in Huong Canh and Son Loi because there have been many projects, industrial parks have been building here, such as Khai Quang, Binh Xuyen 1, Binh Xuyen 2, Ba Hien industrial zones. In practice, most of the cultivated lands in Huong Canh and Son Loi were planning to convert in to industrial zones. Therefore, land area reduction and crop production in this area is unavoidable.

Data in the Appendices also shows the fast reduction of average food (converted to rice) per capita, for instant, from 632kg/capita in 2000 and 177kg/capita in 2007 in Quang Minh commune; 581 in 2000 and 322 in 2007 in Tien Phong commune; 231 in 2000 and 64 in 2007 in Huong Canh; and 441 in 2000 and 329 in 2007 in Son Loi commune while the average food demand for Vietnamese people is about 400 kg/capita. Compare to that, Quang Minh and Huong Canh need a lot of food to meet the demand. For example the simple calculation food balance as in Table 4, food demand was calculated as product of population and food demand for person. According to that calculation, all communities were extremely food deficient at demand of 400kg/capita and Quang Minh and Huong Canh were still food deficiency at demand of 300 kg as proposed that the people food demand is lowered at higher living standards.

**Table 4: Craft villages planned to be re-established and established in Binh Xuyen district**

|            | Population | Food requirement at |                  | Produced | Deficiency at:   |                  |
|------------|------------|---------------------|------------------|----------|------------------|------------------|
|            |            | 400<br>kg/capita    | 300<br>kg/capita |          | 400<br>kg/capita | 300<br>kg/capita |
| Quang Minh | 17721      | 7088400             | 5316300          | 3145000  | 3943400          | 2171300          |
| Tien Phong | 4673       | 1869200             | 1401900          | 1505000  | 364200           | -103100          |
| Huong Canh | 14305      | 5722000             | 4291500          | 912500   | 4809500          | 3379000          |
| Son Loi    | 8454       | 3381600             | 2536200          | 2780700  | 600900           | -244500          |

In addition to the natural increase of population, in-migration also occurred, creating additional food demand. Industrial parks and urban area contributed a large number of residents and workers (3200 in Quang Minh and 3098 in Tien Phong) that consumed a lot of food in these areas. In other words, because of limited cultivated land animal husbandry has also rapidly declined in recent years, hence, food supply is lower than demand currently.

Food deficiency at local units may not influence on food security of the whole district or province because of the self-adjustment of the market. In addition, currently the incomes of the people here have increased (from land compensation, more people work for industry with higher salary, or services, such as room/house renting, construction services etc.). It increases the people's consumption and increases demand in areas with a flow of food from outside the commune, district or province. Food deficiency in one industrial zone may not influence the district, province or region's economic growth. However, a large number of industrial zones experiencing high food deficiency will result in a general lack of food security overall, and may bring back unstable social conditions.

## **5. CONCLUSIONS**

The research results showed very fast conversion from paddy land to industrial, urban and services lands associated with many difficulties for the farmers to adopt changes. Research also showed local governments to pay attention to people older than 35 because they are the owner of the family but have difficult to change job.

Research result also showed policy makers and planners that a large area surrounding industrial areas has been affected because of broken irrigation systems. Crop yields have changed for the worse and the environment is degraded.

Food security research does not show clearly the impact of in-migration to the area, because there are multiple sources for food supply in the area.

Farmers agreed that industrialization brought a better life, economy, infrastructure, and so on but it should be done more carefully, scientifically and safely. Better land use planning is one of the most important for the micro level to efficiently use of natural resources and reasonably distribute human resources.

Delayed projects have resulted in waste of natural resources because investors occupy the land without producing, while farmers experiencing food shortages are unable to use the land for food production. Some land in the study area had been fallow for eight to ten years. This kind of project should be accelerated or replaced by progressive investors.

In order to have sustainable agriculture and rural development as well as increasing labour efficiency and farmers' incomes, it is necessary to transfer the redundant labour force in rural areas to the cities and industrial zones. This will be the new force of working class. Therefore, it needs very much the support from the Government for training and educating to get a high-quality labour force. This is the method to alleviate poverty in the most quick and safe way. In other words, it is the main strategy to catalyze the industrialization process rapidly as well as to meet the justice and sustainable requirement.

### **Dissemination and anticipated impact of research**

Converting paddy land to industrial, services and urban lands was a very hot issue in Viet Nam in recent years. It appeared on all media such as television, radio, newspapers and political systems. Starting from debating of rural unemployed who live in the area of converting land, discussion fails between enterprises and farmers, and natural hazards, insect, disease to reduce agricultural production and food price crisis. Studying land use change and paddy land loss is necessary not only for agriculture but also for economic development in general. Outcomes and lessons learnt may be good for serving policy makers and planners to consider in making plans and decisions.

However, the project met some difficulties in integrating all stakeholders in project areas to have the same voice. As project objective aims to have sustainable and balance economic development with minimum risk for the poor, while local governments put very high priorities on attracting rich investors. To do that in the high competition condition the local

governments have to satisfy investors by putting industrial parks at the good located locations in term of nearby the centre and convenient transportation. Most of the well located areas are paddy rice fields along the main roads. Some problems exist among stakeholders, such as price for converting land, giving job to the land losers, training young local labours and investment to social issues after land conversion. The project tried to bring all stakeholders together but the gaps seem to be larger and larger. The province is confident to go on with their plans, and the district has little weight in solving the problem.

The project also has some anticipated impact in documenting the current land use and finding some suitable location on hilly land for establishing the industrial park. Project also help the local government understand well the negative effects of trying to set up industrial park on paddy land without doing land evaluation.

Capacity building has been done with local commune people and they have had opportunity to learn new skills in order to adapt to new conditions of having limited agricultural land.

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## **APPENDICES**

# Appendix 1. Ground truth points for image classification

|    | X          | Y            | Commune    |            | Landuse                                     | Remark                                                                                                                             |
|----|------------|--------------|------------|------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 1  | 578,705.78 | 2,339,076.99 | Tien Phong | Me Linh    | Rice + vegetable                            | In the middle of earth leveling for industry, expected to be industry                                                              |
| 2  | 578,155.89 | 2,340,755.34 | Tien Phong | Me Linh    | Squash                                      | good soil                                                                                                                          |
| 3  | 576,985.53 | 2,341,765.73 | Me Linh    | Me Linh    | Squash, rose                                | Good and intensive soil, close industry                                                                                            |
| 4  | 574,120.58 | 2,339,501.64 | Van Khe    | Me Linh    | Rice                                        | Double rice + maize                                                                                                                |
| 5  | 573,342.90 | 2,342,810.46 | Van Khe    | Me Linh    | Rice                                        | Double rice + maize                                                                                                                |
| 6  | 570,465.88 | 2,343,214.27 | Thach Da   | Me Linh    | Rice                                        | Double rice + maize                                                                                                                |
| 7  | 567,802.86 | 2,345,359.32 | Lien Mac   | Me Linh    | Rice                                        | Double rice and winter maize                                                                                                       |
| 8  | 569,763.22 | 2,347,085.33 | Tien Thang | Me Linh    | Rice                                        | Double rice and winter maize                                                                                                       |
| 9  | 571,061.14 | 2,347,461.22 | Tien Thang | Me Linh    | Rice                                        | Double rice + maize                                                                                                                |
| 10 | 573,149.06 | 2,350,568.05 |            | Me Linh    | Rice                                        | Very good rice fertile soil, good irrigation system                                                                                |
| 11 | 574,393.09 | 2,348,461.30 |            | Me Linh    | Rice                                        | Good rice soil, flat and good irrigation system                                                                                    |
| 12 | 577,822.04 | 2,347,754.03 | Kim Hoa    | Me Linh    | Rice, maize and bean                        | Alluvial soil in the river levee. Irrigation system is good. Soil is fertile but not very even                                     |
| 13 | 577,852.65 | 2,346,411.99 | Quang Minh | Me Linh    | Rice, maize, bean                           | Partly became industry and resident, irrigation systems is poor                                                                    |
| 14 | 579,055.10 | 2,345,669.07 | Quang Minh | Me Linh    | Rice, peanut, maize, and Thanh Hao medicine | Very close to Industrial zone and residential areas, Rice has been replaced by upland crops because irrigation systems were broken |
| 15 | 578,726.98 | 2,343,741.89 | Quang Minh | Me Linh    | Rice                                        | Double rice and winter maize                                                                                                       |
| 16 | 571,006.84 | 2,351,760.29 | Son Loi    | Binh Xuyen | Rice, maize, beans                          | High and complicated topography, near Binh Xuyen industry, can be irrigated                                                        |
| 17 | 569,679.50 | 2,352,246.32 | Son Loi    | Binh Xuyen | Rice, maize, beans and earth levelling      | Mixed rice and upland crops and industry, planned for industry and will be industry lands                                          |
| 18 | 568,184.38 | 2,352,169.75 | Huong Canh | Binh Xuyen | Rice and industry                           | Is planned to be industry lands, low terraces rice field, well growing and good irrigation                                         |
| 19 | 564,436.42 | 2,349,471.32 | Thanh lang | Binh Xuyen | Rice                                        | Double rice and soybean, very good soil and intensive farming                                                                      |

|    |            |              |            |            |                                           |                                                                                    |
|----|------------|--------------|------------|------------|-------------------------------------------|------------------------------------------------------------------------------------|
| 20 | 562,693.78 | 2,350,179.48 | Thanh lang | Binh Xuyen | Single spring rice                        | Low level land, flooded in rainy season                                            |
| 21 | 568,229.83 | 2,353,653.94 | Huong Canh | Binh Xuyen | Rice, maize, beans                        | Fertile soils in the middle of industrial zone                                     |
| 22 | 569,895.81 | 2,355,253.34 | Son Loi    | Binh Xuyen | Rice                                      | Double rice and winter maize                                                       |
| 23 | 569,349.11 | 2,355,644.12 | Son Loi    | Binh Xuyen | Earth levelling                           | Leveling for industry                                                              |
| 24 | 570,776.03 | 2,356,817.06 | Ba Hien    | Binh Xuyen | Rice                                      | Fertile soil and well growing rice                                                 |
| 25 | 570,352.48 | 2,358,163.07 | Ba Hien    | Binh Xuyen | levelling the surface                     | The main new industrial zone                                                       |
| 26 | 571,791.13 | 2,359,003.25 | Ba Hien    | Binh Xuyen | Rice                                      | Good rice soil with good irrigation systems                                        |
| 27 | 571,536.97 | 2,360,268.06 | Ba Hien    | Binh Xuyen | Upland crops                              | High level field with upland crops, near cemetery                                  |
| 28 | 571,154.47 | 2,362,667.24 | Trung My   | Binh Xuyen | Rice, upland crops                        | Good soil in between hilly land with well irrigated systems                        |
| 29 | 570,800.59 | 2,364,531.83 | Trung My   | Binh Xuyen | Rice                                      | Rice soil with good irrigation system in between hilly lands eucalyptus plantation |
| 30 | 569,927.13 | 2,360,240.18 | Thien Ke   | Binh Xuyen | Extraction of earth for surface levelling | Provide earth for leveling industry base lands                                     |
| 31 | 568,459.89 | 2,359,923.66 | Thien Ke   | Binh Xuyen | Rice and upland crops                     | Sediment rice soil near village                                                    |
| 32 | 568,260.92 | 2,358,728.07 | Thien Ke   | Binh Xuyen | Rice                                      |                                                                                    |
| 33 | 567,048.10 | 2,357,048.53 | Huong Son  | Binh Xuyen | Eucalyptus                                | Near industry, forest is not very well cover                                       |
| 34 | 566,505.36 | 2,360,249.11 | Gia Khanh  | Binh Xuyen | Rice                                      |                                                                                    |
| 35 | 565,611.99 | 2,361,789.77 | Gia Khanh  | Binh Xuyen | Rice                                      |                                                                                    |
| 36 | 573697     | 2344315      | Dai Thinh  | Me Linh    | Earth levelling                           | Point 9b, Earth leveling for industry, close to Hospital                           |

## **Appendix 2. Questionnaires**

### **QUESTIONNAIRE**

Interviewer: .....

Household Number: .....

Date interviewed: .....

#### **I. GENERAL INFORMATION:**

1. Name of household head: ..... Name of interviewee:.....

2. Income per capita/month of the household:

(1) < 80,000 VND

(4) 150,000 - 200,000 VND

(2) 80,000 - 100,000 VND

(5) 200,000 - 250,000 VND

(3) 100,000 - 150,000 VND

(6) >= 250,000 VND

3. Total member in family:..... (persons). Male.....; Female.....

4. Household composition:

| No | Composition relation | Sex | Age | Year at school | Main occupation | Member of organizations |
|----|----------------------|-----|-----|----------------|-----------------|-------------------------|
| 1  |                      |     |     |                |                 |                         |
| 2  |                      |     |     |                |                 |                         |
| 3  |                      |     |     |                |                 |                         |
| 4  |                      |     |     |                |                 |                         |
| 5  |                      |     |     |                |                 |                         |
| 6  |                      |     |     |                |                 |                         |
| 7  |                      |     |     |                |                 |                         |
| 8  |                      |     |     |                |                 |                         |

5. Non land assets:

5.1. House:

- Built by:.....

(1) House hold

(2) Government (by/rent)

(3) Other

- Year of building:.....

- The house was made by:

- (1) Roof:      *Leaf*                      *Clay*                      *Cement*                      *Other...*  
 (2) Floor:      *Clay*                      *Break*                      *Cement*                      *Other...*  
 (3) Wall:      *Bamboo*                      *Wood*                      *Break*                      *Other...*

-Present value of house (Estimation).....(VND)

-In future, number of year could use that house for living :.....(Years)

## 5.2. Living assets

| Items           | Number of units | Year (bought them ) | Value if sold now (000 VND) |
|-----------------|-----------------|---------------------|-----------------------------|
| Television      |                 |                     |                             |
| Radio/cassette  |                 |                     |                             |
| Karaoke         |                 |                     |                             |
| Sewing machine  |                 |                     |                             |
| Electric fan    |                 |                     |                             |
| Electric cooker |                 |                     |                             |
| Motorcycle      |                 |                     |                             |
| Bicycle         |                 |                     |                             |
| Other...        |                 |                     |                             |
|                 |                 |                     |                             |
|                 |                 |                     |                             |
|                 |                 |                     |                             |

## 5.3. Production assets

| Items                | Number of Units | Year (bought them) | Value if sold now (000 vnd) |
|----------------------|-----------------|--------------------|-----------------------------|
| Tractor/power tiller |                 |                    |                             |
| Buffalo              |                 |                    |                             |
| Sprayer              |                 |                    |                             |
| Thresher             |                 |                    |                             |
| Rotary weeder        |                 |                    |                             |
| Rice mill            |                 |                    |                             |
| Irrigation pump      |                 |                    |                             |
| Other...             |                 |                    |                             |
|                      |                 |                    |                             |
|                      |                 |                    |                             |
|                      |                 |                    |                             |

## II. Land use dynamic and supporting policies to the farmer in periods:

### 1. Land use dynamics

| Beginning |                        | Begin LUT* |                |                            | Land transfer 1st time (year..... |       | Land transfer 2nd time (year..... |       | Land transfer 3rd time (year..... |       |
|-----------|------------------------|------------|----------------|----------------------------|-----------------------------------|-------|-----------------------------------|-------|-----------------------------------|-------|
| Parcel No | Area (m <sup>2</sup> ) | Year       | Yield (ton/ha) | Non-agriculture production | New land use type* <sup>1</sup>   | yield | New land use type* <sup>2</sup>   | yield | New land use type* <sup>3</sup>   | yield |
| 1         |                        |            |                |                            |                                   |       |                                   |       |                                   |       |
| 2         |                        |            |                |                            |                                   |       |                                   |       |                                   |       |
| 3         |                        |            |                |                            |                                   |       |                                   |       |                                   |       |
| 4         |                        |            |                |                            |                                   |       |                                   |       |                                   |       |
| 5         |                        |            |                |                            |                                   |       |                                   |       |                                   |       |
| 6         |                        |            |                |                            |                                   |       |                                   |       |                                   |       |
| 7         |                        |            |                |                            |                                   |       |                                   |       |                                   |       |
| 8         |                        |            |                |                            |                                   |       |                                   |       |                                   |       |
| 9         |                        |            |                |                            |                                   |       |                                   |       |                                   |       |
| 10        |                        |            |                |                            |                                   |       |                                   |       |                                   |       |

\* Write down new land use type of the transferred parcels. E. g. CN for industry, N for residential area, CC for public building, name of crop for cropping

Non-agricultural income at the transferring time:

\*1.....

\*2.....

\*3.....

2. Supporting policies to farmer:

| 1 <sup>st</sup> transfer (year..... |                              |                 |                          | 2 <sup>nd</sup> transfer (year..... |                              |                 |                          | 3 <sup>rd</sup> transfer (year..... |                              |                 |                          |
|-------------------------------------|------------------------------|-----------------|--------------------------|-------------------------------------|------------------------------|-----------------|--------------------------|-------------------------------------|------------------------------|-----------------|--------------------------|
| Policies                            | Level gives and carry policy | Time to release | Interest farmer received | Policies                            | Level gives and carry policy | Time to release | Interest farmer received | Policies                            | Level gives and carry policy | Time to release | Interest farmer received |
|                                     |                              |                 |                          |                                     |                              |                 |                          |                                     |                              |                 |                          |
|                                     |                              |                 |                          |                                     |                              |                 |                          |                                     |                              |                 |                          |
|                                     |                              |                 |                          |                                     |                              |                 |                          |                                     |                              |                 |                          |
|                                     |                              |                 |                          |                                     |                              |                 |                          |                                     |                              |                 |                          |
|                                     |                              |                 |                          |                                     |                              |                 |                          |                                     |                              |                 |                          |

### III. Income of household:

#### 1. Annual crops (rice, maize, tomato, cassava, vegetable...)

| order | Type crops (detail) | Area (m <sup>2</sup> ) | Crops/year | Cost/crop (000 vnd) |             |           |               |              |            | Harvest/crop |                    |                    |                       | Note |
|-------|---------------------|------------------------|------------|---------------------|-------------|-----------|---------------|--------------|------------|--------------|--------------------|--------------------|-----------------------|------|
|       |                     |                        |            | Seed                | Fertilisers | Pesticide | Family labour | Hired labour | Other cost | Output (kg)  | Quantity sold (kg) | Price (000 vnd/kg) | Sold output (000 vnd) |      |
|       |                     |                        |            |                     |             |           |               |              |            |              |                    |                    |                       |      |
|       |                     |                        |            |                     |             |           |               |              |            |              |                    |                    |                       |      |
|       |                     |                        |            |                     |             |           |               |              |            |              |                    |                    |                       |      |
|       |                     |                        |            |                     |             |           |               |              |            |              |                    |                    |                       |      |
|       |                     |                        |            |                     |             |           |               |              |            |              |                    |                    |                       |      |

Note down clearly the type of crops

#### 2. Perennial Crops (Fruit,...)

| order | Type crops (detail) | Area (m <sup>2</sup> ) | Investment costs for plantation (000 vnd) | Cost (000 vnd)                    |             |           |               |              |            | Harvest           |                    |                             |                                |
|-------|---------------------|------------------------|-------------------------------------------|-----------------------------------|-------------|-----------|---------------|--------------|------------|-------------------|--------------------|-----------------------------|--------------------------------|
|       |                     |                        |                                           | How many years have you harvested | Fertilisers | Pesticide | Family labour | Hired labour | Other cost | Total output (kg) | Quantity sold (kg) | Price received (000 vnd/kg) | Value of sold output (000 vnd) |
| 1     |                     |                        |                                           |                                   |             |           |               |              |            |                   |                    |                             |                                |
|       |                     |                        |                                           |                                   |             |           |               |              |            |                   |                    |                             |                                |
|       |                     |                        |                                           |                                   |             |           |               |              |            |                   |                    |                             |                                |
|       |                     |                        |                                           |                                   |             |           |               |              |            |                   |                    |                             |                                |

### 3. Livestock

| Items                            | Unit of measurement | Type of breed 1 | Type of breed 2 | Type of breed 3 |
|----------------------------------|---------------------|-----------------|-----------------|-----------------|
| <i>Breed</i>                     |                     |                 |                 |                 |
| Form of breeding                 |                     |                 |                 |                 |
| Number of animal                 | Head                |                 |                 |                 |
| Costs on animal cage             | 000 vnd             |                 |                 |                 |
| Estimated number of years to use | year                |                 |                 |                 |
| 1. Cost                          |                     |                 |                 |                 |
| + Breed                          | 000 vnd             |                 |                 |                 |
| + Feed purchased                 | 000 vnd             |                 |                 |                 |
| + Veterinary medicine            | 000 vnd             |                 |                 |                 |
| + Labour                         | 000 vnd             |                 |                 |                 |
| + Family                         | 000 vnd             |                 |                 |                 |
| + Hired                          | 000 vnd             |                 |                 |                 |
| + Other cost                     | 000 vnd             |                 |                 |                 |
| 2. benefit                       |                     |                 |                 |                 |
| + Quantity of output             | kg                  |                 |                 |                 |
| + Quantity of sold               | kg                  |                 |                 |                 |
| + Price received                 | 000 vnd/kg          |                 |                 |                 |
| + Income from manure             | 000 vnd             |                 |                 |                 |

### IV. Other income (from off-farm and non-farm activities)

| order | Source of income                   | Number Of labours | Number of working Months/year | Annual net income (000 vnd/person) |
|-------|------------------------------------|-------------------|-------------------------------|------------------------------------|
|       | Hired labour (off-farm activities) |                   |                               |                                    |
|       | Hired labour (non-farm activities) |                   |                               |                                    |
|       | Handicraft                         |                   |                               |                                    |
|       | Trade, services                    |                   |                               |                                    |
|       | Worker                             |                   |                               |                                    |
|       | Government employee                |                   |                               |                                    |
|       | Other jobs                         |                   |                               |                                    |
|       | Pension                            |                   |                               |                                    |
|       | Subsidies (if yes)                 |                   |                               |                                    |

### V. credit information

Have you borrowed credit for last year? (a) yes (b) no  
If yes, please give the details as the following

| order | Credit sources      | Amount (mill vnd) | Interest charge (%/month) | Length of credit 9months) | Purpose (mill vnd) |           |             |       |
|-------|---------------------|-------------------|---------------------------|---------------------------|--------------------|-----------|-------------|-------|
|       |                     |                   |                           |                           | Cultivation        | Husbandry | Consumption | Other |
|       | Bank of Agriculture |                   |                           |                           |                    |           |             |       |
|       | Bank for the poor   |                   |                           |                           |                    |           |             |       |
|       | Lender (informal    |                   |                           |                           |                    |           |             |       |

|  |                   |  |  |  |  |  |  |  |
|--|-------------------|--|--|--|--|--|--|--|
|  | credit)           |  |  |  |  |  |  |  |
|  | Relatives/Friends |  |  |  |  |  |  |  |
|  | Others...         |  |  |  |  |  |  |  |

What are criteria of household to get credit?

Capital needed:.....(mill vnd).

The priority to use this capital (tell details):....

### VI. Self-anchored Striving Scale

|    |  |
|----|--|
| 10 |  |
| 9  |  |
| 8  |  |
| 7  |  |
| 6  |  |
| 5  |  |
| 4  |  |
| 3  |  |
| 2  |  |
| 1  |  |

Events.....

- 1: Food shortage > 6months
- 2: Food shortage = 6month
- 3: Food shortage: 3 months
- 4: Food shortage 1-2 month
- 5: Enough food

- 6: Have enough food for husbandry
- 7: Have competence for small investment
- 8: Have machine-tool, capital
- 9: Have lot of money in the Bank
- 10: Have money for tourism

***Explain in detail of each event:***

### VI. HOUSEHOLD OPINIONS

1. Self-assessment on your household economic from 5 years to now:

(0) No change      (1) Improved      (2) Bad

If improved, please explain shortly:

(a)  
(b)

If bad, please explain shortly:

(a)  
(b)

2. The advantage and disadvantage on livelihood of household

Advantage:

(a)  
(b)

Disadvantage:

(a)

(b)

3. To improve standard of living of household, we should do what activities/solutions?

a. Solution 1: . . .

Particularly:

- (a) Activity?
- (b) Stakeholders? . . .
- (c) Responsibility?
- (d) Benefits? . . .

b. Solution 2: . . .

Particularly:

- (a) Activity?
- (b) Stakeholders? . . .
- (c) Responsibility?
- (d) Benefits? . . .

### Appendix 3. Socio-economic data in Binh Xuyen district, Huong Canh town and Son Loi commune

| Item                                                 | Year |      |         |          |          |          |          |         |
|------------------------------------------------------|------|------|---------|----------|----------|----------|----------|---------|
|                                                      | 2000 | 2001 | 2002    | 2003     | 2004     | 2005     | 2006     | 2007    |
| <b>1. Binh Xuyen district (General information)</b>  |      |      |         |          |          |          |          |         |
| Natural area (ha)                                    |      |      |         | 14559.09 | 14559.09 | 14559.09 | 14559.09 | 14566.7 |
| Agricultural area (ha)                               |      |      |         | 7033.59  | 7033.59  | 6394.57  | 6272.27  | 5744.45 |
| Annual crops (ha)                                    |      |      | 10767.6 | 11913.7  | 11728.5  | 11431.1  | 11038.2  | 10228.1 |
| Paddy rice (ha)                                      |      |      | 7801    | 7872.8   | 7768.1   | 7768.1   | 7043.4   | 7043.4  |
| Year rice production (tons)                          |      |      | 35599   | 37350    | 38270    | 35010    | 31090    | 30306   |
| Yearly cereal production converted to rice (tons)    |      |      | 40525.4 | 43031    | 44598    | 40086    | 35820    | 33228   |
| Population                                           |      |      |         | 103815   | 105008   | 106347   | 108524   | 110352  |
| Labour                                               |      |      |         |          | 53296    | 54368    | 5485     | 55452   |
| Population density (person/km <sup>2</sup> )         |      |      |         | 667      | 675      | 683      | 697      | 757     |
| Agricultural land/capita (m <sup>2</sup> /capita)    |      |      | 604     | 602      | 597      | 548      | 518      | 466     |
| Average food/capita (kg/capita)                      |      |      | 393     | 415      | 427      | 379      | 330      | 304     |
| Number of industrial                                 | 4    | 13   | 42      | 67       | 86       | 104      | 125      | 189     |
| Agricultural and forest production value (mill. VND) |      |      | 161631  | 177504   | 190997   | 200580   | 198940   | 183834  |
| - Cropping                                           |      |      | 101963  | 102582   | 113540   | 111809   | 104420   | 86834   |
| - Cereal crop                                        |      |      | 68195   | 71520    | 73599    | 66556    | 58927    | 53074   |
| - Animal husbandry, aquaculture                      |      |      | 46691   | 65527    | 66224    | 77587    | 82304    | 86928   |
| <b>1.1. Hung Canh town</b>                           |      |      |         |          |          |          |          |         |
| Natural area (ha)                                    |      |      | 1006.42 | 1006.42  | 1006.42  | 1006.42  | 1006.42  | 1006.42 |
| Agricultural area (ha)                               |      |      | 668.04  | 668.04   | 668.04   | 573.04   | 556.53   | 550.81  |
| Annual crops (ha)                                    |      |      |         | 694.1    | 694.1    | 772.8    | 740.9    | 679.7   |
| Paddy rice (ha)                                      |      |      | 694.8   | 675.9    | 614.2    | 685      | 656.9    | 625.8   |
| Yearly rice production (tons)                        |      |      | 3433    | 3582     | 3240     | 3699.8   | 3271.5   | 2901.7  |
| Yearly cereal production converted to rice (tons)    |      |      | 3591.9  | 3678     | 3302.8   | 3777     | 3313.4   | 912.5   |

|                                                   |          |          |          |          |          |          |          |          |
|---------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Population                                        |          |          | 15556    | 13013    | 13163    | 13242    | 14035    | 14305    |
| Labour                                            |          |          |          |          | 6840     | 7018     | 7267     | 7484     |
| Population density (person/km <sup>2</sup> )      |          |          | 1288     | 1293     | 1308     | 1316     | 1395     | 1420     |
| Agricultural land/capita (m <sup>2</sup> )        |          |          | 513.5    | 511.8    | 507.5    | 432.7    | 396.5    | 385      |
| Average food/capita (kg)                          |          |          | 230.9    | 243.8    | 250.9    | 285.2    | 236.1    | 63.8     |
| Number of industrial                              |          |          | 0        | 5        | 12       | 22       | 33       | 72       |
| <b>1.2. Son Loi commune</b>                       |          |          |          |          |          |          |          |          |
| Natural area (ha)                                 |          |          | 944.83   | 944.83   | 944.83   | 944.83   | 944.83   | 944.83   |
| Agricultural area (ha)                            |          |          | 649.73   | 649.73   | 649.73   | 573.04   | 517.1    | 375.32   |
| Annual crops (ha)                                 |          |          |          | 1137.3   | 1137.3   | 1002.6   | 953.6    | 959.7    |
| Paddy rice (ha)                                   |          |          | 723.6    | 721      | 725.1    | 649.5    | 619      | 672.2    |
| Annual rice production (tons)                     |          |          | 2972     | 3157     | 3322     | 2901     | 2537.2   | 2438.5   |
| Yearly cereal production converted to rice (tons) |          |          | 3241.4   | 3603.1   | 3865.5   | 3265.1   | 2922.4   | 2780.7   |
| Population                                        |          |          | 7347     | 7972     | 8064     | 8169     | 8293     | 8454     |
| Labour                                            |          |          |          |          | 4158     | 4222     | 4280     | 4319     |
| Population density (person/km <sup>2</sup> )      |          |          | 841      | 844      | 853      | 864      | 877      | 894      |
| Agricultural land/capita (m <sup>2</sup> )        |          |          | 815.1    | 812.4    | 805.7    | 701.5    | 623.5    | 444      |
| Average food/capita (kg)                          |          |          | 441.2    | 465.9    | 479.4    | 399.7    | 352.4    | 328.9    |
| Number of industrial                              |          |          | 0        | 0        | 0        | 0        | 1        | 3        |
| <b>1. Me Linh district</b>                        |          |          |          |          |          |          |          |          |
| Natural area (ha)                                 | 14126.38 | 14126.38 | 14126.38 | 14126.38 | 14126.38 | 14126.32 | 14126.32 | 14126.53 |
| Agricultural area (ha)                            |          |          |          |          | 8515.1   | 8588.22  | 8472.72  | 8660.76  |
| Annual crops (ha)                                 |          |          |          |          | 7604.49  | 7676.73  | 7587.93  | 7654.63  |
| Paddy rice (ha)                                   | 12221    | 11522    | 11877    | 11852    | 11069    | 10429    | 9822     | 10079    |
| Annual rice production (tons)                     | 49703    | 45631    | 53661    | 55251    | 54436    | 50032    | 44114    | 46620    |
| Yearly cereal production converted to rice (tons) | 51839    | 47188    | 55588    | 57306    | 61364    | 56818    | 50655    | 51480    |
| Household                                         |          |          |          |          | 38298    | 38706    | 39404    | 41129    |

|                                                       |         |         |         |         |         |         |         |         |
|-------------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Agricultural household                                |         |         |         |         | 35800   | 35255   | 30907   | 33063   |
| Population                                            | 122804  | 139125  | 157615  | 178562  | 181299  | 182039  | 183428  | 184447  |
| Labour                                                |         |         |         | 105453  | 86395   | 102240  | 103226  | 108178  |
| Population density (person/km <sup>2</sup> )          | 869     | 985     | 1116    | 1264    | 1283    | 1289    | 1298    | 1306    |
| Agricultural land/capita (m <sup>2</sup> )            |         |         |         | 516     | 472     | 468     | 460     | 467     |
| Average food/capita (kg)                              |         |         |         | 309     | 340     | 312     | 276     | 279     |
| Number of industrial                                  |         |         |         |         | 5649    |         |         | 5753    |
| Area for rent (economic organization; ha)             |         |         |         |         | 9276.51 |         |         | 1053.98 |
| Agriculture and forestry production value (mill. VND) | 259787  | 278934  | 308724  | 323269  | 344403  | 360132  | 361892  | 359425  |
| - Cropping                                            | 191333  | 205434  | 227375  | 238087  | 237536  | 234603  | 222784  | 219327  |
| - Cereal crops                                        | 80015   | 85912   | 95088   | 99575   | 97975   | 90705   | 80852   | 82222   |
| - Animal husbandry, aquaculture                       | 62912   | 67550   | 74763   | 78286   | 99439   | 117926  | 130185  | 130680  |
| <b>1.1. Quang Minh communes</b>                       |         |         |         |         |         |         |         |         |
| Natural area (ha)                                     | 1375.55 | 1375.55 | 1375.55 | 1375.55 | 1375.55 | 1376.29 | 1376.29 | 1376.29 |
| Agricultural area (ha)                                |         |         |         |         | 640.3   |         |         | 554.37  |
| Annual crops (ha)                                     | 2205    | 2264    | 2318    | 1889    | 1490    | 860     | 848     | 696     |
| Paddy rice (ha)                                       | 1477    | 1486    | 1446    | 1124    | 884     | 549     | 476     | 625     |
| Annual rice production (tons)                         | 5748    | 5259    | 6061    | 5285    | 4146    | 2528    | 2104    | 2864    |
| Yearly cereal production converted to rice (tons)     | 6766    | 6369    | 7264    | 6088    | 4425    | 2933    | 2385    | 3145    |
| Population                                            |         |         |         |         | 3747    |         |         | 4279    |
| Labour                                                |         |         |         |         | 3724    |         |         | 4143    |
| Population density (person/km <sup>2</sup> )          | 10697   | 12081   | 13687   | 15186   | 17054   | 12887   | 15146   | 17721   |
| Agricultural land/capita (m <sup>2</sup> )            |         |         |         |         | 10946   |         |         | 11055   |
| Average food/capita (kg)                              | 778     | 878     | 995     | 1104    | 1253    | 936     | 1100    | 1288    |
| Number of industrial                                  |         |         |         |         | 375.5   |         |         | 312.8   |
| Natural area (ha)                                     | 632.5   | 527.2   | 530.7   | 400.9   | 259.5   | 227.6   | 157.5   | 177.5   |
| Agricultural area (ha)                                |         |         |         |         | 201     |         |         | 763     |
| Annual crops (ha)                                     |         |         |         |         | 138.68  |         |         | 428.67  |

## 1.2. Tien Phong commune

|                                                   |         |         |         |         |         |         |         |         |
|---------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Natural area (ha)                                 | 1056.93 | 1056.93 | 1056.93 | 1056.93 | 1056.93 | 1057.84 | 1057.84 | 1057.84 |
| Agricultural area (ha)                            |         |         |         |         | 562.24  |         |         | 405.26  |
| Annual crops (ha)                                 | 1638    | 1597    | 1535    | 1727    | 1703    | 1292    | 1220.7  | 1328    |
| Paddy rice (ha)                                   | 1078    | 900     | 800     | 829     | 550     | 455     | 357     | 321     |
| Annual rice production (tons)                     | 4623    | 3587    | 3493    | 3893    | 2696    | 2235    | 1729    | 1505    |
| Yearly cereal production converted to rice (tons) | 4630    | 3615    | 3502    | 3893    | 2696    | 2235    | 1729    | 1505    |
| Population                                        |         |         |         |         | 3212    |         |         | 3240    |
| Agriculture                                       |         |         |         |         | 3033    |         |         | 2612    |
| Population                                        | 7970    | 9331    | 10705   | 12230   | 13998   | 3645    | 4153    | 4673    |
| Labour                                            |         |         |         |         | 3636    |         |         | 8668    |
| Population density (person/km <sup>2</sup> )      | 754     | 883     | 1013    | 1157    | 1334    | 345     | 393     | 1387    |
| Agricultural land/capita (m <sup>2</sup> )        | 0       |         |         |         | 401.7   |         |         | 867.2   |
| Average food/capita (kg)                          | 580.9   | 387.4   | 327.1   | 318.3   | 192.6   | 613.2   | 416.3   | 322.1   |
| Number of Industrial                              |         |         |         |         | 47      |         |         | 288     |
| Area for rent (economic organization; ha)         |         |         |         |         | 7.34    |         |         | 334.79  |

#### **Appendix 4: List of key informants**

1. Province
  - Department of Agriculture and Rural Development (DARD)
    - o Mr. Nguyen Van Chuc, director
    - o Mr. Nguyen Van Khai, vice director
  - Department of Labour, wounded soldier and social
    - o Mr. Le Xuan Dang, director
    - o Mr. Nguyen Tien Doanh, chief inspector
2. District
  - Department of Agriculture and Rural Development of Binh Xuyen district
    - o Mrs. Tran Thi Hong, head of department
  - Department of Agriculture and Rural Development of Me Linh district
    - o Mr. Bui Quoc Hoi, head of department
3. Commune
  - People committee of Quang Minh commune
    - o Mr. Nguyen Van Trong, president
    - o Mrs. Nguyen Thi Phuong, vice president
  - People committee of Tien Phong commune
    - o Mr. Hoang Cong Dang, president
    - o Mr. Vu Van Duong, vice president
    - o Mr. Ho Ngoc Thu, statistical specialist
  - People committee of Huong Canh town
    - o Mr. Nguyen Huu San, president
    - o Mr. Nguyen Duc Hoi, vice president
    - o Mr. Nguyen Xuan Canh, village leader
  - People committee of Son Loi commune
    - o Mr. Nguyen Duy Phien, president
    - o Mr. Nguyen Duc Hoi, vice president
    - o Mr. nuyen Duc Nguyen, village leader
    - o Mr. Nguyen Van Doan, village leader assisstant