



## **STUDY REPORT**

**Needs assessment on sustainable livelihoods that can respond to the  
impacts of climate change in Vietnam**

**The case of Hoa Binh province**

**Hanoi, May 2010**

## **CONTENT**

1. SUMMARY.....	4
2. INTRODUCTION.....	4
2.1. Statement of problems and background.....	4
2.2. Objectives.....	6
3. METHODOLOGY.....	7
4. FINDINGS.....	8
4.1. General introduction of study site.....	8
4.1.1. Hoa Binh province.....	8
4.1.2. Da Bac District.....	8
4.1.3. Current situation of selected communes .....	9
4.2. Main livelihoods in targeted areas.....	10
4.3. Land management in the district.....	12
4.3.1. Land use in the communes.....	12
4.3.2. Land management.....	13
4.4. Value chains of local products and access to markets.....	14
4.4.1. Marketing channels of bamboo in Vay Nua.....	14
4.4.2. Channels for maize marketing in Cao Son .....	16
4.4.3. Marketing channel for acacia in Tu Ly .....	19
4.5. Access to water resources, irrigation and sanitation .....	21
4.5.1. Irrigation .....	21
4.5.2. Water supply for domestic use.....	21
4.5.3. Sanitation in selected communes.....	22
4.6. Climate change impacts in the three communes.....	22
4.6.1. Description of climate change issues in selected study sites.....	22
4.6.2. Impacts of climate change on local livelihoods and adaptation measures.....	24
4.6.3. Institutional roles and responsibilities for responding to climate change .....	24
4.6.4. Awareness of climate change and local people’s views on their needs.....	25
4.7. Adaptation measures already being undertaken by local people .....	25
4.8. Current external support to three selected communes.....	26
5. CONCLUSION AND RECOMMENDATIONS .....	28
5.1. Conclusion .....	28
5.2. Proposed intervention activities.....	28
6. REFERENCES.....	32

## **1. SUMMARY**

This needs assessment study aims to evaluate what is needed by poor rural populations in Hoa Binh province to enable them to develop sustainable livelihoods that can cope with the impacts of climate change. This study in Hoa Binh is one of a series of projects in four different provinces in mountainous Northern Vietnam, the other three being: Thai Nguyen, Quang Ninh and Yen Bai. The purpose of these studies is to: identify the risks that climate change poses to the rural poor; understand the role of natural resources (in particular land and water) and markets in supporting their livelihoods and reducing their vulnerability; and specifically recommend adaptation actions that can help increase the resilience and sustainability of poor people's livelihoods in the face of climate change.

## **2. INTRODUCTION**

### **2.1. Statement of problems and background**

In Vietnam's upland areas, although people's livelihoods have improved in the last decades, communities still suffer entrenched poverty and food shortages. The Northern Mountainous Region is ranked the poorest area of the country, where over 30% of its inhabitants are classified as poor according to per capita income. Cash income from agricultural products remains important to the livelihoods of the rural people.

Climate change is a serious risk to poverty reduction and threatens to undermine decades of development efforts. Many studies show that Vietnam will be one of the most vulnerable countries due to climate change in the next decades. Climate change poses risks to lives and livelihoods, especially where socio-economic conditions are already low and people are particularly dependent on the environment and natural resources for their livelihoods.

In Vietnam, the adverse effects of climate change are already evident. The most commonly discussed consequence of climate change is sea level rise, impacts of which include loss of crops and arable land to salt-water intrusion and storm surges. However, vulnerability to climate change impacts in Vietnam is by no means restricted to the coastal regions. Indeed this study is a response to the fact that many climate change adaptation interventions in Vietnam are focusing on the coastal areas, and there is limited understanding of, and support to address, the impacts of climate change on poor communities in Vietnam's extensive rural mountainous areas.

Impacts of climate change in the Northern mountainous areas include reduction in rainfall during some seasons and more severe droughts in some regions. Other areas may experience the same overall rainfall, but be subject to extreme weather events such as rain storms that are shorter and heavier, and can cause flash floods and landslides. The risk of natural disasters is particularly acute on steeply sloping land, and land which is affected by soil erosion due to other exacerbating factors such as deforestation. Floods and landslides can damage infrastructure including water supplies, as well as threatening homes, agricultural land and other assets.

The impacts of climate change, including natural disasters, are expected to be more severe in the rural areas of a developing country like Vietnam due to high levels of poverty, poor quality of infrastructure,

limited access to technologies and a high dependence on natural resources. All these factors increase the vulnerability of rural communities and undermine their ability to sustain their livelihoods.

Opportunities to generate sustainable livelihoods are limited in rural areas, in particular in the mountains. A livelihood is viewed as sustainable when it can avoid or recover from stresses and shocks, and maintain or enhance its capacities and assets without being dependent on external support, and does not compromise the livelihood options open to others, now or in the future. There is a direct relationship between poverty and vulnerability to external threats. The livelihoods and well-being of the rural poor are heavily dependent on natural resources, so they are particularly vulnerable to environmental degradation and the impacts of climate change.

Furthermore the capacity of developing countries such as Vietnam to support its poor rural populations to adapt to a changing climate is limited. Thus, a good adaptation strategy to climate change in the coming time is urgently needed. The support measures arising from this needs assessment should have an emphasis on reducing vulnerability and creating rural livelihood opportunities, but also ensure an integrated approach that takes into account the role of climate change in exacerbating these challenges and enhances communities capacity to adapt.

#### **Four interlinked issues**

**1) Climate change** is one of a number of factors influencing the ability of the rural poor to develop sustainable livelihoods. In particular, this study recognises the close relationship between climate change and three other interlinked issues that impact on poverty: water availability, access to land and access to markets.

**2) Irrigation, clean water and sanitation** are crucial factors in ensuring the food security, health and ability to generate income for poor rural communities. Availability of clean water is particularly threatened by the impacts of climate change, including rising temperatures, droughts, and natural disasters that can damage infrastructure and sanitation systems. Besides the health impacts of these problems, if local people are obliged to travel far to access clean water, it reduces their capacity to undertake other livelihoods activities, and can even cause conflicts.

**3) Land** is an important natural resource and a crucial capital asset in agriculture in Vietnam. Although the natural land of Vietnam is large, the land that can be used for agricultural practices is limited. Not only per-capita agricultural land area in highly populated river deltas is low but it is also limited in mountainous regions. Especially due to the booms of industrialisation and urbanisation recently, agricultural land has been increasingly scarce during the last decades. It can also be expected to be further depleted and also degraded in quality in the next decades due to the effects of climate change. The reduction in availability and diminishing quality of agricultural land will certainly affect livelihoods of rural population in the future.

**4) Market development** is a key to raising the living standards of people who live in Vietnam's rural areas, especially uplands, where agricultural activities are predominant. Analysis of agricultural products' value chains is needed in order to better understand the sustainable livelihoods of farmers, other actors in the chain such as collectors, wholesalers, retailers, etc and to identify constraints as well as intervention strategies that can improve farmers' access to markets and market information. There have been many

efforts from government and other organisations to assist farmers to get better access to market and market information. However, there is a lack of detailed value chain analysis of potential local products that might empower farmers to get reliable information and stable prices.

Thus, if rural populations are supported to improve their access to water, land and markets, their ability to develop sustainable livelihoods will be strengthened and their vulnerability to climate change will be reduced. Combining climate change adaptation and sustainable livelihoods is a new approach to the reduction of vulnerabilities and poverty.

## **2.2. Objectives**

This study is designed with the overall objective of forming a comprehensive picture of the problems and needs of local people in maintaining sustainable livelihoods in the face of climate change, and recommending how their livelihoods can be improved in short term and sustained in the long term by developing adaptation responses to climate change in Hoa Binh.

Specifically, the research was divided into four themes which, as explained above, are closely interlinked: water, land, markets and climate change. A report was produced for each of the four themes, and this synthesis report for Hoa Binh province brings those findings together.

The key objectives of the study are:

- 1. Identifying past, current and likely future:** livelihoods activities of the local communities; land access and management arrangements; irrigation systems, access to clean water and sanitation; market opportunities of agricultural and forest products; and climate change impacts on the area.
- 2. Assessing the awareness and existing capacity of local people on:** climate change and adaptation; land access and management; irrigation and clean water and sanitation systems; value chain channels for local products.
- 3. Evaluating the efforts and interest of government authorities in addressing:** climate change and adaptation; land access and management; irrigation and clean water and sanitation systems; value chain channels for local products.
- 4. Identifying constraints, challenges, and potential solutions for:** coping with the adverse impact of climate change; improving irrigation, access to clean water resources and sanitation; enhancing value chain awareness and market opportunities; and improving land issues access and management issues confronting poor people in these communes.
- 5. Deriving recommendations** that can form a basis for future development intervention activities to promote sustainable livelihoods that can cope with climate change, and take into account challenges related to land, water and access to markets.

### **3. METHODOLOGY**

The methodological approach chosen as the basis for this needs assessment study was participatory rural appraisal (PRA), because this approach allows the target stakeholders – poor farmers – to have an active role in identifying and explaining the challenges they face, their strengths and opportunities, and what they most need to support them to address climate change and build more sustainable livelihoods. It is also intended to encourage these stakeholders to feel ownership of the findings of the assessment and therefore be more likely to support and collaborate to implement the resulting projects.

#### **Study sites**

Three of the poorest communes in one of the poorer districts in Hoa Binh province: Vay Nua, Cao Son and Tu Ly communes, in Da Bac district.

#### **Target groups**

The key stakeholders whose needs were being assessed are local poor people. A range of groups were targeted, including farmers, the landless and those in situations particular vulnerable to natural disasters, and ensuring a representative range of ethnic minorities, ages and genders.

Other important stakeholders were local government officials, from the commune, district and provincial level, in particular from relevant departments such as the Department of Environment and Rural Development and Disaster Management teams. Representatives from mass social organisations such as Womens' Associations and Veterans' Unions were also targeted.

#### **Selection of tools**

Besides initial desk study and in-depth interviews, a wide range of PRA tools were used, including focus group discussions, observation and transect walks, calendar and timeline activities, ranking exercises, case studies in target locations, and SWOT analysis.

A feedback workshop was held following the visits to all three of the communes, at which stakeholders were invited to comment on the accuracy of the findings, how appropriate they considered the proposed recommendations, and any obstacles and opportunities they saw in implementing them. The purpose was to ensure the outputs of the needs assessment are as relevant and useful as possible, and to encourage the beneficiaries to feel a sense of ownership over the success of future projects.

#### **Data analysis and interpretation**

Since the methodological approach was PRA, qualitative analysis is a core method in analyzing data collected. However, ranking exercises, calendars and timelines generated some quantitative data, which allows for quantitative comparisons between communes and between districts.

Secondary data, in the form of reports provided by government departments, provided a combination of quantitative and qualitative information, and an important part of the analysis is to compare the information gathered from stakeholders with the information contained in secondary documents.

## 4. FINDINGS

### 4.1. General introduction of study site

#### 4.1.1. Hoa Binh province

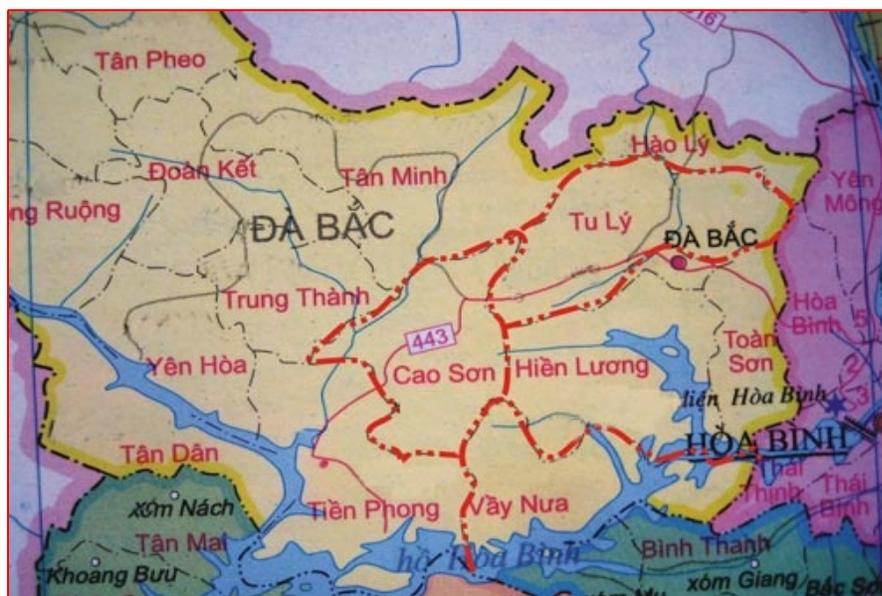
Hoa Binh is a poor province, with the poor people mostly living in mountainous, remote areas under difficult conditions and having small-scale production. The total land area of Hoa Binh is 4,663 km<sup>2</sup> with a population of 830,000 people including six major ethnic groups: Muong, Kinh, Thai, Dao, Tay and H'mong.

Agricultural production, despite opportunities including underutilized land, faces many difficulties, including rugged terrain, steep hills, land divided by many rivers and streams, old-fashioned cultivation practices, isolated, remote areas, and low labour quality. Infrastructure, including irrigation and transport, is poor.

The province's residents, especially farmers, still struggle to sustain their livelihoods. In 2009, 181 (or 86%) of the 210 communes were considered particularly disadvantaged, and of these 79 communes were in extremely difficult conditions; this dramatically affects investment and production capacity of farming households.

#### 4.1.2. Da Bac District

Da Bac is one of the poorest districts of Hoa Binh province which is why it was selected for the study. The district is located in the Northwest of Hoa Binh, in the left bank of Da river and in the end of Hoang Lien Son mountain. Da Bac has 21 communes and towns of which Da Bac town is the centre of the district. The town is 20 km from Hoa Binh city.



**Figure 2: Map of Da Bac district and location of selected communes**

*Source: Extracted from Hoa Binh map (People Committee of Hoa Binh province)*

The total land area of Da Bac district is 82,018.6 ha and its population reached 52,856 people in 2009 meaning that the population density is not very high. Only 47,113.9 ha of this is agricultural land. In 2009 the poverty rate was 28.5%, though this figure was based on the 2005 poverty line, and would be much higher if the expected new higher poverty line is applied. In the district, there are 5 major ethnic groups including Muong, Tay, Kinh, Dao and Thai.

Although the district is still poor, its economic growth shows higher rate potential development in the coming years. Da Bac is dominated by agriculture-forestry-fisheries sector with 54%. Industry and construction sector is really small accounting for just 11.2%, while service sector is of 34.8%.

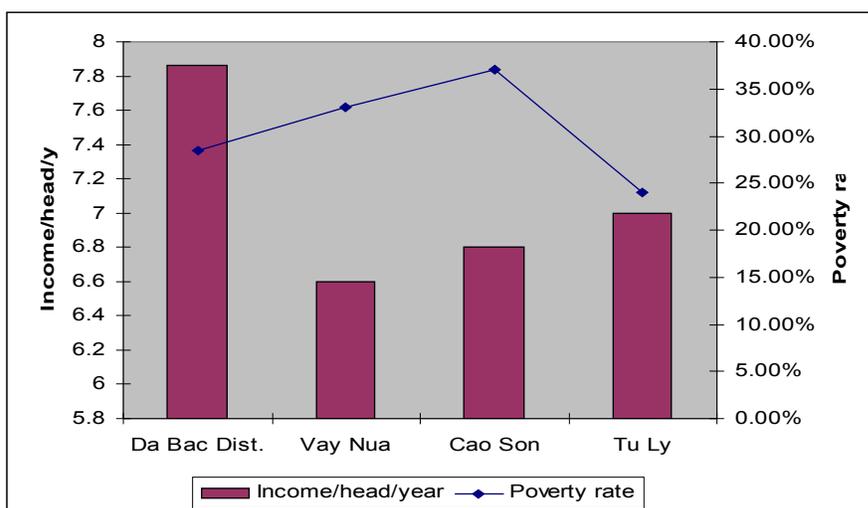
### **4.1.3. Current situation of selected communes**

Tu Ly and Cao Son Communes were the most populated communes of Da Bac District. Among the three studied communes, Vay Nua Commune has highest percentage of ethnic minority population. Among targeted communes, Cao Son was the poorest communes following by Vay Nua Commune. Poverty incidences of these communes were higher than the average poverty incidence of Da Bac District, while Tu Ly Commune had lowest poverty incidence and also below the district average.

**Vay Nua** is a very poor commune with a poverty rate of 33.1% Average income per capita is VND 6.6 million per year. The commune is classified as an “extremely difficult commune”, which receives support from the Government’s Program 135. Although the economic growth of the commune has accelerated in recent years, reaching 11.4% in 2009, the economic structure of the commune is heavily based on the agriculture, forestry and fisheries sector. In 2009, this sector generated 92.7% of the commune’s total production, with just 7.3% earned by services and other sectors. The commune has implemented a number of investment projects supported by the government such as a road from Mo Ne to Sang Trech, road maintenance and a drinking water system with a total of VND 100 million.

**Cao Son** has four villages that qualify for assistance under the category of Program 135. The commune’s economic growth has been relatively high in recent years reaching 13.3% in 2009 with income per capita VND 6.8 million per year. The commune has very high poverty rate, at 37% in 2009, considerably higher than average data of the district. The commune’s target for 2010 is to cut that down to 30%. Among agricultural crops, maize is the most important with an annual output of 4,658 tons in 2009 equivalent to VND 13,042 million, while rice output was just 690 tons equivalent to VND 4,140 million. Livestock and forestry are also important. Through Program 135, the commune was able to repair a canal, upgrade the drinking water supply system, and improve roads to promote socio-economic development.

**Tu Ly** is also poor, with a poverty rate of 24% in 2009, but this is not as poor as the other two communes, partly because it is located quite close to the district town. Although agriculture is still the dominant economic sector (70%), construction and handicraft accounted for 20% and services 10% in 2009. Economic growth reached 12% and income per capita was VND 7 million. As expected given the lower poverty rate, Tu Ly performs better Vay Nua and Cao Son in selected socio-economic indicators such as 100% of children going to school, and 99% of household with electricity access. More labourers from Tu Ly have migrated to work outside the commune than from in Vay Nua and Cao Son. Poor households tend to be new young families or those who have dependents with long-term illnesses. It is very difficult for these households to escape from poverty and the risk of falling back into poverty is also high.



**Figure 5: Income per capita and poverty rate in the study areas**

*Source: 2009's socio-economic reports of Da Bac district and surveyed communes*

Road conditions to the commune centres are relatively good, and have been improved recently, making it easier for local products to access the markets, though this is less true for Vay Nua than the other two communes, whose residents still have to spend a long transporting their products to the urban centres.

## 4.2. Main livelihoods in targeted areas

The table below shows the most important livelihoods to farmers, as ranked by themselves through focus group activities. Maize and is one of the top two crops for all three communes. Rice is one of the top two for the two somewhat better-off communes, whereas rice production is much less significant in Vay Lua where arable land is more scarce and land per capita is lower, but forest products are more important here than in the other communes. Livestock play an important but lesser role in all three communes.

**Table 6: Matrix of livelihood ranking of the study communes by local residents**

Rank	Commune		
	Vay Nua	Cao Son	Tu Ly
1	Maize	Maize	Rice
2	Pigs, Chickens	Rice	Maize
3	Bamboo, Acacia	Buffaloes and cows	Pig
4	Fish	Edible Canna	Buffaloes and cows
5	Rice	Pigs	Bamboo
6		Acacia, Bamboo	Edible Canna

*Source: Based on fieldwork surveys*

To help understand what determines the livelihoods choices in different communes, and why some households are better off than others, the research team worked with selected households to develop an assets review, comparing poorer households with better-off ones, in terms of their assets and access to resources. In all three communes, better-off households not only have better living conditions but also have better access to production resources in terms of land, labour and financial capital. The study found

that the poor face many challenges in accessing resources. Richer households also have better capacity to do business, as well as more extensive relationships with others that allow them to access information, techniques and support in developing their livelihoods (this important resource is known as social capital).

**Table 7: Livelihood assets of selected households in three communes**

Household ranking	Rich/ well-being	Average	Poor
<b><i>Vay Nua commune</i></b>			
Housing	Wooden houses, houses on stilts, Area: > 50 m <sup>2</sup>	Houses on stilts Area: 30-40 m <sup>2</sup>	Thatched cottages Area: < 40 m <sup>2</sup>
Durable asset	Colour TV, Good motorbikes, Refrigerators	Colour/black&white TV, China motorbikes	No TV, Bycles/no bicycles nor vehicles
Means of carriage	Carriage motors Pack-saddles	Pack-saddles	Pack-saddles
Investment	Rarely lack of capital	Rather lack of capital	Lack of capital
Land	Large area Percentage of good land	Average area Percentage of good land	Average area Percentage of good land
Labour	Skilled Good at doing business	Reasonable good	Inefficient Unskilled
Relationship	Extensive (within the province), Limited supports received	Extensive (within the district)	Just within the commune Supports granted
<b><i>Cao Son commune</i></b>			
Housing	Two storey house, flat roof, Area > 70m <sup>2</sup>	Houses made of bricks Area < 70 m <sup>2</sup>	Terrace houses, thatched cottages, Area: 20-30 m <sup>2</sup>
Durable assets	Colour TV, refrigerator, motorbikes, automobile	Colour TV, motorbike	Colour TV, China motobike
Means of transportations	Vans, cars, motorbikes	Motorbikes, wagons	Motorbikes, human strength
Investment	Savings	Limited borrowing	Borrowing
Land	> 2-3 ha, better land	Area of 2000 m <sup>2</sup> , worse land	Area of 2000 m <sup>2</sup> , worse land
Labour	Hiring labour, good at running business	Hired labour (occasionally)	Hired labour
Relationship	Extensive, beyond the province	Within the province	Within the commune Aids/ supports granted
<b><i>Tu Ly commune</i></b>			
Housing	1-2 storey houses made of bricks, Flat roof houses	Terrace houses, Area 50m <sup>2</sup>	Cottages Area <30 m <sup>2</sup>
Durable assets	High quality TV, Refrigerator, gas ovens, Buffaloes & oxes	Colour TV Buffaloes & oxes	Colour/ black & white TV
Means of transportation	Motobikes, Wagons	China motobikes, Wagons	Human strength
Investment	Investment with household's capital	Investment (of which a part is borrowed)	Borrowed, prepayments
Land	Land used rights transferees	Stable	Land used rights transferred
Labour	Pioneering		
Relationship	Extensive, beyond the province	Within the province	Limited

*Souce: Result from PRA in selected communes*

The best-off households are in Tu Ly. They benefit from better conditions for agricultural production and better market access, since they are located closer to the district's economic centre. The relative wealth of this commune is demonstrated by the presence of 16 cars and other motor vehicles (besides motorbikes).

### 4.3. Land management in the district

In Da Bac district, land use and land use planning has received a lot of attention from district leaders. The land use is often planned for a period of 10 years. The district has submitted a land use plan for the period 2011-2020. In 2008 the district's agricultural land accounted for 57.3% of the total land area.

The district has implemented land use purpose change. 256.8 ha of agricultural land was transformed into non-agricultural land during 2001-2008. The district also plans that by 2020 a further 821 ha of agricultural land will be transformed into non-agricultural land for development and construction projects. This means that agricultural sector will shrink if un-used land is not explored for agricultural production purposes. Fortunately, rice land area remains more or less the same according to the plan. Out of 821 ha of land requisitioned by the Government, the majority is to create protected forest (48.2%), and productive forest (43.2%) and just 8.5% is allocated for perennial crops.

The land acquisition process in Da Bac district has been relatively smooth due to the fact that the acquired land often accounts for only a small fraction of household land area. Livelihoods have therefore not been seriously affected even though the acquisition affects a large number of households in many communes over a long period of time.

#### 4.3.1. Land use in the communes

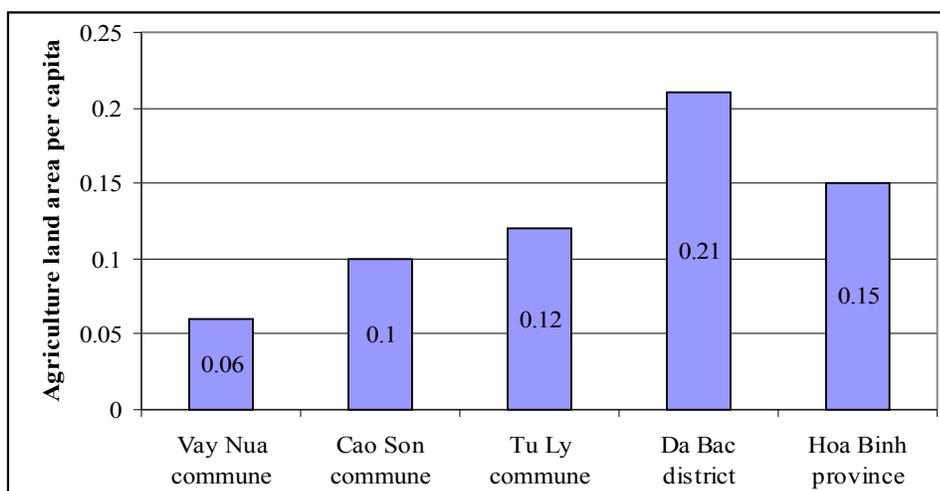
Between the three study communes, land resources differ due to different geographic conditions. However, land use has not changed much in each commune according to commune leaders.

**Table 8: Land resources of the study communes in 2009**

Population and land	Communes		
	Vay Nua	Cao Son	Tu Ly
Population (persons)	2,380	3,791	5,416
Natural area (ha)	5,980	4,842	4,514
Agricultural production land (ha)	133.55	370.4	655.3
Production forest (ha)	-	848.7	958.1
Protection forest (ha)	3,135.2	2,455.1	1,009.9

*Source: Da Bac DPC (2009b)*

Although its total area is larger, Vay Nua commune has more mountains and therefore much less agricultural production land compared to Cao Son and Tu Ly. The protected forest area in Vay Nua is 28% greater than that of Cao Son commune and 2.4 times of that of Tu Ly. Per capita agricultural land is therefore lowest in Va Nua, though it is low in all three communes, as shown below.



**Figure 7: Average agriculture land per capita in three selected communes in 2009**

*Source: 2009's socio-economic reports of Da Bac district and surveyed communes*

In Vay Nua Commune, the average size of agricultural land in local areas at present is only about 600 m<sup>2</sup>. Besides the problem of scale, agricultural land is scattered, with households often cultivating 3 or more areas of land at different locations in the commune. The situation is particularly difficult in Vay Nua where each piece is small and the distance between them is greater. This makes it difficult and less cost-effective to apply technology such as irrigation systems. It also makes it difficult to market products.

#### 4.3.2. Land management

Borders among communes in Da Bac district were clearly identified and border disputes among them have been resolved recently. Based on the 1993 Land Law, land certificates were conferred to farmers in 1993-1994 for agricultural land in all three communes. Forest land certificates were issued between 1994 and 2004. In all three communes, land laws are more or less been respected. Land transactions are not significant because areas of land are small and remote. Some small pieces of agricultural land are being used for other purposes such as residential. Official land use change only takes place when forest land is transferred to non-agricultural land due to the implementation of transportation or irrigation projects.

The most serious issue is increasing land scarcity, especially of agricultural land. On issue of land use certificates, farmers have the right to use their agricultural land for 20 years, and forest land for 50 years. In practice, agricultural production land has already all been distributed. Therefore, new young households can only inherit land from their parents and thus they often have very small agricultural land area. In the worst cases, they are landless. 100% of interviewed poor households in group discussions stated that they do not have enough land for agricultural production. As the population grows, the per capita agricultural land will be even smaller in the future. Land transferring is not very common.

Land degradation is a closely related problem. Soil erosion has been getting more serious in all three communes, caused in particular by extreme heavy rain and flash floods. In Tu Ly “slash and burn” practices are blamed for soil erosion. Local people are aware that forests should be better protected because they can protect against erosion. Both flash flooding and deforestation contribute to an increase in landslides. Another critical reason for land degradation is overuse and misuse of fertilisers and pesticides. Farmers do not have adequate knowledge on the proper use of these chemicals, and they tend to assume

that increasing the dosage will increase effectiveness. Land and water resources have already been seriously affected, and land fertility considerably reduced in Cao Son and Tu Ly. Information and training on sustainable land use are urgently needed.

Much-needed productive land can only really be increased if forest land is converted to agricultural land. But this is not necessarily recommended, not only because steep forest land is difficult to cultivate, but also, maintaining forest is good for mitigation of carbon emissions and protection of soil quality.

In fact, farmers in this commune are increasingly planting trees, in particular acacia to replace old bamboo. There is still a good potential for forest economy development in the local areas. This is because forest land and un-used land is still relatively large. The other reason is that local people now have more experiences in putting higher productivity on forest land as well as on the fields. They also have better estimations in terms of economic efficiencies of production alternatives.

Given existing natural conditions and present technologies, agricultural productivity has almost reached “ceiling” level. Therefore, sustainable forestry seems to have greater potential in the coming years.

#### **4.4. Value chains of local products and access to markets**

The province has implemented a number of socio-economic development programs in recent years. However, most of these have focused on production development, and improvement of product quality and quantity. This study finds that a key issue that has not been examined adequately is the issue of how to ensure that these products are reaching the markets and getting the best price for farmers.

##### **4.4.1. Marketing channels of bamboo in Vay Nua**

Findings of the priority ranking show that bamboo and acacia are the most suitable and play important role in the livelihood of Vay Nua farmers. However, areas for bamboo are declining while areas for acacia are increasing, despite of both of trees generating most of income for a large part of local residents, particularly poor households. Therefore, the research team recommended conducting a value chain study for bamboo in Vay Nua commune in the time being but acacia's value chain study may be taken into account in the future. Marketing channel for bamboo is simple and number of stakeholders is limited is presented in Figure 9.

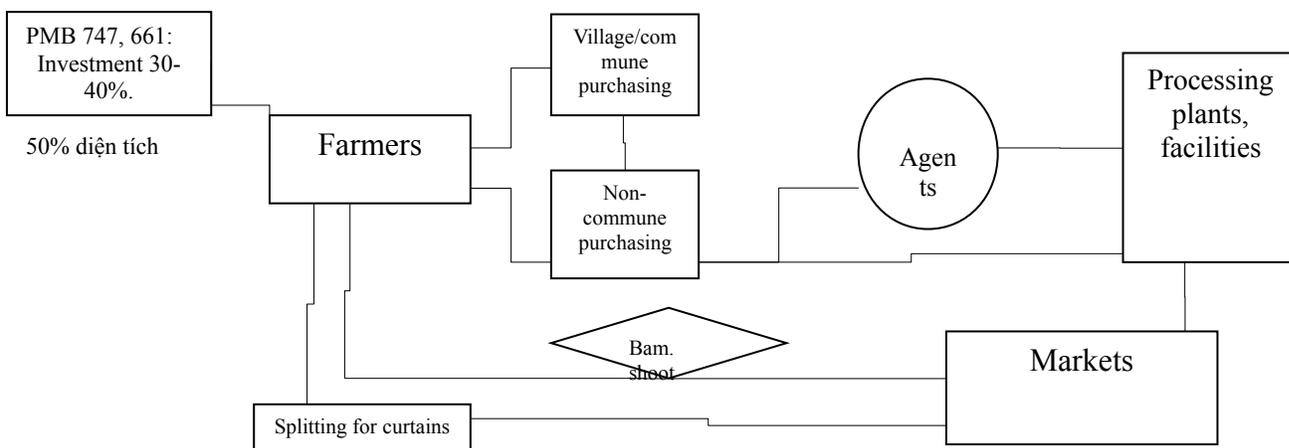
Bamboo is a tree, which is easy for growing and harvesting. The development of bamboo in Vay Nua initially supported by projects namely 747 and 661 not only technical support such as growing and cultivating, but also 40% of capital for bamboo cultivation for the local people was contributed by the projects. At the most intensive time, there were totally 1,500 ha for bamboo in the commune, of which, 50 percent of this area were raised under supports of the projects, and the rest were raised by local people with their own capital, seeds, and labour. However, recently, bamboo has been grown for several years thus getting old and stunted, providing less shoots, and having more elder diseases, and making incomes generated from bamboo tend to decrease. Area for bamboo growing has declined to 1,000 ha; moreover, people are destroying bamboo for growing acacia making area for the latter increase rapidly. It takes 7-10 years for a harvest (just once), economic value of acacia is still higher than that of bamboo due to higher market price.

It is possible to consider Bamboo as the tree for the poor because it is easy to grow, require limited capital, and the seeds are available within the locality, especially, it just takes three years for harvesting, and people can intercrop some short-term plants, which can generate incomes also during this time. It is possible to harvest bamboo all around the year but the major harvest falls in period of October to December. Yet, bamboos are likely cut at anytime once the farmers need money. Moreover, the farmers also have additional income from bamboo shoots in fresh shoot collecting seasons. Actually, income from old bamboo (3-4 years) is by far higher. However, the poor are always in need of money for their daily lives thus the tree is often harvested early and bamboo shoots are often over-collected with a view to meeting necessities of daily lives, making income from bamboo dramatically lower than it could have been.

Most of residents sell their bamboo to purchasers within the commune; there are 7 purchasers in the whole commune dividing to localities of small villages and hamlets. Such purchasers consume about 70% of bamboo in the commune, the rest are sold to non-commune purchasers. These purchasers also play the role of information suppliers to residential households in terms of prices, product forms, and trading time. Bamboo's prices have been relatively stable in recent years. However, purchasers fix prices, and farmers have no other choices but accepting given prices, the latter have no idea about the selling prices of the former either. Farmers for bargaining with purchasers often refer the prices accepted by previous sellers. Bamboo's prices are provided to local households depending on specific categories. Yet, classification made by farmers (as sellers) is not the same as that of purchasers (as buyers), this resulting to a fact that some bamboo of residents (the sellers) are under-valuated, thus the sellers are often at a disadvantage due to such classification.

Marketing channels of purchasers are various basing on different bamboo categories, for instance: bamboo used as material for paper producing are sold to the paper producing liability limited company of Thuan Phat which has a processing facility right in the locality. Bamboo with better quality that can be used for construction works are consumed in Hoa Binh city or lowland cities and provinces (such as Hanoi, and Hai Duong). It is noteworthy that big volume, far distance, and unfavourable conditions of transportation and traffic make up high total transportation costs; therefore, although the prices to the end-users are high (maybe twofold or threefold of original purchasing prices), profits gained by purchasers are not reasonably big. Purchasers not only buy bamboo but also acacia and cassava from the local farmers.

**Figure 9: Bamboo marketing channel in Vay Nua commune**



Source: Drawing based on information collected from field trip

**Table 9: Difficulties and challenges in bamboo production and marketing in Vay Nua**

For farmers	For collectors	For processors
<ul style="list-style-type: none"> <li>Bamboo is competed by other cultivated plants (e.g. acacia)</li> <li>Declining interest in bamboo due to untreatable diseases</li> <li>Bamboo cultivation makes land impoverished</li> <li>Applied unsuitable cultivation practices</li> <li>Trade off between low current income (harvest bamboo shoot) and higher future income (harvest bamboo).</li> <li>Disadvantage position in bargaining bamboo selling prices – price takers</li> <li>Being accepted bamboo classification decided by purchasers</li> <li>No suitable pre-processing</li> <li>Lack of product's information and prices.</li> </ul>	<ul style="list-style-type: none"> <li>Competition among collectors</li> <li>Un-written law on boundary of purchasing area.</li> <li>Huge volume of bamboo transportation</li> <li>High transportation cost</li> <li>Poor road conditions</li> <li>Lack of access to credit</li> </ul>	<ul style="list-style-type: none"> <li>Not enough raw material for processing</li> <li>Un-timely and adequate raw material for processing</li> <li>High ratio of transportation cost due to distance and poor condition of transportation.</li> <li>Mainly bought bamboo from middleman than directly from farmers</li> </ul>

#### 4.4.2. Channels for maize marketing in Cao Son

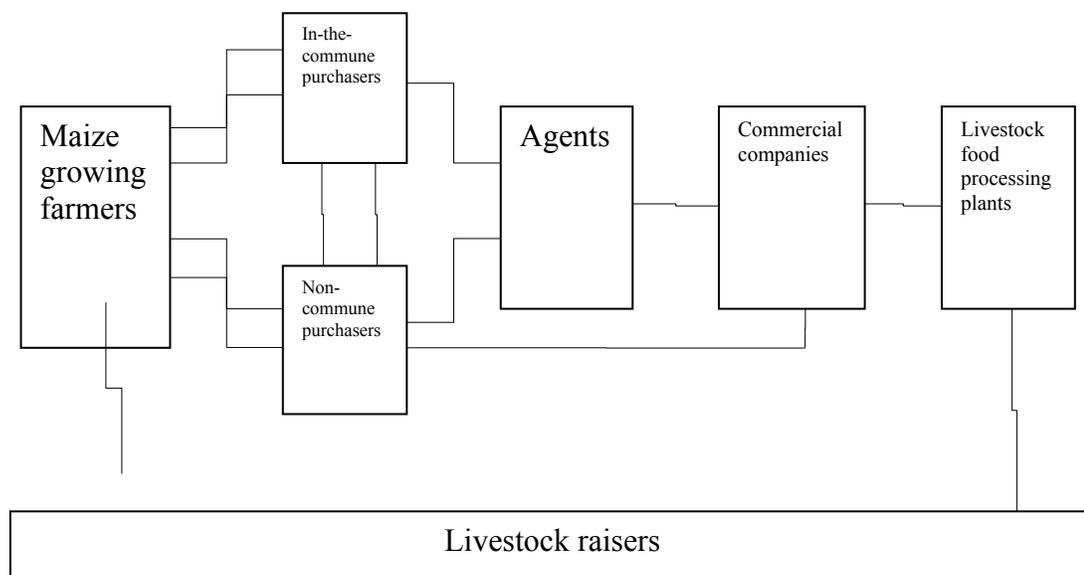
Cao Son commune locates in lower land, which is more favourable for agricultural production. The commune is also of a larger area and better traffic and transportation conditions with closer distance to the downtown. Seven commodities namely rice, maize, cassava, edible canna, acacia, china tree and bamboo, were ranked and scored by households participating in PRA basing on two groups of criteria including adaptive to climate changes and value chain structure. According to farmers' assessments, maize is the cultivated tree that generates 70% of household income; the number is even higher with poor households. Therefore, maize is a crop that plays an important role in local farmers' livelihood and is selected for value chain study in Cao Son. The Figure 10 describes factors and relations of these factors involved in maize's value chain in Cao Son.

Maize is the main income-generating source for residents in Cao Son. However, costs of maize raising are relatively high due to high prices of seeds, inorganic fertilizers, botanical preservation chemicals, and grass-repellents, etc., which require high ratio of investment. Hence, it is difficult for poor households to afford such costs before the harvest. In this case, purchasing agents provide advanced payments (not only capital and materials but also they are willing to advance money for farmer households to afford the necessities of their daily lives, and they will be repaid by harvested maize at the end of the crop). According to farmer households, they often receive advanced payments with relatively high interests (the equivalent monetary values of advanced materials, seeds, capital, and fertilizers are often 15 – 20% higher than market prices).

There are 4 purchasing agents in the whole commune, which consume 80% of total maize produced by local households, the rest 20% are sold to non-commune purchasers (including Quyet Tien Co-operative whose facility located in Da Bac town, this cooperative not only collects maize in Cao Son but also in other communes within the districts). Not only the local purchasers in the commune provide advanced payments in forms of money and/or materials to farmer households but also non-commune agents do. What noteworthy is that there is a negotiated division of purchasing locations among local and non-commune purchasers, they should get a deal to purchase in locations allocated to the others.

Maize is a crop that is the most labour-intensive, particularly for working the soil, raising the trees and harvesting, thus, farmers often mutually help one another to assure a good crop. Most of harvested products are for commercial purpose, just a small amount are stored for domestic livestock raising. Poor households often sell maize right at the fields, after harvesting (in forms of fresh corncob or fresh-shelled corn). With the others, they often dry shelled corn to reserve it for about a week waiting for higher price then. Before selling, farmers often make a call to purchasers whom they knew well before or who made advanced payments to farmers to get information about prices (farmers also referred prices dealt by previous sellers beforehand for better bargain with purchasers), time and location for delivery, as well as forms (corncob or shelled corn) and quality of the product. To farmers, standards for qualified maize are big, even, unbroken corn kernels, without worms and impurities, and with red colour. Such criteria are basically similar to those set by purchasers. However, it is more difficult to agree on the moisture of maize. Then, maize will be dried to satisfy required of water proportion (humidity), sold to agents, and transported to livestock food processing factories.

**Figure 10: Marketing channel of maize in Cao Son commune**



Source: Drawing from information collected from field trip

Note: Dark arrows present main flow of the product, dashed arrows present inter-relations between the two players regarding advanced payments in forms of materials, cash and/or housewares, and product marketing

Actually, there are many difficulties confronting different actors in maize marketing chain. Compared to collectors and processors, maize farmers still have much more constraints (Table 10).

**Table 10. Difficulties and challenges in maize production and marketing in Cao Son**

Farmers	Collectors	Processors
<ul style="list-style-type: none"> <li>• Growing maize lead to soil erosion</li> <li>• High ratio of expenditures for maize HYV.</li> <li>• Improper cultivate practices (e.g. sowing more than one seed/hole, too depend on chemical fertiliser and weed-killer).</li> <li>• Yearly increased cost of maize growing and over-used chemical causing adverse impacts to sustainable usage of land.</li> <li>• Lack of fund for seeds and fertiliser. Some households receive advanced loan/material from collectors with high interest rate</li> <li>• Not enough drying facility as maize is harvested during rainy season with high humidity</li> <li>• It is usually difficult to measure accurately and to agree on the moisture level of traded maize by both sellers and buyers.</li> <li>• Lack of information of maize price.</li> <li>• Farmers are mostly ignored in the pricing process even they are the crucial product makers.</li> <li>• Significant costs of transportation and preservation due to huge volume of goods and unfavourable traffic</li> </ul>	<ul style="list-style-type: none"> <li>• Competition among collectors</li> <li>• Lack of funds/capital to purchase corn. Lack of access to credit due to collateral.</li> <li>• Lack of storehouse</li> <li>• Farmer cannot pay back advanced loan</li> <li>• High cost of transport</li> <li>• Poor road conditions</li> <li>• Difficulty in access directly animal feed factories due to no VAT invoice</li> </ul>	<ul style="list-style-type: none"> <li>• Not enough material for processing</li> <li>• Price fluctuation.</li> </ul>

#### 4.4.3. Marketing channel for acacia in Tu Ly

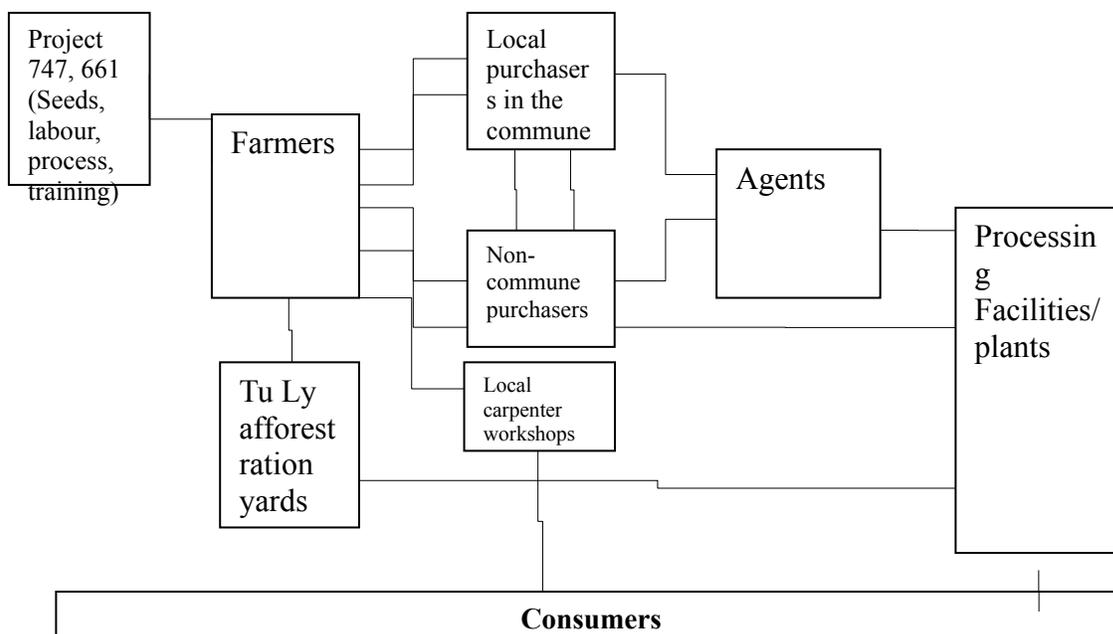
The recognition of potential special local agricultural products in Tu Ly commune was carried out similar to what did in Vay Nua and Cao Son. Nine commodities, including rice, cassava, edible canna, fruit-trees, acacia, china tree, and bamboo, were assessed and scored by local households participating in PRA. Findings from priority ranking and scoring show that acacia, china tree, and bamboo are the most suitable plants in the commune; at present, income generated from acacia is not only higher than that generated from other plants but also make up an important income source of households in the locality. Therefore, acacia was selected for value chain study in Tu Ly.

The Figure 11 describes marketing channel for acacia in Tu Ly, including all involved players and their relation. Dark arrows present main flow of the products, while the dashed arrows present opposite relations of production input supplying (including seeds, materials, chemicals, and fertilizers).

Initially, acacia growing farmers are provided with supports, in forms of seeds, labour wages (converted to amount of rice), training of growing process, technical practices and specific product taking over supervision, by projects 747, and 661. So far, as the projects have ended, local residents buy seeding trees themselves. Acacia seeding trees are sold by Tu Ly afforestation yards (located right in the commune) or in Phu Tho province. In general, farmers experience no challenges in buying seeding trees and the cost is also modest. Given the price of VND 400 per seeding tree and the density of 2,500 – 2,600 trees/ha, the average cost for seeding trees is around VND 1 million/ha. Nevertheless, some poor households still have to get advanced payment from purchasers and refund as collecting products. Thanks to experiences on acacia growing gained during the implementing time of the two projects, farmers in Tu Ly hardly face any difficulties in developing their acacia yards.

By the harvesting time, local households carry out procedures to apply for permits of exploitation. The procedures for exploitation depend on whether acacias are grown in the households' yards or forestry hills. Large amount of acacia produced in the commune (70%) is sold to local purchasers, while the other 30% are sold to non-commune purchasers. Normally, purchasing households take initiative to order and buy acacia fields/ hills of farmer households. Basing on their own experiences, the purchasers estimate amount of wood/timber and firewood of the acacia field/ hill, then bargaining prices and time of delivery, as well as selling manner (the trees are cut by farmer households or the purchasers) with the sellers. Farmers also referred prices adopted by previous sellers for bargains with the buyers. Such purchasers can also be processors who will use the collected wood to make furniture for local marketing, the rest of material wood is sold to people in lowland provinces, firewood is sold to factories for making plywood, and small branches are sold to paper producing facilities.

**Figure 11: Marketing channel of Acacia in Tu Ly commune**



Source: Drawing based on information collected from field trip

**Table 11. Difficulties and challenges in acacia production and marketing in Tu Ly**

For farmer	For collectors	For processor
<ul style="list-style-type: none"> <li>• It takes long time (7 to 10 years) for a crop of acacia</li> <li>• The intercropped plants is still under research. Income from these plants are not enough for family daily living.</li> <li>• Lack of fund for growing acacia, especially for alternative source of income</li> <li>• High cost of transport, particularly with fields/hills located far from the residential houses.</li> <li>• Lack of pro-processing</li> </ul>	<ul style="list-style-type: none"> <li>• Competition among collectors</li> <li>• Lack of funds/capital to purchase acacia</li> <li>• High cost of transport</li> <li>• Poor road conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Price fluctuation.</li> <li>• High cost of transport</li> </ul>

Overall, bamboo, maize and acacia are potential products of targeted communes should be support to develop a value chain in coming time. However, farmers are at disadvantage compared to other actors in chains. They lack of information of markets and products. They also lack of skill in production and processing technique. Input costs are gradually increasing due to increasing costs of seeds/varieties, materials, labor and advanced payments to the poor. In addition, local households still confront with lack of consistency on product quality criteria, high transportation costs, and poor transportation lines, and poor bargaining power and position. Particularly, local households do not have any association, which could help them to improve their position.

## **4.5. Access to water resources, irrigation and sanitation**

### **4.5.1. Irrigation**

The main types of irrigation structures in Da Bac District are weirs and reservoirs. Due to difficulties in management and maintenance, and the fact that farms are small, scattered and terraced, pumping stations are no longer used.

Besides a big reservoir in Cao Son, Tu Ly is the only commune with reservoirs. The irrigation areas of these reservoirs are approximately 13 ha in winter-spring and 17 ha in summer-autumn crop. Elsewhere, weirs serve 6 ha. The actual capacity of existing weirs tends to be less than 3/4 of their designed capacity. From reservoirs and weirs, canals deliver water to farms. Many canals are lined with stone. Most irrigation structures were constructed by Program 135 Programme, and also Program 742 - a resettlement program following construction of Hoa Binh Dam.

Communes have to manage all irrigation structures themselves, and delegate management tasks to relevant villages. The district does not received subsidy on water fees from the government yet nor does it collect fees from households. This lack of budget makes maintenance very difficult. Villages only cover the cost of minor repairs. On ad-hoc basic, households are requested to contribute labour and VND 10,000 – 15,000/household to buy construction materials to repair canals. If major repairs are required, communes request budget from district or provincial government. Hence irrigation structures deteriorate after only a few years in operational in all studied communes. Main solutions of local farmers are to dredge canal, fill in leaking holes, or change cropping patterns.

Overall, a part of cultivated areas in targeted communes lacks of water for irrigation during the period between December and March due to deteriorated structures or no function properly or not operating designed capacity fully. In addition, farmers do not have good awareness of saving irrigation water. Thus, lack of water resource for irrigation not only affects to crop production but also to social issue due to there is water use conflicts among water users.

### **4.5.2. Water supply for domestic use**

Da Bac District has quite rich surface and ground water. The population mainly take water from streams, reservoirs, and rivers. There is no water supply station in the area, except in Da Bac Town.

Most existing water supply systems supply water to groups of 7–9 households. Water is initially filtered before being distributed to households through pipes for domestic use. However many water supply systems no longer function, either because they have been broken or due to water source depletion. Hamlets usually assign a person to manage the common water containers, but this person usually does very little. As a result, the containers are silted with mud and sand after a few years in operation, and probably contaminated, carrying a risk of spreading disease.

Another problem is conflicts over water use because people at the head of the system take water of the people at the tail of the system. Farmers in Cao Son established a team of 4 persons to manage the Doi Bieu and Suoi Chuong Water Supply Systems. However, they could not work because famers at hamlet near the head of the system take as much water as they can and break the pipe system. Consequently,

households in hamlets downstream of the systems do not have sufficient water. The commune authorities are not helping these hamlets solving the problems.

Households who do not have access to water supply systems, have to take water by themselves from water sources uphill or in mountains (300–800m from their homes). Hand-dug-wells or drilled-wells are used in approximately half of the district's communes. Vay Nua does not have any wells. Cao Son has approximately 40 hand-dug wells and 20 drilled wells. Tu Ly has 40 dug wells and 3 drilled wells. No further water filtration or treatment methods are used. In general, physical water quality from stream, hand-dug-wells, and drilled-wells seems relatively good, and 100% of interviewed persons said they boil water before drinking. However, most wells do not reach standard health and safety requirements.

A potential solution to water supply problems could be found by collecting rainwater. However, only a few households in Cao Son and Tu Ly have rainwater containers. Households in Vay Nua are not in the habit of storing rainwater for later use, even though water in this commune is much more scarce. People are not aware about saving water, or participating in group management of water supply systems.

No remarkable waterborne diseases are reported in the communes. However, goitre and renal calculus diseases have gradually increased in the last few years in Cao Son Commune. This needs to be studied further to conclude whether the causes of these diseases relate to the use of polluted water or not.

### **4.5.3. Sanitation in selected communes**

Meetings with farmers and field observation showed that general sanitation condition in the project area is sound. Most households use pit latrines, which are holes dug nearby their houses and surrounded by bamboo screen or plastic cover. When holes are full, latrines are shifted to other places around their houses. Double-vault-pit latrines are rare and water closed latrines with septic tanks are not used commonly. Only some households in Cao Son Commune use these types of toilets. It is estimated that only 10% of households have hygienic latrines.

Domestic waste is dumped in holes buried around houses or disposed of on open ground. Only Cao Son commune has landfill of 4,000 m<sup>2</sup> for the Cao Son town. In other areas, waste is mainly treated by burying it in holes dug in households' gardens. Wastewater generated from domestic use is released freely and filters into the ground.

Farmers in the project area breed buffaloes and cows. In general, cattle are bred in cages, which are kept quite clean. However, there are still some people graze cattle near stream. For example, in Thin Hamlet of Vay Nua Commune, buffaloes are grazed near a stream contaminating water source of Tham Hamlet. People in Tham Hamlet reported that sometimes they smell cow urine in their drinking water.

## **4.6. Climate change impacts in the three communes**

### **4.6.1. Description of climate change issues in selected study sites**

Local people in these three communes do not have a strong understanding of the causes or impacts of climate change, in scientific terms, but when asked about observed changes in the weather and other

indicators of a changing climate (e.g. variations in harvesting times, changes in pest control problems), all of the participants in the focus groups and interviews were able to identify a striking list of symptoms that are likely to be closely related to climate change. According to farmers themselves, the most serious events of climate change are flash floods, drought, changing rainfall, crop diseases and human diseases. Ranked next in intensity and frequency are landslides and hot and dry winds. On the other hand, in Tu Ly commune in the same district, most of these events are ranked in low or medium levels, even for drought, landslides, abnormal temperatures and crop diseases.

**Table 2. Climate change issues in selected commune**

<b>Vay Nua commune</b>	<b>Cao Son commune</b>	<b>Tu Ly commune</b>
Drought	Changing rainfall	Rainfall
Plant diseases	Drought	Flash floods
Human diseases	Flash Floods	Landslides
Land degradation	Landslides	Abnormal temperature
Landslides	Human diseases	Polluted environment
Changing rainfall	Storms	Polluted and depleted water resource
Flash floods	Whirlwinds	Plant diseases
Storms	High Temperatures	Drought
Whirlwinds	Hot and dry winds	Landslide
High Temperatures		Storms
Hot and dry winds		Animal diseases

*Source: Summarised from survey results*

In all three communes, high temperatures and drought in early 2009 and 2010 made agricultural production difficult. Cultivation time for spring rice and maize has been delayed in the last two years. Natural disasters seem to have the most negative effects in Vay Nua where the terrain is more rugged. Rainfall is reported to have fluctuated significantly in recent years. Flash floods happen more frequently, causing severe damage to crop land.

Landslides are expected and drought lasts longer than usual. Typhoons are stronger and damage agricultural production in both cultivation and livestock in a more severe manner although the number of typhoons is smaller than in the past. Soil erosion is a serious threat for agricultural production and needs urgent measures. Flash flood also happens in Cao Son causing soil erosion as well. In Tu Ly, flash flood seems to be smaller than that in Vay Nua but it also causes soil erosion. Due to hill land is steep, it is very difficult to prevent this phenomenon.

People in all three selected communes agreed that:

- The intensity of storms has increased and the frequency of the cyclones has probably increased;
- Due to deforestation and abnormal weather events, flashfloods occur more frequently now and with less time to prepare between the rain storm and dangerous water levels;
- Rainfall levels are changing, the rainy season is coming later and rain is more often. The dry season is longer than before.
- The dry and hot winds are coming earlier;
- Weather is hotter than before;

- Winter is shorter and not so cold (with the exception of some extreme cold bouts killing livestock);
- Drought happens more often, many water resources are depleted;
- Landslides are bigger and more often now;

#### 4.6.2. Impacts of climate change on local livelihoods and adaptation measures

The table below shows that climate change related symptoms have been having some seriously harmful impacts on local people’s livelihoods in recent years. Annual crops like maize, rice and forest trees like bamboo and acacia are affected by drought, soil erosion and land slides. Maize is affected by typhoons, while rice production is affected by drought, diseases and flash floods. Livestock is affected mainly by diseases or very cold weather. With low financial capacity, poor living conditions and limited alternatives sources of income, it will be very challenging for local people to sustain their livelihoods in coming years.

**Table 4: Key climate change threats to main livelihoods**

Commune	Livelihoods	Difficulties due to climate changes affecting respective livelihoods
Vay Nua	Maize	Droughts; Typhoons causing fallen trees; land slides and erosion.
	Pigs, chickens	Epidemic due to weather changes.
	Bamboo, Acacia	Land slides, soil erosion, typhoons
Cao Son	Maize	Drought: Since 2007, rain often comes 2 months late and thus maize cultivation must be delayed accordingly; Flash floods.
	Rice	Storms and typhoons in Summer-Autumn season causes “small fruit” rice; Flash floods; Drought: Canals are good but there is no water (6-7 recent years)
	Buffalo, cows	Very cold weather causes deaths of buffalos and cows.
Tu Ly	Rice	Drought; Diseases; Flash floods
	Maize	Drought; Land slide; Soil erosion; Typhoons.
	Pigs	Diseases due to changing weather.

*Source: Summarised from survey results*

#### 4.6.3. Institutional roles and responsibilities for responding to climate change

The Sub-Department of Environment Protection (of DONRE) has been appointed as the provincial focal point for climate change matters. Recently, this agency sent requests to Vietnam Environment Authority (VEA) under MONRE for budget to set up an Action Plan to Respond to Climate Change in Hoa Binh Province. One interviewee reported that climate change is a "hot issue" in central agencies only, not in local agencies at province and district level. So far, there have been no capacity building activities on responding to climate change for relevant staff of provincial agencies on this matter.

However, local authorities and residents at the comun level seemed more aware of the impacts of climate change and related issues such as scarcity of land and water, and natural disasters. Staff at this level perhaps care more about their communities as well. All the interviewed leaders in the study communes of Vay Nua, Cao Son and Tu Ly had great concerns about the recent signs and effects of climate changes and land resource scarcity.

Boards for Prevention of Floods and Storms have been set up in all communes, but have not undertaken many activities due to lack of budget. Heads of the Villages and Farmers' Associations were found to be the most important actors in supporting local populations to respond to these threats, especially in relation to natural disaster management. Local people often just need simple adaptation measures for their survival, but government action plans on how to respond to climate change in local areas come too late.

#### **4.6.4. Awareness of climate change and local people's views on their needs**

Most people consider that abnormal weather events are causes of increasing diseases in crops and humans, while very few people understand that other causes for human diseases include using too much pesticides, herbicides instead of applying Integrated Pest Management (IPM).

Through this process of participatory rural appraisal (PRA) in three selected communes, people stated that their main requirements for adaptation with climate change are:

- Support for building water pipeline from water resources to agriculture land;
- Support for drilling well near houses for clean water supply;
- Support for improving fertility of agriculture land (guide for plant of green lines and making organic compost);
- Support for conversion to plant acacia, chukrasia tabularis and mushroom;
- Support for development of animal husbandry with cow, pig, chicken;
- Support for reforestation, afforestation by seed supply, technical guide and soft loan;
- Support for management of crop and animal diseases;
- Support for climate change responding by supplying of information, conducting training courses and organizing ad hoc group;

#### **4.7. Adaptation measures already being undertaken by local people**

In fighting against these events for their survival, local people have already found and developed some suitable measures to adapt to such climate change phenomenon as presented in the Table 15.

**Table 15. Recent adaptation measures of local people**

<b>Phenomenon</b>	<b>Impacts</b>	<b>Adaptation measures</b>
Drought	<ul style="list-style-type: none"> <li>▪ Cannot cultivate rice</li> <li>▪ Late culture of maize</li> <li>▪ Decrease of crops yields</li> <li>▪ Lacking of clean water</li> </ul>	<ul style="list-style-type: none"> <li>▪ Changing to cultivate maize</li> <li>▪ Changing to planting bamboo, acacia, chukrasia tabularis</li> <li>▪ Keeping water in drainages</li> <li>▪ Mixed cultivation of maize and canna</li> <li>▪ Changing to animal husbandry (cow, pig, duck, farmed fish)</li> <li>▪ Drilling of water wells</li> </ul>
Increasing of crops diseases	<ul style="list-style-type: none"> <li>▪ Decrease of crops yields</li> <li>▪ Loss of crops</li> <li>▪ Decrease of quality</li> <li>▪ Bad impacts to the health of people</li> </ul>	<ul style="list-style-type: none"> <li>▪ Spraying pesticides</li> <li>▪ Using diseases resistant varieties</li> <li>▪ Spraying straw ash mixing with canxi oxit powder</li> </ul>

Phenomenon	Impacts	Adaptation measures
		<ul style="list-style-type: none"> <li>▪ Applying mix production rice-fish, rice-duck</li> </ul>
Flash floods	<ul style="list-style-type: none"> <li>▪ Loss of plants</li> <li>▪ Loss of agriculture lands</li> <li>▪ Destroy of roads</li> <li>▪ Loss of houses</li> <li>▪ Soil erosion</li> <li>▪ Mortality, injured people</li> </ul>	<ul style="list-style-type: none"> <li>▪ Planting more trees in streambanks</li> <li>▪ Using stones to change water flow</li> <li>▪ Warning of flash floods</li> <li>▪ Propaganda of prevention measures</li> <li>▪ Demonstration of rescue</li> </ul>
Abnormal hot weather	<ul style="list-style-type: none"> <li>▪ Loss of plants</li> <li>▪ Decrease of crops yields</li> <li>▪ Increase of plant diseases</li> <li>▪ Increase of animal diseases</li> <li>▪ Increase of human diseases</li> </ul>	<ul style="list-style-type: none"> <li>▪ Planting of soy bean and green bean</li> <li>▪ Planting more trees</li> <li>▪ Spraying pesticides</li> <li>▪ Vaccination for animal</li> <li>▪ Daily drinking of water with local medicinal tree for reducing heat in body</li> </ul>
Pollution of water resources	<ul style="list-style-type: none"> <li>▪ Lacking of clean water</li> <li>▪ Lacking of irrigation water</li> <li>▪ Water born diseases (digestion, eyes)</li> <li>▪ New diseases (cancer of liver and lung, more child mortality)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Drilling of water well</li> <li>▪ Limiting the use of pesticides and herbicides</li> <li>▪ Using microbiology compost</li> <li>▪ Build animal rearing houses to avoid free range</li> </ul>

Source: Summarised from survey results

#### 4.8. Current external support to three selected communes

The three communes have been receiving a lot of government support through National Target Programs such as: the Program for Hunger Alleviation and Poverty Reduction; Programs 134 and 135, which focus on construction, road irrigation and sanitation infrastructure; Program 742 (formerly 747) which has improved irrigation, water supply, and sanitation; and the Poverty Reduction in Northern Mountainous Areas Project. These programs are financed by the Government of Vietnam and international donors such as WB, JICA, and INGOs. Thanks to this support, the living standards of people have increased remarkably, the household poor rate has been decreasing remarkable also.

Besides government support, International NGOs have been supporting these communes somewhat, but not extensively. In Vay Nua commune, a revolving fund was set up by Oxfam Belgium in 1993 to support local people who were obliged to move to higher land when Hoa Binh reservoir was built. This allowed one stakeholder to take out a loan of 1 million VND (about 70 USD) with low interest.

In Cao Son and Tu Ly communes (together with other 3 communes), people have been supported by Action Aid through the Programme for Supporting Development of Da Bac district. 550,371 USD was committed for the period 2007-2010, though in the Report on Supporting from NGOs to Hoa Binh Province in 2009 of the Department for Planning and Investment of Hoa Binh Province, the support in 2009 was reported to be only 100,000 USD for 5 communes.

This study concludes that, to ensure that local people achieve more sustainable livelihoods even in the context of threats to their livelihoods being exacerbated by the impacts of climate change, further external support is required.



## **5. CONCLUSION AND RECOMMENDATIONS**

### **5.1. Conclusion**

This study finds that the poor in Hoa Binh are inhibited from developing sustainable livelihoods due to a number of factors, all of which are linked to climate change. These factors include a **lack of access to land** (whether through ownership or land use rights) which prevents income generation, inhibits long-term investment and discourages good land management. A second factor that hinders poor people from developing sustainable livelihoods is **lack of irrigation, clean water and sanitation**. The consequences of this can include low productivity, diminished crop quality, time wasted collecting water, poor health and even conflict over water resources. A third factor is **lack of access to markets**. Many farmers only produce enough food to feed their families, or even less; but others who do produce enough to sell face many difficulties in making a profit, due to limited knowledge about value chains and marketing, poor infrastructure and transport, and inequitable value chains which disempower the producer.

A fourth factor undermining the ability of the rural poor to break out of the poverty cycle is **climate change**. The impacts of climate change are exacerbating the impacts of each of the other three factors, all of which are closely inter-related. Increased frequency and severity of natural disasters, such as extreme heavy rain, is responsible for landslides and soil erosion that reduces the availability of arable land. Rising temperatures and longer droughts are reducing the availability of water resources for irrigation, drinking water and sanitation. If farmers are inhibited from investing in new products and diversifying their livelihoods due to inequitable value chains, they will be less able to change to more drought-resistant or pest-resistant products.

Evidently climate change adaptation measures are needed, to ensure that the livelihoods built by the rural poor are sustainable now and in the future. Any intervention activities must take into account the role of the above three factors – land management, water and sanitation and access to markets – in supporting sustainable livelihoods that are resilient to the impacts of climate change. They must also ensure that the benefits do not accrue to one particular group in the community, to the exclusion of others: such as women, the elderly, those with a disability, or a particular ethnic group.

To adapt successfully, rural poor need not only to learn and apply a new tool or technique; they need to be empowered to continue to adapt to their changing conditions as necessary. Today that might mean building a well, reinforcing the roof, or learning to manage pests more effectively. Tomorrow, it might mean investing in a new crop, moving house to a less vulnerable location, or even finding different employment. All of these adaptation approaches entail costs and risks which are impossible for the poorest of the poor. The best way to achieve long-term resilience is to break out of poverty.

### **5.2. Proposed intervention activities**

This report recommends a number of interventions to support local communities to develop sustainable livelihoods and increase their resilience to climate change. Each recommendation addresses one or more of the study's focus issues of land entitlement and management, water resources and sanitation, improving access to markets, and adaptation to extreme weather events and other impacts of climate change. The recommendations that are selected for implementation should be tailored to fit with, and build upon, local

government and community capacity in order to ensure that their positive outcomes are sustainable in the long-term. Implementation will be most effective if undertaken gradually, ensuring participation and ownership by the local people themselves. For some of the interventions, pilot and demonstration models are recommended as an initial step, and then, based on lessons learned from these, adjustments will be made to ensure the interventions meet the specific needs of the targeted beneficiaries.

The recommended activities are as follows:

- **Build the capacity of local people** – through delivering training courses, preparing and disseminating information materials, running awareness raising campaigns, and in some cases building capacity of district staff to run training – in the following areas:

#### **Climate change**

- strengthening awareness of local people about climate change – its possible impacts, and mitigation and adaptation measures – through seminars, mass media, training courses, study tours.
- management skills, record-keeping skills, sharing experience and information in relation to climate change impacts, extreme weather events and appropriate responses;

#### **Land management and access**

- appropriate and timely use of fertilisers, pesticides, and weed killers, and sustainable techniques for applying them, according to different land types (e.g. compost; IPM), and health impacts of chemicals;
- techniques for better cultivation on sloping land, ensuring the alternation among major crops, intercropping trees, plants that enhance soil fertility and trees that prevent soil erosion;
- best practice methods for growing bamboo and maize, to maximise efficiency;
- land management; land use rights; elements of land law related to the rights and responsibilities of land users – for different interest groups e.g. local leaders, large-scale and small-scale farmers, agro-forest farmers (appropriate in all three study communes)

#### **Water supply, irrigation and sanitation**

- proper collection, storage and use of rainwater; how to maintain and use hand-dug-wells and drilled wells, and how to protect hydraulic structures
- protection of water quality, causes of water pollution, and prevention and detection of common waterborne diseases;
- filtration technology e.g. water filtration containers, and how to construct and maintain them

#### **Access to markets**

- accessing and sharing up-to-date market information, especially about product prices, thus facilitating their ability to bargain with purchasers, e.g. build news boards in villages and support local people to update them;

- carrying out trade promotional activities to launch and promote local products, gradually building trademarks, making the product visible and available to end-users;
- understanding commerce-based production measures, e.g. respecting signed purchasing contracts without breaking/violating the agreements.
- **Carry out pilot activities, and then share and apply lessons learned, on:**
  - preservation and semi-processing of agricultural products, supporting purchasers e.g. drying maize on the spot, right after buying the corn, to preserve its quality; processing wood ready for making household furniture;
  - forest cultivation and protection to reduce soil erosion and water run-off and increase soil fertility;
  - applying agro-forestry model with interpolation between acacia trees and crops such as beans or peanuts (beans increase the nitrogen content of the soil, improving fertility, and acacia has good soil reclamation effects).
  - Growing hedgerows to prevent soil erosion by retaining run-off water and serving as organic fertilisers;
  - transition to drought-resistant crops;
  - Participatory Irrigation Management;
  - record-keeping and communication systems to help with predicting and preparing for extreme weather events.
- **Support formation of local action groups, including:**
  - agro-input services groups: plan, monitor and assess them; assist them to access traders; support farmers to sign permanent contracts with partners;
  - farmer marketing groups (at village and commune level) to strengthen local people's capacity to engage actively in the market;
  - self-credit groups in villages, using funds from pig and chicken production;
  - Water Using Farmer Groups to maintain water supplies;
- **Provide materials, resources and structures to assist with adaptation** (supported by technical assistance and training in how to use and maintain them) such as:
  - build models of hygienic toilets, water filtration containers, rainwater containers for some poor households;
  - build metal support structures for exposed to reduce the risk of soil erosion and landslides;
  - provide bamboo and maize seedlings for farmers;
  - dig gutters and construct level terracing in fields to slow run-off water and reduce the problem of soil sediments accumulating at one end of the field (can be expensive, may only be feasible for small areas)

- **Repair structures using appropriate and affordable technology**, that will be feasible for local people to maintain, prioritising areas with more beneficiaries, e.g.
  - enlarging the right canal intake of Suoi Lao Weir in Suoi Lao Weir of Giang Hamlet (Cao Son Commune) to ensure full irrigation for 15 ha (Cost estimate: VND 20 mil)
  - constructing a small water supply system (weir, pipe, and common container) for group of 25 - 30 households in Tay Mang Hamlet (Tu Ly Commune) (Cost estimate: VND 140 mil.)
- **Support a funding source to build a microfinance loan system** that provides longer-term loans and low interest rates, to enable poor people to invest in the changes to their livelihoods that are needed to better respond to climate change.
- **Strengthen the capacity of local authorities** to formulate and implement action plans to respond to climate change and prepare better for natural disasters, such as:
  - Building awareness about climate change impacts, and potential adaptation and mitigation measures through training, workshops and study tours;
  - Setting up an Ad hoc Committee to Respond to Climate Change headed by Department of Natural Resources & Environment in province or Ad hoc Group to Respond to Climate Change in the Committee on Prevention of Flood & Storm in district and
- **Conduct further research** on:
  - how to ensure that product purchasing contracts are applied in a way that meets the interests of both purchasers and farmers.
  - how to support reducing transaction, and transportation costs for agricultural and forest products

## 6. REFERENCES

- ADGER, W. N. (1999). Social Vulnerability to Climate Change and Extremes in Coastal Vietnam. *World Development* Vol. 27, No. 2, pp. 249-269.
- Asian Disaster Preparedness Center (ADPC). (2003). *Climate Change and development in Vietnam: Agriculture and Adaptation for the Mekong Delta Region*. GTZ report. Division 44 - Environment and Infrastructure.
- ADB (2007) *Making Markets Work Better for the Poor Project (M4P/ADB)*. Making Value Chains Work Better for the Poor : A toolbook for practitioners of Value Chain Analysis.
- Cao Son Commune People Committee (2009), 2009's socio-economic, defense and security performance and task direction for 2010.
- Chaudhry, P; Ruyschaert, G. (2007). *Climate change and human development in Vietnam: A case study*. Human development report 2007/2008. UNDP.
- C. McSweeney, M. New and G. Lizcano. (Undated). Vietnam. UNDP Climate Change Country Profiles
- Communist Party Committee of Hoa Binh province (2009), Report on overview of leading the implementation of the tasks set for 2009 and task direction for 2010.
- Da Bac District People Committee (DPC) (2002), Comprehensive report on land use planning of Da Bac district, Hoa Binh province in the period 2001-2010.
- Da Bac DPC (2009a), 2009's socio-economic performance and task direction for 2010.
- Da Bac DPC (2009b), Report on land use planning for the period 2011-2020.
- Da Bac DPC (2009c), Sample sheet system on land use planning from 2005-2010.
- Da Bac DPC (2009d), Official results of implemented area, productivity and output of crops in 2003; 2004; 2005; 2006; and 2007
- Dao T.A (2005). *Contract farming, Collective actions of the households and the poor's participation in the North of Vietnam*.
- Dasgupta, S., Laplante, B., Meisner C., Wheller, D., Yan, J. (2007). *The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis*. World Bank. [http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2007/02/09/000016406\\_20070209161430/Rendered/PDF/wps4136.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2007/02/09/000016406_20070209161430/Rendered/PDF/wps4136.pdf)
- GSO (2009) *Statistical handbook 2009*.
- Intergovernmental Panel on Climate Change (IPCC, 2001), *Climate Change 2001: Impacts, Adaptation and Vulnerability, Contribution of Working Group III (WGIII) to the Third Assessment Report (AR3) of the Intergovernmental Panel on Climate Change*
- Intergovernmental Panel on Climate Change (IPCC, 2007), *Climate Change 2007: The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.), Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA
- John A. C, Neil J, W, John R H, and Kurt L. (2008). *BRIEFING: a post-IPCC AR4 update on sea level rise*. Antarctic Climate & Ecosystems Cooperative Research Centre (ACECRC). Asian Development Bank (ADB). (2009). *Water - Vital for Vietnam's future*.

- Le H.D (2009). A comprehensive report on successful models of market linkages through contract farming and some policy selections to encourage marketing agricultural products through contracts in the coming period.
- Luu D. K (2009). Enhancing farmer household's participating capacity into commodity production: A value chains approach. A research at ministerial level project. Ha Noi.
- Luu D. K, Nguyen M. H and Nguyen V. N (2009). Agricultural Trade in the Greater Mekong Sub-Region" Case Studies of Cassava and Rubber in Vietnam. A project of the Development Analysis Network (DAN).
- Nang, D. T. (2006). Loss of Land and Farmers' Livelihood. Case study in Tho Da village, Kim No Commune, Dong Anh District, Hanoi, Vietnam. Master Thesis No 35. Swedish University of Agricultural Sciences
- National Assembly of Vietnam (2003), 2003 Land Law, Hanoi, Vietnam.
- National target programme responding to climate change, MONRE, 2008
- Nguyen D.A.T; Tran C.T.(2005), Participation of the Poor in Cassava Value Chain, M4P/ADB, Hanoi.
- Nguyen T.V (2009). A Research report on successful models of marketing farmer products through cooperatives.
- Primary Report of Da Bac DPC, General Population and House Census Directive Board of Da Bac District, dated 4/5/2009
- Provincial People Committee (PPC) of Hoa Binh (2009), Report on the results of land planning, land use in 2001-2010 and the proposal for land use demand by the year 2020 of Hoa Binh province.
- Report on Situation of Socio-economics, National Defence, and Security in 2009 and Direction for 2010, Cao Son CPC, dated 11/1/2010
- Report on Situation of Socio-economics, National Defence, and Security in 2009 and Direction for 2010, Vay Nua CPC, dated 12/1/2010
- Report on Situation of Socio-economics, National Defence, and Security in 2009 and Direction for 2010, Tu Ly CPC, dated 1/2010
- Report on of Socio-economic Situation in 2009 and Direction for 2010, Da Bac DPC, dated 15/12/2009
- Roberts M. and Nguyen T.K (2005). Contract usage and the rice quality in value chains in Angiang, Vietnam.
- Surveyed data, Agricultural Office of Da Bac District, dated June 2009.
- Statistic data, Statistic Office of Da Bac District, dated 28/7/2009
- Statistic data, Da Bac DPC, dated 31/1/2010
- Scawthorn, S (2009). Disaster Damage Assessment in Vietnam. Report 01: Current Status. Prepared for Central Project Office - Ministry of Agriculture and Rural Development - The Socialist Republic of Vietnam
- The Government of Vietnam (GOV) (2004), Resolution No. 197/2004/ND-CP dated 3/12/2004 on compensation and supports for resettlement when the state acquires land.
- The Government of Vietnam (GOV) (2007), Resolution No. 84/2007/ND-CP dated May 25, 2007 stipulating supplements on land use certificate issue, land acquisition, implementation of land use rights, procedures of compensation for resettlement when the state acquires land and on land dispute settlement.
- Tran C.T, Pham Q.D et al. (2005). Participation of the Poor in Tea Value Chain, M4P/ADB, Hanoi.

- Tu Ly Commune People Committee. (2009). 2009's socio-economic, defense and security performance and task direction for 2010.
- Vay Nua Commune People Committee. (2009). 2009's socio-economic, defense and security performance and task direction for 2010.
- Water Environment Partnership in Asia. (2009). Retrieved 23/6/2010. <http://www.wepa-db.net/policies/state/vietnam/>