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MASTER THESIS

Evaluation impact of the development project in Vietnam

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Declaration

I declare that this thesis “Evaluation impact of the development project in Vietnam” is a presentation of my own research work and that it has not been submitted anywhere. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions.

This thesis was done under the supervision and guidance of Ing.Petra Chaloupková, Ph.D – Vice Dean for International Relation of Faculty of Tropical AgriSciences.

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Abbreviations

ADB – Asian Development Bank

ABS – An Binh Securities Joint Stock Company

app. – approximately

CIA – Central Intelligence Agency

CULS – Czech University of Life Sciences Prague

DO– Dissolved oxygen

FAO – Food and Agriculture Organization

FITA – The Federation of International Trade Association

GDP – Gross Domestic Product

GO – Governmental organization

GSO – General Statistics Office

IMF – International Monetary Fund

MARD – Ministry of Agriculture and Rural Development

MPO – Ministerstvo průmyslu a obchodu (Ministry of industry and trade)

MZV – Ministerstvo zahraničních věcí (Ministry of foreign affairs)

NASO – National Aquaculture Sector Overview

NGO – Nongovernmental organization

RIA 1 – Research Institute for Aquaculture Number 1

SITC – Standard International Trade Classification

UN – United Nations

USD – United States Dollar

VBARD – Vietnam Bank for Agriculture and Development

VND – Vietnamese Dong

WB – World Bank

Abstract

From 2008 to 2010, The Ministry of Agriculture of the Czech Republic developed the project: “Support of freshwater fish farming in mountain area, Vietnam”, which was in Cao Bang and Lang Son provinces. Project was coordinated with the Czech University of Life Sciences Prague (CULS) and with the Research Institute for Aquaculture No.1 of Vietnam. This thesis is carried out with the purpose of evaluating the impact of the project to the local farmers.

Cao Bang and Lang Son are two provinces located in the Northern part of Vietnam. Most of lands in two provinces are forested and no good conditions for development of agriculture, so the living standard of people is poor. Participating in the project, the local farmers have the chance to improve their lives.

Overcoming many difficulties during the implementation, the project finally gained some significant impacts for the lives of local people.

Local farmers in the targeted areas were directly interviewed to collect necessary information. Collected data and information were analyzed and processed by means of excel tables, graphics illustrations and expressive statistical tools such as ratios, proportions and percentage.

Finally, with the hope to help similar projects in the future can reap more successes, author of this thesis also gave some recommendations.

Key words : aquaculture, freshwater fish, fish production, development, Cao Bang, Lang Son, Vietnam

Abstrakt

Rozvojový projekt "Podpora chovu sladkovodních ryb v horských oblastech, Vietnam", který byl financován Ministerstvem zemědělství České republiky a koordinována s Českou zemědělskou univerzitou v Praze (ČZU) a Výzkumného ústavu pro akvakulturu číslo 1 z Vietnamu, byl realizován v provincii Cao Bang a Lang Son v letech 2008 až 2010. Tato práce se provádí za účelem posouzení vlivu projektu na místní zemědělce, kteří se podíleli na projektu, který byl spuštěn.

Cao Bang a Lang Son jsou dvě provincie nacházející se v severní části Vietnamu. Tyto provincie mají podobný životní standard. Životy lidí jsou zde špatné, protože jsou zde špatné podmínky pro zemědělství a velká část půdy je hustě zalesněná. S přáním zlepšit své životy se místní lidé rozhodli podílet se na projektu.

V průběhu realizace se projekt setkal s mnoha těžkostmi a problémy, ale nakonec přinesl významný dopad na životy místních lidí.

Aby byl splněn účel, rozhovory se s farmáři konaly v cílových oblastech. Cílovými respondenti studie jsou místní farmáři, kteří se přímo podílejí na projektu. Byly analyzovány a zpracovávány údaje a informace shromážděné pomocí aplikace Excelových tabulek, grafických ilustrací a expresivních statistických nástrojů jako jsou ratio, poměry a procenta.

V závěru, s nadějí do budoucna pomoci podobným projektům uspět, autorka této práce poskytla několik doporučení.

Klíčová slova: akvakultura, sladkovodní ryby, produkce ryb, rozvoj, Cao Bang, Lang Son, Vietnam

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1. INTRODUCTION

Vietnam is a successful story of the developing process. The ongoing economic process and political reform begun since 1986 have transformed Vietnam from one of the poorest countries became the average low income nation in 25 years.

Vietnam has been appreciated for the equity of its development, which is better than some countries in the similar situation. Today, Vietnam is improving their position and their role on the regional and the global stage by chairing the 2009 Annual Meetings of the Boards of Governors of the World Bank Group and the IMF, and carried out the Chairmanship of the Association of South East Asian Nations (ASEAN) in 2010.

Vietnam is being known around the world as an agricultural country. Additionally, Vietnam is one of the biggest exporting countries of rice, coffee, pepper, aquaculture after implementing “Doi Moi” campaign in 1986. Agriculture has played a particularly important role in ensuring food security, creating jobs and income for the citizens, and is determining factor in poverty reduction as well as contributing to the country’s economic development and political stability.

Regarding agriculture and rural development perspective, Decision of 10th Congress’s Central Committee Party in 2006 asserted: Industrialization of agriculture and rural areas, one of the most important tasks of industrialization and modernization of the country, is creating powerful shifts in agricultural production, the rural economy and improving the living standards. Now and in years to come, the issues of agriculture, farmers and rural areas have always been considered as important factors to promote industrialization of agriculture and rural development, towards building a larger – scale commodity in agriculture, diversity, fast and sustainable development, high yield, quality and high competitiveness. Moreover, those also create conditions and gradually form clean agriculture, strive to increase the value added in agriculture, forestry and fisheries (GSO, 2012).

Vietnam’s agriculture and rural are developing in the context of the positive impacts of the State and Party policies. However, Vietnam agriculture and rural development are still facing many difficulties and challenges. The process of industrialization and modernization of the country took on large extent, has accelerated the pace of urbanization with increasing of the number of industrial

zones, new urban areas, leading to shrink agricultural land and agricultural labor surplus. Rural environment, environmental soil and water are also extremely polluted. The process of world economic integration of Vietnam entered a new phase also directly impacts to agricultural economics and rural sociology. In 2007, Vietnam became an official member of the WTO, besides the advantages of import and export market of agricultural products, agricultural expand, new difficulties also appeared such as hundreds of tariff reductions on agricultural products, forest products, fisheries according to WTO requirements, the tougher agricultural market competition.

Today Vietnam is one of the fastest developing economies in the world but they still have a lot of problems, which must be solved such as inflation and high poverty. Although achieving good performance but the alleviation of poverty in Vietnam is confronted with some serious challenges. For instance, the majority of poor people live in remote rural areas, limited assets, low educational level and poor health conditions. Moreover, the poor people have met many difficulties to access to the general conditions of poverty reduction because they have not kept pace with the increasing of poverty reduction conditions, especially ethnic areas, remote areas, ethnic minority.

However, the process of industrialization and modernization and open economy policy were completed. Therefore, Vietnam has attracted a lot of attention from other countries in the world. Many projects and investments have been invested in to boost Vietnam's economic development. For example, the development project "Support of freshwater fish production in mountains areas (Vietnam)" was one of them.

From 2008 to 2010, The Ministry of Agriculture of the Czech Republic developed the project: "Support of freshwater fish farming in mountain area, Vietnam", which was implemented in Cao Bang and Lang Son provinces. Project was coordinated with the Czech University of Life Sciences Prague (CULS) and with the Research Institute for Aquaculture No.1 of Vietnam. The main aim of this project was to introduce sustainable approach of freshwater fish production in the reservoirs that was constructed for irrigation purposes located in Cao Bang and Lang Son provinces, thereby it helped the local farmers improving their living.

This thesis is carried out with the purpose of evaluating the impact of the project to the local farmers, who participated in the project when it was running.

Evaluating the impacts is an important final step of any project or program. According to Baker, the activity of evaluating the effects is to determine these impacts more broadly on the effectiveness of a program and to know positive or negative influences on individuals, households and institution (Baker, 2009).

The process of impact evaluation for the project “Support of freshwater fish farming in mountain areas, Vietnam” showed an overall picture of the social and economic lives of the local farmers, who implemented project activities. Through this picture, we can see the farmers’ lives before and after the project, and so that we have a most objective assessment of the success of the project.

2. OBJECTIVES

The main objective is to evaluate impact of the development project “Support of freshwater fish farming in mountain areas, Vietnam” on local farmers in Cao Bang and Lang Son provinces, Vietnam. This project has been running from 2008 to 2010. The main aim of this project was to introduce sustainable approach of freshwater fish production in the reservoirs that was constructed for irrigation purposes located in the provinces. The project activities were oriented to capacity building and technical support of these cooperatives. Another activity was promoting effective harvesting methods in the reservoirs. The provinces Cao Bang and Lang Son were selected for cooperation due to appropriate conditions suitable for cage culture fisheries.

Beside the evaluation of the project, other purposes of this thesis are:

- Analyze socio – economic situation of local farmers who implemented the project activities;
- Evaluate the profitability of fish production and also identify the constraints faced local farmers in the implementation.
- Provide suggestions for improvement of the project implementation.

Hypothesis

The main hypothesis is to confirm or disprove if the investment in fish production brings an opportunity for the local farmers to improve the farm

productivity and gets higher income in long term period after the end of the project implementation.

3. METHODOLOGY

3.1 Area description

Data collection was in Cao Bang and Lang Son, located in the Northern part of Vietnam, where the project was implemented. In Cao Bang province, data was collected at 3 cooperatives: Ban Nua, Na Tau, 1/4 and in Lang Son province 2 cooperatives - Hop Thinh and Na Pia the research was carried out. These cooperatives have a similar living standard. 11 million people living in these areas divided in 31 ethnic minorities. Tay (35%), Nung (45%) and Hmong are mainly minorities in Cao Bang and Lang Son (Nguyen, 2006). Each minority group has its own traditions, customs and community structure, which leads to different socio-economic diversification of the region (Dinh, 2006). The lives of people here are poor because of bad conditions for agriculture and a huge part of land is heavily forested. The area is located far away from schools and hospitals but this situation is being improved. Transportation is a major challenge facing the area by high and twisty terrain.

3.2 Research design

This study was carried out with the purpose of evaluating impact of the project named “Support of freshwater fish farming in mountain areas, Vietnam”. To accomplish this purpose, the interviews with farmers were held at five cooperatives – Hop Thinh, Na Pia, Na Tau, 1/4 and Ban Nua - which were recommended engaging into the project by the Ministry of Agriculture and Rural Development (MARD) of Vietnam.

Under the guidance of the project, in these cooperatives, fishes were fed in cages and in reservoirs. Silver carp, rohu, common carp, grass carp and tilapia were identified for production.

Target respondents of the study were the local farmers who were directly involved in the project. A few of them are still feeding fish but also people who do

not feed fish anymore. The reason for this situation will be explained in the Results part.

To evaluate impact of project, this study addressed the characteristics of the targeted farmers and found the reasons why they decided to participate in the project. The major constraints in fish production during the project implementation were also mentioned. Subsequently this study is concentrated on changes of socio – economic situation and the lives of the local farmers after the project was done. These changes represented the impact of the project on the targeted areas. The study also reflected the current fish production in Cao Bang and Lang Son by using the results obtained in five cooperatives. Finally this study pointed out some possible ways to solve the problems of fish production.

3.3 Data collection

a) Secondary data

First, secondary data has been collected from the report of the “Support of freshwater fish farming in mountain areas, Vietnam” project. Then the data regarding country, social, economic and fishery sector were found and collected from the FAO, World Bank, UNDP and GSO. The study was also used the information as well as data from scientific journals, the Vietnamese literature, other theses and internet sources mentioned in the references of this thesis.

b) Primary data

Primary data was collected from the interviews with the local farmers who participated in the project “Support of freshwater fish farming in mountainous areas, Vietnam”. Personal interviews were held with the representatives of the Research Institute for Aquaculture No 1, Cao Bang Fishery Centre, Lang Son Fishery Centre.

The survey with 18 questions, which were designed with structured and semi – structured questionnaires, close - end and open – end questions. In July, 2014 the local farmers were interviewed with the great help from Mr. Bui The Anh – partner of this project in Vietnam. Each interview was designed in 20 – 30 minutes and taken in one week to collect all necessary information and data.

3.4 Data processing

Collected data and information were analyzed and processed by means of excel tables, graphics illustrations and expressive statistical tools such as ratios, proportions and percentage. The explanation and processing of questionnaires were done with a lot of efforts to keep the statistical rigor and the study was conducted to be representative for the entire province. Besides that, this study was also used SWOT analysis to evaluate the strengths, weakness, opportunities and threats of cage culture system and the fish production in the targeted areas.

4. REVIEW

4.1 Description of the project

The development project – “Support of freshwater fish farming in mountain areas, Vietnam” financed by the Ministry of Agriculture of the Czech Republic was coordinated by the Czech University of Life Sciences Prague (CULS) and on the Vietnamese side by the Research Institute for Aquaculture No.1. The project started in 2008 and finished in 2010.

The main objective of the project was to introduce sustainable approach of freshwater fish production in the reservoirs with area from 12 to 18 ha that were constructed for irrigation purposes located in the provinces of Lang Son and Cao Bang.

The project started in 2008 by analyzing the potential of aquaculture and environmental assessment. The result of the assessment showed that all of the lakes did not have the presence of pesticides or other inorganic compounds, but they had signs of pollution and the increased concentrations of heavy metals (Project report, 2010).

Then the experts decided the types of fishes and the methods for fishing. Project introduced sustainable technologies in the area of freshwater fish farming that were culturally based fisheries and cage culture.

Culture based fisheries was considered as a form of sustainable management. New farming techniques on small reservoirs were transferred to the fisheries cooperative, which were considered as the most appropriate choice for aquaculture in

small reservoirs in Vietnam (ACIAR, 2008). It has been applied to many more stocking density based on the nutrient source water. Grass carp and silver carp were recommended to feed for local farmers. In particular, silver carp and mrigal were two main species being stocked.

With the cage culture, project provided a new type cage with many advantages (long lasting, resistant to wind, storms, easy to make, easy to install and move, low cost investment with materials available locally). The various techniques have been introduced to the cooperative, such as grow-out, fry rearing to fingerling, integrated farming (duck-cum-fish).

Besides, the project also provided for each cooperative 30kg earth worm (Project report, 2010) and instructed people how to grow worms.

At the same time, the project also boosted the quality of fish harvesting in reservoirs by encouraging people to use pneumatic Lift Net – PLN. Before the project, the local farmers used gill nets and large liftnets to harvest fish, but both approaches were not effective. The gill nets harmed the fish, made the fish not be preserved for long periods and needed to be processed immediately. The large liftnets were usually high efficiency but they were not easy to move to other fishing locations reservoirs. The PLN was fishing equipment, which was not harmful to fish from the combination of two methods above.

The project also helped local people to orient the consumer market. The project provided an opportunity for people to discuss and build the market demand, the ability to assess themselves, and production planning schedule for the business in the future, establish good relationships with local consumers in the local market.

4.2 World fish production and distribution

4.2.1 World fish production

Operation of the world fisheries grows increasingly in both production and capacity. Fisheries' yield was increasing all over the world each year, in the period 2006 – 2011 with average growth of 2.3% (Phan, 2013). In particular, the major contribution to global yield was maintaining a high growth rate: 6.1% in 6 years (from 2006 to 2011). Meanwhile, the yield from the fishing activity has leveled off, almost no growth in the recently years, the average rate in the 2006 – 2011 period

was only 0.1% lower. This is due to farming activities, which are encouraged toward sustainable development, environmental protection by governments and international organizations. Meanwhile fishing activities are being limited because the volume of natural aquaculture product of the world is also limited and has risked affecting the global ecological balance, therefore governments and international organizations do not support to develop.

Table 1: The total yield of the world's fisheries (mil. ton)

	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2006- 2011</i>
Exploitation and fishing							
Inland	9.8	10.0	10.2	10.4	11.2	11.5	
<i>Percent growth (%)</i>		2.0	2.0	2.0	7.7	2.7	3.3
Marine	80.2	80.4	79.5	79.2	77.4	78.9	
<i>Percent growth (%)</i>		0.2	-1.1	-0.4	-2.3	1.9	-0.3
Total	90.0	90.3	89.7	89.6	88.6	90.4	
<i>Percent growth (%)</i>		0.3	-0.7	-0.1	-1.1	2.0	0.1
Fishery							
Inland	31.3	33.4	36.0	38.1	41.7	44.3	
<i>Percent growth (%)</i>		6.7	7.8	5.8	9.4	6.2	7.2
Marine	16.0	16.6	16.9	17.6	18.1	19.3	
<i>Percent growth (%)</i>		3.8	1.8	4.1	2.8	6.6	3.8
Total	47.3	49.9	52.9	55.7	59.9	63.3	
<i>Percent growth (%)</i>		5.5	6.0	5.3	7.5	6.2	6.1

World total	137.3	140.2	142.6	145.3	148.5	154.0	
<i>Percent growth (%)</i>		<i>2.1</i>	<i>1.7</i>	<i>1.9</i>	<i>2.2</i>	<i>3.7</i>	<i>2.3</i>

(Source: Phan, 2013)

However, exploitation and fishing activities still play a major role in the global aquaculture supplier with over 58% share in 2011. In the future, fish farming will gradually keep a critical role providing global fisheries.

Graph 1: The structure of the global aquaculture supply



(Source: Author, collect data by FAO)

Aquaculture is still regarded as one of the manufacturing sector has contributed significantly to the economies of many countries. In addition, it plays a role in providing a large amount of demand for aquatic food for human consumption. The table 2 below reflects the world's demand aquaculture from 2006 to 2011.

Table 2: The world's demand aquaculture

	2006	2007	2008	2009	2010	2011	2006-2011
Food for people	114.3	117.3	119.7	123.6	128.3	130.8	
<i>Percent growth (%)</i>		2.6	2.0	3.3	3.8	1.9	2.7
Non - food	23.0	23.0	22.9	21.8	20.2	23.3	
<i>Percent growth (%)</i>		0.0	-0.4	-4.8	-7.3	14.9	0.2
Population	6.6	6.7	6.7	6.8	6.9	7.0	
<i>Percent growth (%)</i>		1.5	0.0	1.5	1.5	1.4	1.2
Aquaculture consumption per capita (kg/1 person)	17.4	17.6	17.8	18.1	18.6	18.8	
<i>Percent growth (%)</i>		1.1	1.1	1.7	2.8	1.1	1.6

(Source: Phan, 2013)

The demand for aquaculture as food for people has been growing in recent years with average growth of 2.7% during 6 years (from 2006 to 2011). Meanwhile, the demand for aquaculture as non-food increased at the low pace, on average only 0.2% from 2006 to 2011. In addition, demand for aquaculture per capita is also increasing with an average of 1.6% in the same period. In the period 2006-2011, the increasing demand for aquaculture as food for people was higher than the total global aquaculture production with 2.3%. With the global population expected to continue to increase with the increase of average aquaculture consumption, the more likely source of aquaculture in the future will not meet the total demand. When the global population and average fisheries are project to increase, there are many possibilities that the overall project fisheries supply will not meet the demand.

4.2.2 World fish distribution

With a long coastline, dense river system and especially the encouragement of Government for developing, aquaculture activities in the countries of East Asia, South Asia and Southeast Asia are developing and these areas are playing a role in the main seafood supply in the world with 53,301 thousand tons in 2010, accounting for 90% of global aquaculture.

Latin America has the second highest yield (about 1,920 thousand tons in 2010), mainly in Chile, Ecuador and Brazil. Europe's output is about 2,528 tons, accounting for about 4% of globally aquacultural production. Africa's aquaculture production reached only 1,288 tons in 2010 due to the lack of development of non - farming activities and the government support. The output in other countries in North America and Oceania are relatively small, corresponding to 656 thousand tons and 184 thousand tons (Phan, 2009).

4.3 Country profile

4.3.1 Geography

Vietnam (official name: The Socialist Republic of Vietnam) is an S-shape country which is located in the eastern Indochina Peninsula, in the Southeast Asia. Vietnam borders to China in the north, to Laos and Cambodia in the west, Thailand Bay in the south west, and the East Sea in the east.

Vietnam is a tropical country with lowlands, hills, mountains and many plateaus with thick forests. Agricultural land accounts for 35 % (WB, 2011)¹. The country is divided into mountainous areas and the Red River Delta in the north; the Annamite Mountains, Highlands, central coastal plains and the Mekong Delta in the south.

Following the length of territory, Vietnam's climate is distributed into 3 regions: the north has humid subtropical climate, the central has character of tropical monsoon climate while the south is in the tropical savanna. The climate of Vietnam has a relatively average humidity of 84-100% for the whole year (Tran *et al.*, 2011). However, because of differences in latitude and topography, the climate trends are fairly diverse in each region. The annual high amount of rainfall in

¹ <http://data.worldbank.org/indicator/AG.LND.AGRI.ZS>

regions ranging from 120 to 300 centimeters, in some places can cause floods, nearly 90% of the average rainfall in summer (Isponre, 2009). The annual average temperature in the plains is generally slightly higher than the mountains and plateaus. The detail climate conditions are shown in the table 3.

Table 3: The climate conditions across the country

Area/Indicator	Temperature January (°C)	Temperature July (°C)	Average annual rainfall (mm)	Annual average maximum relative humidity (%)
Northern	17	30	1 680	73-84
Central	18 - 28	24 - 37	1 650	75-88
Southern	17 - 34	22 -33	1 980	68-91

(Sources: FAO, 2010; ADB, 2010)

4.3.2 Demography

The Socialistic Republic of Vietnam has 59 provinces and 5 autonomous cities, provinces are divided into districts and villages. According to the investigation by the General Statistics Office of Vietnam on the first day of April, 2009, all over Vietnam has 85,846,997 people. The most crowded region is the Red River Delta with approximately 19.5 million people, followed by the North Central and South Central Coast of approximately 18.8 million people, the third is Mekong delta with about 17.1 million people. The least populous region is Central Highlands with about 5.1 million people. The world Fact Book published by the CIA estimated the population of Vietnam in 7/2014 will be 93,421,835 million people and Vietnam will rank 15th in the world.²

According to the investigation by the General Statistics Office of Vietnam in 2009, Vietnam has about 25.4 million people, corresponding to 29.6% living in urban areas and about 64.4 million people residing in rural areas. On average, the sex ratio is now 98 males/100 females, and the highest region is Central highlands with 102 males/ 100 females (GSO, 2009).

² <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2119rank.html>

4.3.3 Social situation

Table 4 gives the informations about main social indicators, which are useful, interesting for observation and enlighten social situation in the country.

Table 4: Social indicators

Indicator	Year		Source
Population growth rate (average annual %)	2012	1,1	WB
Urban population (%)	2012	32	WB
Population aged 0-14 years (%)	2012	23	WB
Population aged 60+ years (women and men, % of total)	2009	9,9/7,3	UN data
Sex ratio (men per 100 women)	2009	98	GSO of Vietnam
Life expectancy at birth (women and men, years)	2011	75,1	WB
Infant mortality rate (per 1 000 live births)	2011	17	WB
Fertility rate, total (live births per woman)	2011	1,8	WB
Contraceptive prevalence (ages 15-49, %)	2011	78	WB
Prevalence of HIV total (% of pop ages 15-49)	2011	0.5	WB
Literacy rate, youth female (% ages 15-24)	2010	96	WB
Education: Female third-level students (% of total)	2005-2008	48.8	UN data
Seats held by women in national parliaments (%)	2009	25.8	UN data

(Sources: UN data, WB, GSO, 2005-2012)

4.3.4 Economic situation

Since 1986, Vietnam has made a comprehensive reform the country with the goals of improving living standards and encouraging foreign investment through more open economic policies. Today, Vietnam is one of the fastest developing economies in the world and still is in a transitional process; has many export-driven products and cooperation in international integration (Dufhues, 2007). Vietnam is the 6th largest economy in Southeast Asia and the 57th largest in the world in terms of scale of nominal domestic product in 2011 and 128th in terms of nominal domestic product per capita (GSO, 2013).

Vietnam is a member of the United Nations, the World Trade Organization, International Monetary Fund, the World Bank Group, the Asian Development Bank, Economic Cooperation Forum Asia – Pacific ASEAN. Vietnam participates in the free trade agreement with ASEAN multilateral, Korea, Japan, China.

Table 5 shows the main economic indicators and development in Vietnam in 4 years (2002, 2003, 2010, 2011).

Table 5: Main economic indicators and its development

Year	2002	2003	2010	2011
GNI per capita, PPP (current international \$)	1,620.0	1,750.0	3,060.0	3,250.0
Population, total (in millions)	79.5	80.5	86.9	87.8
GDP (current US\$) (in millions)	35,058.2	39,552.5	106,426.8	123,679.3
GDP growth (annual %)	7.1	7.3	6.8	6.0
Life expectancy at birth, total (years)	72.8	73.1	74.8	75.1

(Source: World Bank, 2002, 2003, 2010, 2011)

Vietnam's economy under the government's leadership has completely developed but a lot of problems still exist, which must be solved. One of the problems is inflation. According to BBC News (2011), "The country's consumer price index was 23% from a year earlier, which is the highest rate of inflation in

Asia”³. According to the evolution of inflation and growth in Vietnam since 2000, when the inflation threshold was low, less than 5% from 2000-2003, the economic growth is relatively high and stable. The inflation was approximately double in 2007 – 2011, the growth tends to slow down and down⁴. And to prevent inflation, Vietnam has taken measures such as reducing the money supply, investment restructuring, decreasing, credit but these measures are identifiable situations with the potential to cause instability of monetary policy and macroeconomics.

4.4 Agricultural sector

4.4.1 Agriculture

Agriculture is an important economic sector of Vietnam. Currently, Vietnam is an agricultural country. In 2009, the value of agricultural output reached 71,473 trillion VNĐ (price compared with 1994 rates), up 1.32% from 2008 and accounted for 13.85% of total gross domestic product (GSO, 2009).

Vietnam agriculture in the country’s reforms has made remarkable achievements. According to the Ministry of Agriculture and Rural Development from 1986 to 2005, the value of agricultural production increased on average 5.5% per year. Despite the world economic crisis in many countries, the country’s economy through agricultural stability while maintaining balance. Today agriculture contributes about 19.66% of GDP of Vietnam (WB, 2011)⁵.

Reform policies have made a miracle: food production per capita has been increasing continuously – a solution to the problem of food scarcity. The regional concentration of production has contributed to increasing exports and created favorable conditions for the application of technical advances, associated with agricultural production. “In 1985, agricultural exports reached 400 million dollars, 2 billion dollars in 2004 and in 2010, total export of agriculture, forestry and fish production reached over 18 billion dollars and Vietnam became one of the biggest

³ <http://www.bbc.co.uk/news/business-14642479>

⁴ <http://petrotimes.vn/news/vn/kinh-te/viet-nam-dang-trong-vong-luan-quan-giua-lam-phat-va-tang-truong.html>

⁵ <http://www.tradingeconomics.com/vietnam/agriculture-value-added-percent-of-gdp-wb-data.html>

exporting agriculture, forestry and fisheries countries in the world” (Nguyễn Lâm Dũng, 2012).⁶

All fields of crop production, animal husbandry, forestry and aquaculture have developed strongly. Rice yield in 2010 increased continuously over the year. Yield was estimated at 53kg/ha, 4.4 times higher yield in 1945 and nearly 2 times in 1985, before the period of innovation. In year 2010 the productivity of agriculture was nearly 40 million tones, reached 41.8 million tons in 2011 and 42.5 million tons in 2012.

However, besides the development, agriculture in Vietnam still has challenges, because the developmental level of agriculture is generally low, small – scale production, low labor productivity, poor quality of product.

4.4.2 Fishery sector

4.4.2.1 Conditions for the development of the fisheries sector

a) Natural conditions

Vietnam lies in the monsoon tropics, has a coastline of over 3,260 km from Mong Cai (Quang Ninh) to Ha Tien (Kien Giang); the areas of internal waters and territorial sea are wider than 226,000 km²; the areas of exclusive economic zones are wider than 1,000,000 km². The sea areas have more than 400 large and small islands, which can provide the logistics services, ship the products, fishing and are the place for mooring of boats in the coast.

Vietnam seas have many bays, lagoons, estuaries, in which more than 10,000 ha are planned for aquaculture. It is potential to develop activities of the exploitation and production aquaculture. Inland there are about 1.7 million ha of water surface area for aquaculture, concluding are 120,000 ha small ponds, ditches and 244,000 ha large water reservoirs.

Climate resource has encouraged fisheries to develop in a convenient way.

⁶http://blogtiengviet.net/nguyenlandung/2012/12/31/nha_n_laoni_na_ng_nghiar_p_namar_c_ta

The richness and complexity of a biological community are one of the advantages for aquaculture with about 510 species, including many species of high economic value (ABS, 2010).

However, besides that, the favorable conditions are also difficult due to terrain conditions and complex watersheds, annual heavy rainfall, storms, floods, dry season or drought.

b) Socio – economic conditions

Fishing has existed for a long time. Labor resource is experienced and its costs are lower than the other regions in the world (ABS, 2010). Nowadays fisheries are considered as a key part of the economy, so Vietnamese Government has many policies to encourage investment for the development of fisheries. However, besides that there are still many difficulties and obstacles posed to the fisheries sector in the country. Production activities are highly self-sufficient. Technology in production is primitive and backward. The products’ quality is not high. Labor is abundant but at low technical level, mostly experienced so that it is difficult to keep up with changes in natural conditions and market demand.

It is basically asserted that Vietnam has an abundance of potentials to develop the fisheries sector into a key economic sector.

4.4.2.2 The characters of fisheries sector

a) Aquaculture production in Vietnam

With the favorable conditions in 2012, the yield of aquaculture increased by 10.6% (compared to 2011), primarily due to the yield of tuna increased in the central region because of the favorable weather and the fishing technology with high pressure, doubling capacity and decreased by 15 – 30% of time at sea (Vietnam Directorate of fisheries, 2012).

Table 6: The yield of aquaculture production in 2012

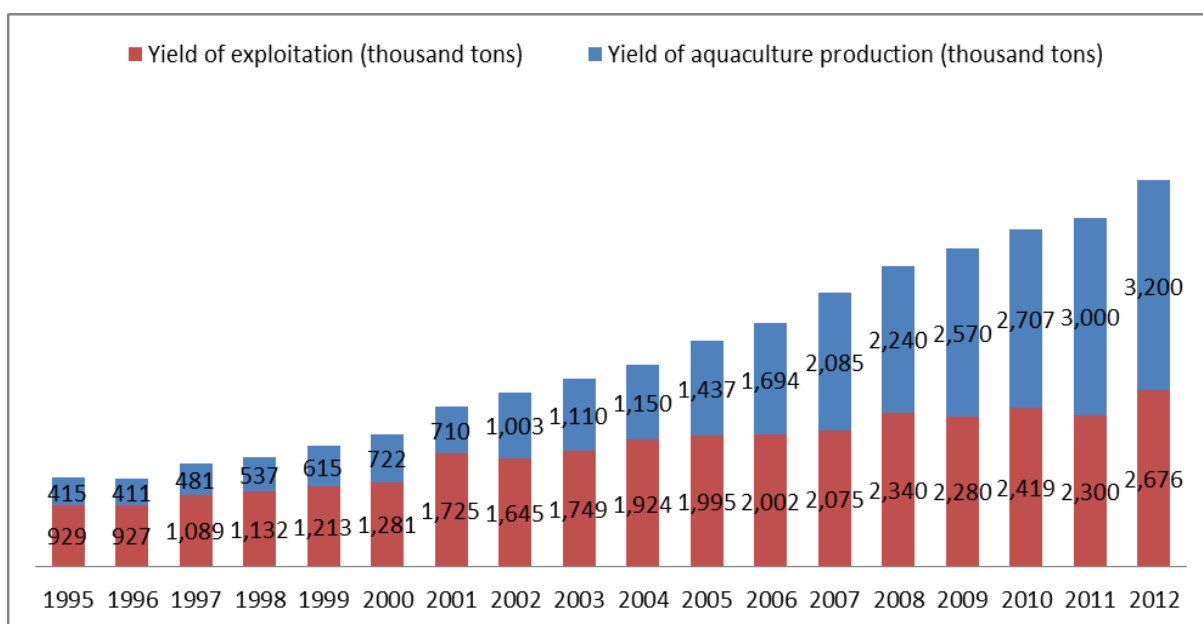
	<i>2011</i>	<i>2012</i>	<i>Increase or decrease (%)</i>
Total yield	5,417	5,876	8.5

<i>(thousand ton)</i>			
Yield of exploitation	2,420	2,676	10.6
<i>(thousand tons)</i>			
- Exploiting marine resources	2,226	2,483	9.6
- Exploiting inland	154	193	25.3
Yield of aquaculture production	2,997	3,200	6.8
(thousand tons)			
- Shrimp	496	500	0.9
- Shark catfish	1,151	1,190	3.4
- Others	1,350	1,510	10.6
Area of production	1,200,000	1,200,000	0
(ha)			
- Shrimp	656,000	658,000	0.3
- Shark catfish	5,500	5,600	1.8
- Others	538,500	536,400	0.4

(Source: Vietnam directorate of fisheries, 2012)

The yield of Vietnam aquaculture production has made a continuous growth in the last 17 years with the average rate is 9.07% per year. With the urge of Government, aquaculture activities have significantly grown, the yield has continued to rise in recent years, an average of 12.77% per year, a significant contribution the growth of total fish production of the country. Meanwhile, before the gradual depletion of natural aquatic resources and the level of fishing activity have not improved, aquaculture production from mining operations increased quite lowly in recent years with an increase of average of 6.42% per year.

Graph 2: The yield of aquaculture production in Vietnam from 1995 to 2012



(Source: Vasep, 2012)

b) Fish seed resources in aquaculture of Vietnam

Seed sources in the operation of the fisheries play a very important role, it is the first stage in the value chain of fisheries, which is likely to affect to all other stages of the production chain. The quality of seed sources in Vietnam aquaculture is quite low.

- Shark catfish: low quality brood, no selective, degenerative phenomenon. The shark catfish sources are purchased mainly from farmers with low quality (ABS, 2010).
- Shrimp: the quality of shrimp sources is an alarming problem. The sources are almost entirely dependent on the natural exploitation with uneven quality. The hatchery operations are not controlled, the seeds of shrimp are mixed between good and bad quality. This makes most shrimps less disease-resistant. In addition, the seed price does not have a preliminary basis for determining, causing erratic price fluctuations.

c) Food for fishes

According to Directorate of fisheries, Vietnam has more than 130 manufacturers to produce aquatic food with 3.77 million tons. 96 manufactories

produce food for the shark catfish, 68 manufactories produce food for penaeus monodon and 38 manufacturers produce for whiteleg shrimp. The rate of aquatic food imports in the country is declining gradually, but the source of materials for the production of food (such as corn, soybean meal, fish meal, salmon oil) still depends heavily on imports for more than 50% (Phan, 2013).

d) The strong regional fisheries activities in the country

Manufacturing activities, exports of Vietnam aquaculture scatter across the country with a variety of fish species which are classified into five major exporting regions.

- North Central Region, Central Coast: the strength of these regions is about seawater, brackish water; focusing on some types of shrimp, oysters, abalone, grouper, cobia, snapper.
- South Central Coastal areas: the strength of this region is also about seawater and brackish water with some aquatic types such as tilapia, all kinds of shrimp.
- Southeast region: includes 4 provinces of Ninh Thuan, Binh Thuan, Ba Ria – Vung Tau and Ho Chi Minh City, mainly of aquatic species of freshwater and brackish water fish such as grouper, tilapia, all kinds of shrimp.
- Mekong Delta: comprises of the coastal provinces in the Mekong Delta like Tien Giang, Ben Tre, Tra Vinh, Soc Trang, Bac Lieu, Ca Mau, Kien Giang...This is the area of vibrant fishing activities on all types of water, especially shrimp, shark catfish, basa, oysters, clams and a number of marine fish species.
- The local province: including the inland provinces with the dense river system such as Hanoi, Binh Duong, Can Tho, Hau Giang, Dong Thap, An Giang. This region is favourable for fish species in freshwater: shark catfish, tilapia, carp (Phan, 2013).

e) Fishery sector in the national economy

Fishery is a key economic sector in the national economy. Throughout the years, the fishery sector has made remarkable progress. Having been a small part of the agricultural economy with low technology, this sector has a large scale with the increasing growth nowadays.

Table 7: GDP of fisheries comparing to the national GDP in 2001 – 2011

	2001	2005	2010	Average growth (%)		
				2001	2006-2011	2001-2011
				-	120	11
GDP_ nation	292,535	393,031	551,609	7.66	6.68	7.22
GDP_ fisheries	7,449	10,181	14,286	8.12	6.85	7.45
Proportion between GDP_ fisheries and GDP_ fisheries (%)	2.55	2.59	2.60			

(Source: GSO, 2012)

4.5 Fish production in Cao Bang and Lang Son

There are 14 provinces in the northern mountains with complex terrain, separated by high mountains but there are many ponds, lakes, rivers and streams. This is a good condition for fish farming. Aquaculture in the northern mountains today is developed in paddy fields, ponds, small lakes, in cages, cages in river, streams.

Feeding fish in ponds and small lakes is the main way of farmers in this area. The types of aquaculture in small water are now more progressing. Not only carp, grass carp, but also the other fishes such as carp hybrids, tilapia, shrimp, etc are feeding. Water from the surface, middle and bottom layer of the ponds is used economically efficient.

The dams on stream, large and small reservoirs are now more being created. Most of this water is used for aquaculture. Besides feeding fish in large lakes, for the management and protection of aquatic resources, the people in this country have cages to keep aquaculture (mainly grass carp, cirrhinus).

Today in the mountainous areas, aquaculture has got new development, stability, and is attracting more farmers to participate. In many local places, aquaculture has been considered as a good solution to hunger eradication and reduce poverty.

However, compared to the plains and coastal, aquaculture development in the northern mountains is also slow, because of natural characteristics, terrain, traffic restrictions, poor economic and social areas.

4.5.1 Cao Bang Province

Cao Bang Province is located in northeastern Vietnam. Both the north and the northeast border Guangxi Province (China) with the border long 332km (Cao Bang Portal, 2013). Cao Bang has an area of 6,724, 62km² (Cao Bang Portal, 2013), is a plateau with an average elevation of 220m above sea level (Cao Bang Portal, 2013). Cao Bang has many mountains. Mountains and forests account for over 90% of the province (Cao Bang Portal, 2013). This made Cao Bang be divided into three distinct regions: eastern has rocky, western is mountains alternating rocks, southwestern is largely forests and mountains.

Cao Bang has a network of rivers, streams, lakes quite naturally but is not distributed uniformly. The system of rivers is mainly flowing towards the North West – East and North – South. The stream changes following seasons: large in the rainy season and low in the dry season. The system of rivers includes 3 main rivers: Bang Giang, Quay Son and Song Gam. This erratic hydrological regime is a permanent concern of all people, who live in Cao Bang.

Being a mountainous province, under the influence of extreme weather conditions, but the agricultural sector of Cao Bang remains relatively well developed. In recent years, the share of agriculture – forestry – fishery in total GDP is declining, but still has a relatively large contribution into the provincial GDP. In 2010, the sector made up 35.37% of total GDP of the province of Cao Bang (Cao Bang Portal, 2013).

Despite a mountainous province, Cao Bang has a relatively large potential for fisheries. Cao Bang fishery production has shifted from farming production with low productivity to industrial, semi – industrial production and associated fish on paddy fields. Fishery production value of Cao Bang is gradually increasing.

Table 8: Production of the fish farming by Cao Bang

Area / Year	1995 (tonnes)	2000 (tonnes)	2008 (tonnes)
Whole country	209142	391053	1863314
Cao Bang	85	197	284

(Source: GSO, 2010)

According to the synthesis of the Bureau of Statistics of Cao Bang in 2013, farming area was 306.13 ha, decreased over the same period last year. Total harvested fish yield reached by 275.23 tons, by 94.19% compared to the same period last year, in which fish productivity reached 267.09 tons (decrease 6.21%), 1.76 tons of shrimp (increase 3.53%) and a number of other aquaculture products was amounted 6.38 tons. Farming aquaculture was estimated at 208.88 tons, decreasing 7.3% compared to the same period last year, in which 208.56 tons of fish, 0.19 tons of shrimps. Productivity of fisheries exploitation was 66.35 tons, decreasing by 0.81% over the same period last year.

4.5.2 Lang Son province

Lang Son is a mountainous province in the Northeast. Lang Son is a nodal point of the economic exchanges with the western provinces such as Cao Bang, Thai Nguyen, Bac Kan; the eastern province like Quang Ninh and the southern provinces such as Bac Giang, Bac Ninh, Hanoi and the northern borders with China, with 2 international gates, 2 national gates and 7 pairs of border markets. On the other hand, Lang Son has an international railway, which is very favorable conditions for economic, science – technology exchanges with the southern provinces in Vietnam, with China and through it to the Central Asian countries, Europe and other countries (Lang Son Portal, 2013).

The terrain is mostly hills and low mountains, the average altitude is 252m above the sea level and the lowest is 20m. The terrain is divided into three sub – regions: the northern mountains, karst, and the hill, low mountains in the south and southeast. The moderate temperature is the characteristic of Lang Son’s climate. Winter lasts relatively long and cold, average rainfall is 1,400 – 1,500mm with about 135 rainy days per year (Lang Son Portal, 2013). The terrain is high around 251m, so although it is located in a tropical monsoon, Lang Son has the tropical climate. This

distribution of climate has allowed Lang Son can grow diversified crops, both subtropical and tropical ones.

The total land area of province is 830,521 ha; agricultural land accounts 68,958 ha, accounting for 8.3% of the land (Lang Son Portal, 2013). Thus the potential is huge for the promotion of agricultural development in the coming years.

Despite being a mountainous province with lack of water surface, Lang Son is particularly interested in aquaculture development.

Table 9: Production of the farmed fish by province

Area / Year	1995 (tonnes)	2000 (tonnes)	2008 (tonnes)
Whole country	209,142	391,053	1,863,314
Lang Son	75	391	958

(Source: GSO, 2010)

Since the beginning of this year, the area of aquaculture in the province reached 990ha. Total mining production was estimated at 925.8 tones, increasing to 50.3% compared to the same period last year (Lang Son online, 2013)⁷. Especially the province has studied and encouraged successfully the model of acipenser in Van Quan, salmon in Mau Son. Viet Nam has coordinated with other countries for feeding fish on Ky Cung river together in order to exploit fisheries resources. In addition, the province has supported millions of seed fish for people in remote areas, thereby evoked the movement in intensive fish farming to improve people's living standards.

4.6 The role of Vietnam in world fish production

Vietnam has a long coastline of 3,260km and more than 1 million km² of the marine exclusive economic zones (World Bank, 2010)⁸, the supply for aquaculture is plentiful and stable. The expansion of aquaculture area and improvement to exploit fishing helped the yields of aquaculture increase in recent years. The average growth in 2006 – 2008 period was about 11%, and by the end of November in 2009 the

⁷ <http://baolangson.vn/tin-bai/Kinh-te/lang-son-nuoi-trong-thuy-san-tang-manh/30-29-52513>

⁸ http://climatechange.worldbank.org/sites/default/files/documents/EACC_Vietnam.pdf

number of aquaculture production has reached more than 4.4 million tons (ABS, 2010).

According to estimates by FAO, the demand for aquaculture in the world reaches high all times. “The contribution of fish to global diets has reached a record of about 17 kg per person on average” (FAO, 2013)⁹.

Aquaculture export has increased strongly over the years with an average growth rate of 15.5 % per year (ABS, 2010). This growth process has made Vietnam become one of the five largest aquaculture exporters in the world, and played an important role for supplying the global aquaculture.

In recent years, the aquaculture products in Vietnam are increasingly diversified. Products such as shrimp, shark catfish, tuna, dry goods, octopuses have gained a foothold in the domestic market of many countries and accounts for the largest proportion of aquaculture exports. The shrimp continued to maintain its leading position in the aquaculture food with a turnover of 2.24 billion dollars in 2012 (Phan, 2013). The shark catfish continued to hold the number 2 with exports of 1.74 billion dollars in 2012 with a slight decrease of 3.4 % compared to 2011 (Phan, 2013). The number of Squid and octopus were exported in 2012, were accounted for 502 million dollars, decreasing by 3.5% (Phan, 2013).

In 2012, Vietnam exported aquaculture products to 156 countries with a total market value of 6.13 billion dollars. Five main markets are the USA, EU, Japan, Korea, China accounted for 70% of exports. Exporting to most markets increases slowly, excluding China. Exporting to China maintained high growth of 20.5%. In particular, due to economic difficulties, the major market EU declined sharply by 14.6%, which affected on the demand of aquaculture food of citizens in this area (Phan, 2013).

The popularity of Vietnam’s aquaculture has gradually been affirmed in many markets. The shark catfish has become favorite and widely consumed in many countries and is always one of the top leaders in the import market. The shrimps are competing “fair” with much larger rivals in the world such as Thailand, Indonesia, Ecuador, India, Mexico, etc. Many other species (squid, octopus, tuna) are trying to appear in many markets all over the world

⁹ <http://www.fao.org/news/story/jp/item/50260/icode/>

5. RESULTS

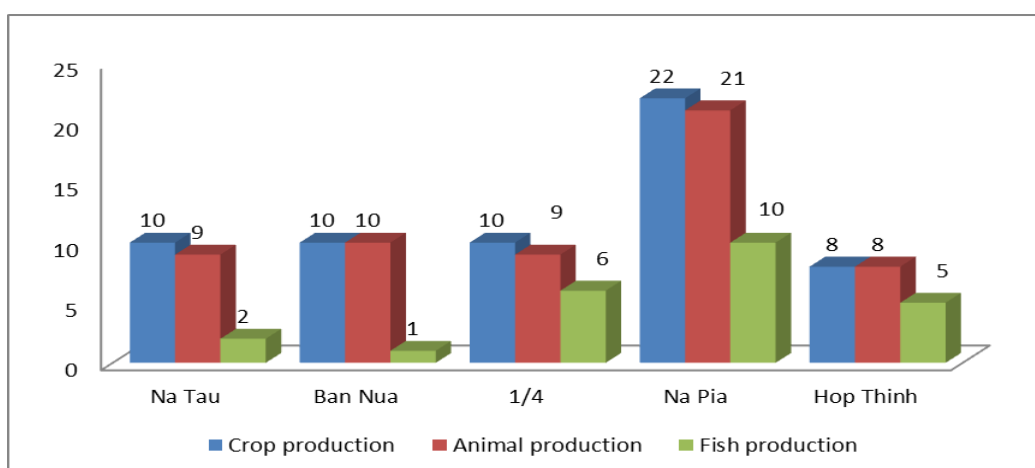
5.1 Characterization of the farmers

The survey was carried out in 3 cooperatives (Na Tau, Ban Nua, 1/4) in Cao Bang province and 2 cooperatives (Na Pia, Ban Nua) in Lang Son province. It has been oriented to evaluate the impact of the development project to the local farmers. The total number of farmers was 60 with particular characteristics.

The majority of the local farmers is Tay minority with 45% of respondents, followed by Nung with 35% and Hmong with 20%. Although they are ethnic but they understand and speak the Kinh language (Vietnamese) fluently.

Results from the survey also showed the link between the farmers and the agricultural sector in these areas.

Graph 3: The local farmers with agricultural sector (Unit: person)

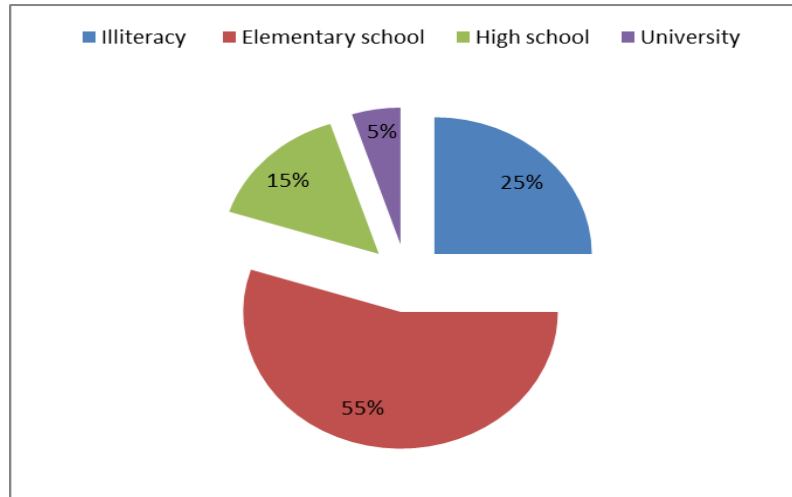


(Source: Author – based on questionnaires, 2013)

The above graph showed us three main sectors in agriculture in these areas are crop production, animal production and fish production. All interviewed farmers live on crop production. They mainly cultivate rice, maize, cassava and some vegetables. Besides the cultivation, 95% farmers also raise the livestock such as chickens, ducks, pigs and buffaloes. The number of the farmers engaged in fish production is 40%. This figure demonstrates that fish production played a minor role in economic development of households in these areas.

A remarkable feature is that the level of education of the local people of these areas is very low. It has negative impacts on the development of agriculture in general and fisheries in particular here.

Graph 4: Educational level of the farmers



(Source: Author – based on questionnaires, 2013)

The chart explained the educational level of the farmers. Majority of people graduated from elementary school (55% of the respondents). The number of high school and university educated farmers is quite low (accounted only 25% of high school and 5% of university). The percentage of illiterate people accounted for 15% of the respondents.

5.2 The reason why the local farmers participate in the project

To evaluate the impact of the project “Support of freshwater fish farming in mountain areas, Vietnam”, the local farmers were interviewed about the reasons why they decided to participate in the project. Many different reasons were given but we can divide as three main reasons as follows:

- Economic
- Nutritional
- Opportunity to improve understanding of fishing

55% farmers responded that they wanted to improve the economy of family, 38% for the improvement of nutrition. The remaining 7% participated in the project because this was a chance that they could gain new knowledge about fish farming.

a) Economic reason

The targeted areas have the low income per capita. To overcome the poverty, the local farmers try to find different ways to live on. The project was one of the solutions that they think can help them to improve their income. With the help of project the quality and quantity of fish production can be enhanced, so that the farmers though they can sell the fish with higher prices and gain higher yield. This will contribute to increase income of their families.

b) Nutritional reason

Fish is a sustainable source of protein and vitamins. Especially for Vietnamese people fish is one of the main dishes. Vietnamese people eat fish in the daily meals or for special occasions for example New Year, Wedding or reception for visitors. Improving the quality and quantity of fish production is important to ensure the nutritional needs for the local people.

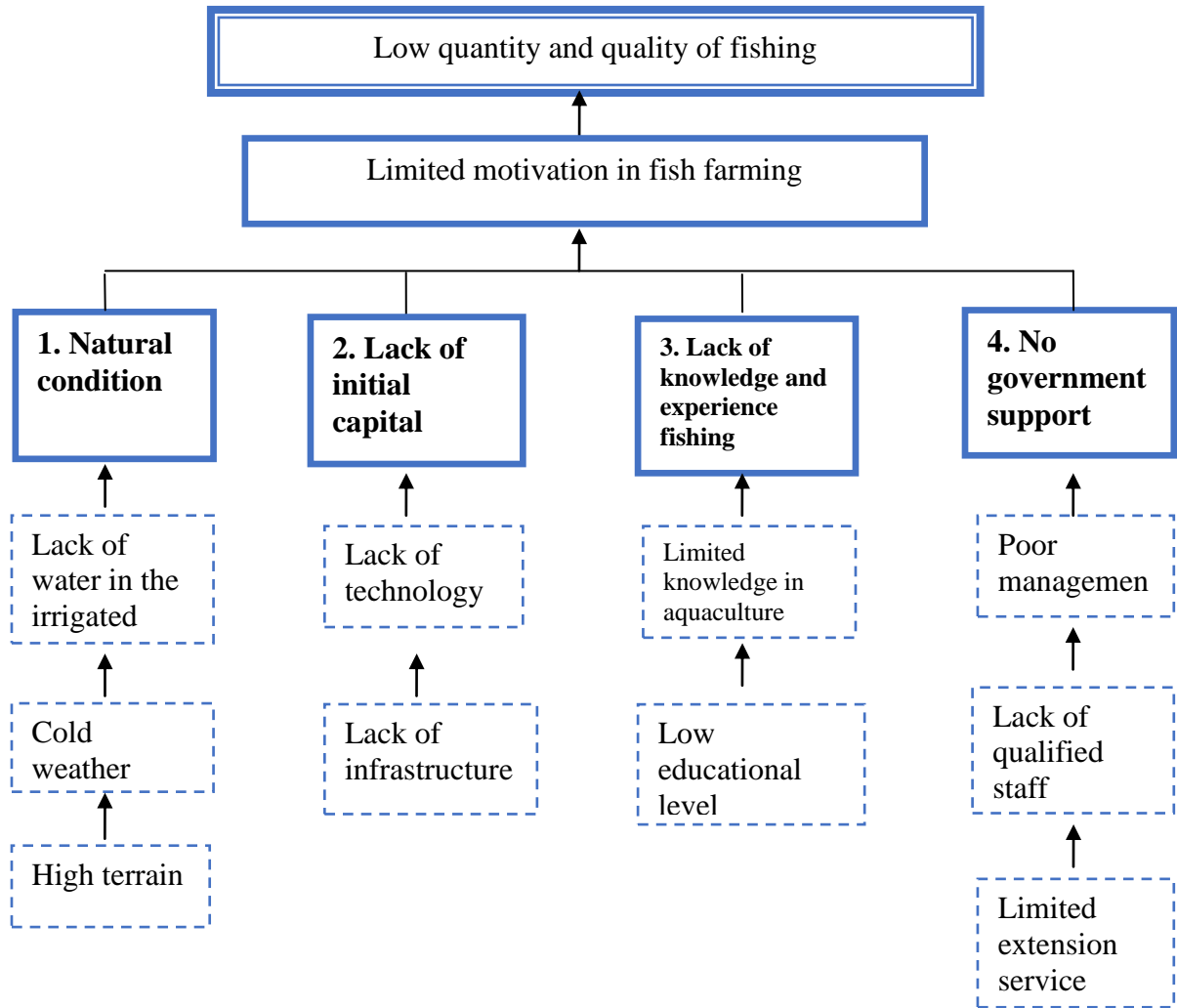
c) Opportunity to improve understanding of fishing

A small minority of the local people agreed to participate in the project on the ground that was an opportunity to bring new insights for themselves. This is the part of young people and more knowledgeable than others in the targeted areas. Youngers have the tendency to learn new experience so they actively participated in the project than olders.

5.3 The major problems in fish production during the project implementation

The survey reveals that the main problems in the implementation of integrated system of aquaculture as followed: natural conditions, lack of initial capital, lack of knowledge and experience fishing, and no government support.

Scheme 1: The major problems during the project's implementation



(Author – based on questionnaires, 2013)

In scheme 1 the highlighted parts show the main constraints in the implementation of project about aquaculture for farmers linked with these activities. The survey demonstrates that 30% of farmers responded that natural condition affected the quality and success of the project. The second problem is that the project had to face with the lack of initial capital represented by 27% from the survey results. Then 25% responded that lack of knowledge and experience in fishing discouraged them to engage strongly in the project activities. The remaining 18% also said that without government support, it was difficult for them to move forward. The survey also found out that all farmers agreed that integrated system of aquaculture needs to be improved in many ways also and farmers need to be given more assistance.

5.3.1 Natural conditions

Natural conditions are difficult to mention first of all because there was a large influence in the process of project implementation. Cao Bang and Lang Son provinces are located in the mountainous area of Vietnam where the terrain is higher and the weather is colder than other areas. The average elevation above sea level is 220m in Cao Bang (Cao Bang Portal, 2013) and 252m in Lang Son (Lang Son Portal, 2013)¹⁰. Such terrain led to the trouble of transportation during the project implementation. In addition, the large area and low traffic also limited the condition of fish seeds. Long distances and transportation period reduced the quality of fish seed. Sometimes the death of fish seed caused severe damage to the economy of the local farmers.

Cold climate is also one of the reasons causing limitation to the fishing in area. Farmers here can only fish once a year.

One of the difficulties was unguaranteed water levels. Lakes, where the cages were constructed, are mainly used for irrigation.

Picture 1: The water level was dropped during the irrigation season



(Source: Author, 2013)

¹⁰ Mentioned in the part “4.5 Fish production in Cao Bang and Lang Son”

5.3.2 Lack of initial capital

Areas where the project selected are the poor areas of Vietnam. Therefore, during the implementation the project has faced up with the significant shortages in infrastructure and technology. This can be seen most clearly in the degraded cages but the farmers did not have the ability to repair or renew them.

Picture 2: The damage of fish cages



(Source: Author, 2013)

The quality of bamboo is not good and has been soaked in water for a long time, which affected on the quality of cages. Most of the cages were broken and farmers did not have money to repair and renew. People do not have enough cages, so many households do not feed fish anymore.

Until now the demand of aquatic seed gradually increases, there are very few fish feed production facilities. Farmers must buy and ship them from far places with high costs. Most farmers are poor and they cannot afford to pay for the fish seed.

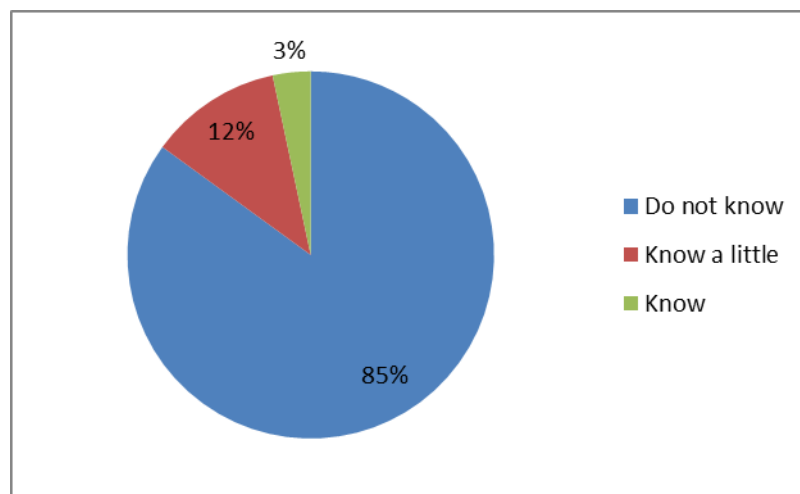
5.3.3 Lack of knowledge and experience in fish farming

Before the project came to the targeted area, fish had been freely fed mostly in ponds, lakes and reservoirs. Fish farming in the area at this time was considered as a form of food supply in place for household. Besides that the level of education and understanding of farmers are low; they mainly fish follow the experiences handed

down without verification and scientific intervention. This is the reason why fishing farming here was not efficient, leading the low economics.

Results from the survey showed that 85% local farmers did not know about the cage culture and the culture based fisheries. 12% local farmers knew but they did not understand carefully. Only 3% knew exactly what the cage culture and the culture based fisheries are, but they lack practical skills.

Graph 5: Percentage of people know about the cage culture and the culture based fisheries



(Source: Author – based on questionnaires, 2013)

5.3.4 No Government support

Lack of interest from the Government is one of the things that influences on the development of aquaculture in the targeted areas. Because of the lack of Government support the extension service here is limited. The extension center or aquatic center is located away from these areas. Due to the remote roads and walking difficulties so the extension staff does not regularly come to these areas to implement the extension program for improving the awareness of the farmers.

Besides the Government also does not have much support to enhance the qualification of extension workers and have led to the lack of qualify staff.

The ignorant farmers and the limitation in qualification of extension staff made the project encounter some failures. The most significant thing is the poor management leading to the great number of stolen fishes. To prevent fish stealing the

farmers always have to look the cages very carefully. This reduces the productivity of other agricultural activities and many families abandoned fish farming.

5.3.5 Other problems

When the experts of the project implemented the environmental assessment, they found signs of pollution. The concentrations of heavy metals were found in lake in Na Tau (Cr, Ni, V) and Khuoi An lake in cooperative 1/4 (Co) (Project report)¹¹.

The impacts of environmental pollution from mining and atmospheric deposition affect the quantity and quality of fish in the targeted areas.

5.4 Evaluation impact the project to socio – economic situation and the lives of local farmers

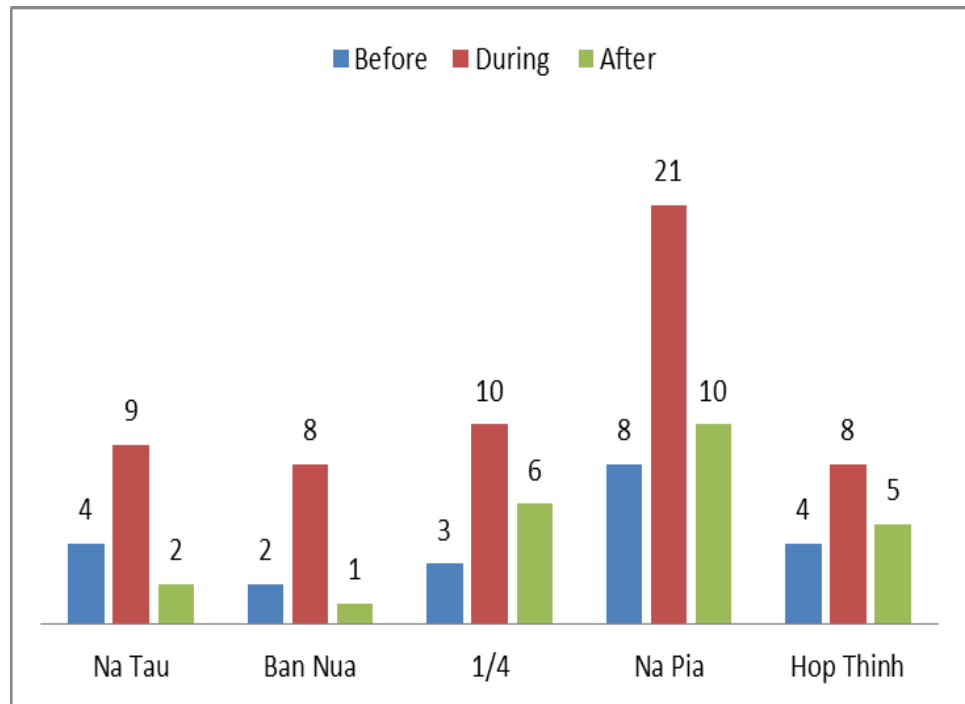
The project “Support of freshwater fish farming in mountain areas, Vietnam” was implemented from 2008 until 2010 in Cao Bang and Lang Son provinces. With the aim of improving the quality life of local people the project has significant impacts on the lives of local people.

5.4.1 Impact on the number of fishing farmers

The chart below shows us the change on the number of fishing farmers before, during and after the project implementation. The number of fishing farmers increased when the project came to the local. Information based on survey shows that, when the project came, almost all of the local farmers were involved in the project. The percentage of fishing farmers in cooperatives has increased around 60 – 70%. Especially in cooperative 1/4, 100% of respondents answered that they were involved in fishing during the implementation of the project.

¹¹ http://vietnam.czu.cz/store/brochure_vn_2010_11.pdf

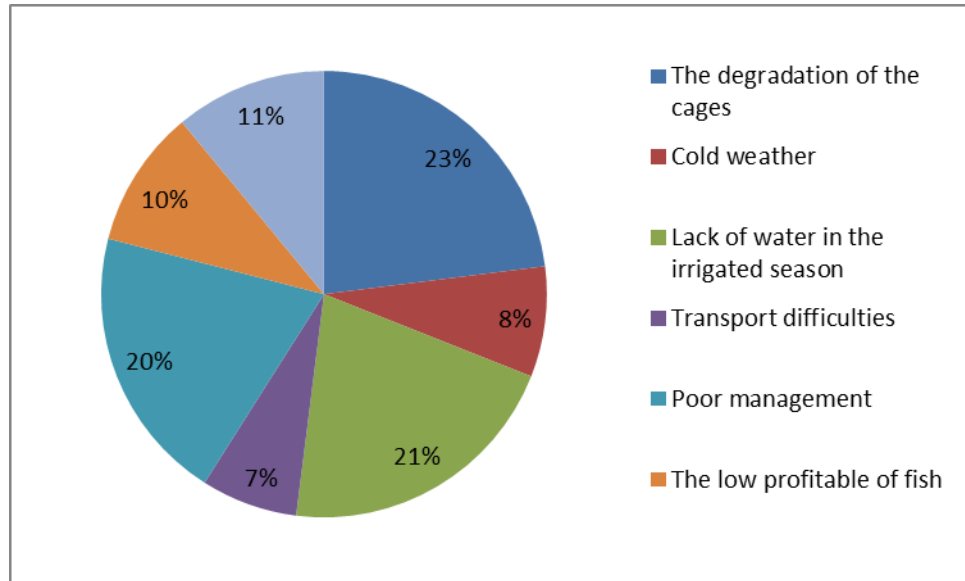
Graph 6: The change on the number of fishing farmers before, during and after the project implementation (Unit: person)



(Source: Author – based on questionnaires, 2013)

After the project was done, the number of fishing family has dropped sharply. Typically in Na Tau and Ban Nua, the number of fishing farmers is currently very few. There are two farmers in Na Tau and only one farmer in Ban Nua. When being asked about why they did not continue to fish follow the project, the local farmers gave the reasons such as: the degradation of the cages; cold weather; lack of water in the irrigated season; transport difficulties; poor management and the low profitable of fish.

Graph 7: The reasons why people cannot continue to fish follow the project



(Source: Author – based on questionnaires, 2013)

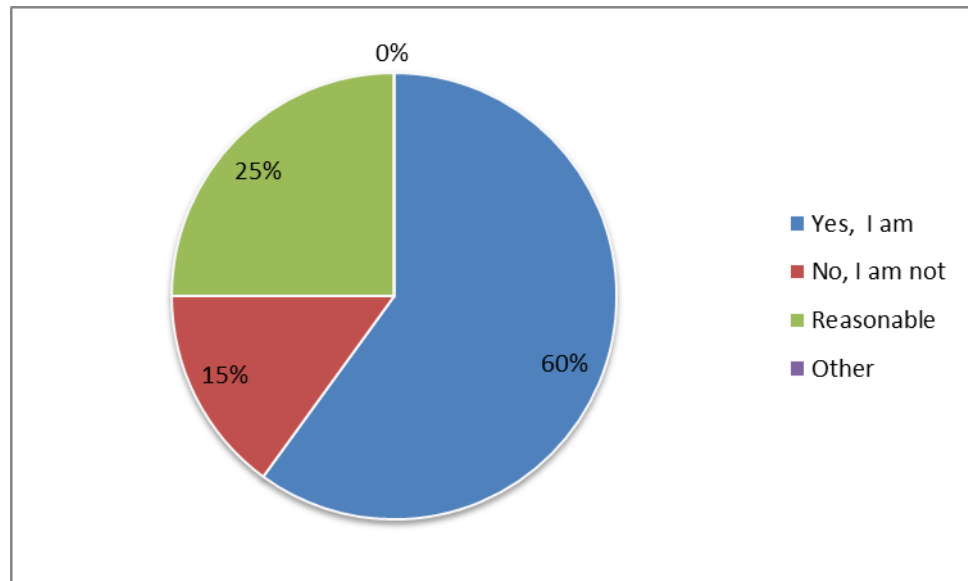
Graph 7 has provided the most important reasons why the local farmers cannot continue to fish follow the project. Three reasons are most people give it such as the degradation of the cages (23%); lack of water in the irrigated season (21%) and the poor management (20%).

5.4.2 Impact of the training course on fish farming

Training courses are one of the most important parts in the this project, especially when the main purpose of the project is to improve people's lives through bringing suitable available farming technologies and most of the local people do not gain much knowledge. The research survey demonstrates that 69% farmers participated in the training course, 31% never attended any seminars because besides the fish farming, the local farmers have to work on the fields or do other things, it means that one family can only has 2 or 3 people who can attend the training course.

The level of satisfaction for those farmers who participated on the training course was also evaluated. The survey shows that 60% of farmers were satisfied, 25% were reasonably satisfied and the remaining 15% were not satisfied. The result from satisfaction of farmers can be considered positive.

Graph 8: Level of satisfaction of the local farmers on the training course



(Source: Author – based on questionnaires, 2013)

5.4.3 Impact on the socio - economic life of the local people

Before the project was conducted, Cao Bang and Lang Son provinces with the cooperatives which were selected in the project were very poor areas. So the main objective of the project was to improve the life quality of rural people by introducing sustainable technologies in the area of freshwater fish farming leading to the increase in production and in creating a more stable socio – economic environment.

a) Economic lives

Evaluating the impact of the project on the economic lives of the local people is mainly based on two aspects of changes in infrastructure and the profit from fish production.

The number of cages in each cooperative is the most visible in the influence of the project. Before the implementation of the project, the local farmers mostly feed fish in a free way. When getting the support and help from the project they changed to follow a new method “cage culture”. The farmers have built cages under the guidance of experts from the project. Until now the number of cages in each cooperative based on the survey is as follows in the table 10.

Table 10: The number of cages in each cooperative (Unit: person)

	<i>Na Tau</i>	<i>Ban Nua</i>	<i>1/4</i>	<i>Na Pia</i>	<i>Hop Think</i>
Number of cages	16	2	8	17	7

(Source: Author – based on questionnaires, 2013)

Besides that the amount of profit earned from fish farming, the farmers have used to buy items to enhance their lives as beds, wardrobes, televisions, bicycles, motorcycles.

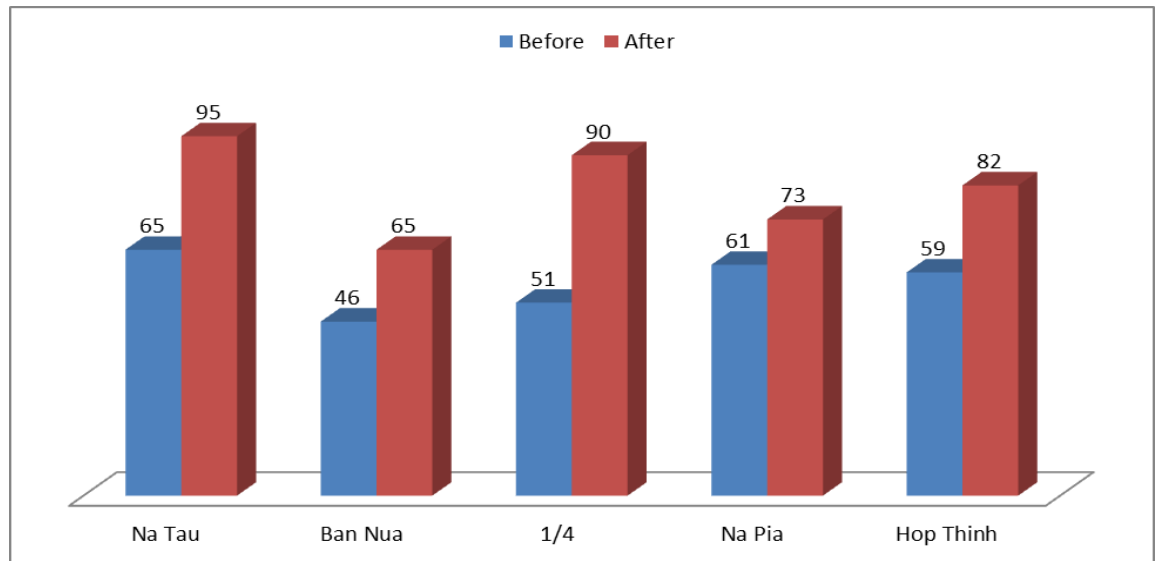
b) Social life

The cooperation between extension workers and farmer has been improved after the project was implemented.

One of the reasons for agriculture in general and fish farming in particular of Cao Bang and Lang Son provinces is retarded due to the limited extension work. Because of the topographical constraints, leading to the difficult traffic, the extension program cannot reach to the local farmers. On the other hand, the extension workers did not really care about this area. This has led to a lack of trust of the local farmers with the extension workers and the extension programs.

Participating in the project, the local farmers and the extension workers were actually working together. They had the opportunity to understand each other better. Because of the successful results, the local people have become convinced by the extension workers.

Graph 9: Satisfaction of the local farmers in the extension workers before and after the project (%)



(Source: Author – based on questionnaires, 2013)

The chart above demonstrates the satisfaction level of the local farmers with the extension workers. The blue columns express the satisfaction of the local farmers before the project and the brown columns show after the project. The level satisfaction in all five cooperatives has gone up after the project implementation. This is also a significant sign helping the implementation of other projects or other extension programs in the future in these areas become easier.

5.4.4 Profitability from fish production

The impact of the project in this section will be looking back over the description of yields, profits and prices in each cooperative. All of the results are based on the research from 2008 to 2010.

Cooperative Hop Think

Hop Think is medium effectual cooperative of the project because the fish yield was only satisfied the local demand. On the other, only one type of fish was fed here that led to the loss in the market competition.

From 2007 to 2010 the farmers had to pay membership fee 36,000,000VND (1714.3 USD). Besides they also had to pay for the long term rental of the reservoir and reservoir rent. That cost accounted for about 16,000,000VND (762USD). Totally unrelated profits were 20,000,000VND (952.38USD).

Table 11: Hop Think fish production unrelated profits [1USD = 21,000VND]

Fish production unrelated profits			
Indicator/Year	2007/2008	2009/2010	Total 2007/2010
Membership fee (VND '000)	18,000	18,000	36,000
Expenses (VND '000)	6,000	10,000	16,000
Profit (VND '000)	12,000	8,000	20,000
Profit (USD)	571.43	381	952.38

(Sources: Author – based on questionnaires, 2013; Jandová, 2011)

Cooperative Na Pia

The results showed that Na Pia is also a medium effectual cooperative with the credit profit, appropriate location, well segmented product and with own enterprise. There were still disadvantages as unsatisfactory water management and missing direct marketing. These disadvantages led to Na Pia's inability to achieve higher profits.

Table 12: Total profits due to fish production Na Pia in 2010 [1USD = 21,000 VND]

Indicator/Species	Income/species (VND)	Income/species(USD)
Silver carp	480,000	22.85
Rohu	1,600,000	76.2
Common carp	400,000	19.05
Tilapia	4,125,000	196.43

Grass carp	3,000,000	142.85
Total income	9,605,000	457.38
Expenses (VND)	3,900,000	
(USD)	185.71	
Total profits	5,705,000	
(VND)	271.67	
(USD)		

(Sources: Author – based on questionnaires, 2013; Jandová, 2011)

The membership fee in 2006 was 24,000,000VND (totally 1142.86USD). In 2010 they earned 9,605,000VND (457.38USD) from fish production. They bought new equipment 3,000,000VND (142.85USD), and they paid for renting reservoir 900,000 VND (46USD) per year. Thus in 2010 the profits earned from fish production were 5,705,000 VND (271.67USD).

Cooperative Ban Nua

Ban Nua is cooperative where the fish production was not profitable. The membership fee here was very low, only 30,000 VND/person (1.43USD/ person). This fee equaled on 0.015 times in comparison with Hop Thinh (2,000,000 VND/person) and 0.03 times in comparison with Na Tau (1,000,000VND/person). Low initial capital in addition to only one kind of product was produced that made the profits of fish become low. The members divided the fish for each other and the rest was sold to the neighbor. If fish had been sold, they would be able to generate 3,200,000 VND (152.38USD).

Table 13: Hypothetical profits Ban Nua

Hypothetical profits according to fish production	
Indicator/Species	Grass carp
Amount (kg)	80
Price (VND)/kg	40,000
Price (USD)/kg	1.9

Income (VND)	3,200,000
Income (USD)	152.38

(Sources: Author – based on questionnaires, 2013; Jandová, 2011)

Cooperative Na Tau

In 2010 cooperative Na Tau obtained 11,454,000VND (586.4USD) directly from fish marketing. The high profits led Na Tau to become the most effectual cooperative in these targeted areas.

Just like other areas the farmers here are obliged to pay rent for reservoir, but the difference is in natural goods (200kg rice/year) and the product diversification. The farmers combined duck rising and fish farming, instead of described species were produced miner species for home consumption and ducks for marketing. The farmers also did not have to spend a lot of money for other fees, formed by market fee and transportation expenses.

Table 14: Total profits due to fish production Na Tau

Profits according to fish production			
Indicator/Species	Silver carp	Tilapia	Mrigal
Amount (kg)	60	140	20
Price (VND)/kg	50,000	58,000	20,000
Price (USD)/kg	2.38	2.76	0.95
Income/species (VND)	3,000,000	8,120,000	400,000
Income/species (USD)	142.86	386.67	19.05
Total income (VND)	11,520,000		
Total income (USD)	548.57		
Expenses (VND)	66,000		
Expenses (USD)	3.14		
Total profits (VND)	11,454,000		
Total profits (USD)	545.43		

(Sources: Author – based on questionnaires, 2013; Jandová, 2011)

Cooperative 1/4

The profit from fish production of cooperative 1/4 was lower than other areas in the project. That was connected with the low harvest and the fish diseases. Cooperative 1/4 generated 3,750,000VND (178.57USD) from fish production. The farmers had to pay 10% of total production as a rent – 375,000VND (17.85USD) per a year. Besides that they had to pay for fish medicine and package (190,000VND; 300,000VND). Total profits were 2,885,000VND (137.38USD).

Table 15: Profits due to fish production 1.4 cooperative

Profits according to fish production	
Indicator/Species	Tilapia
Amount (kg)	150
Price (VND)/kg	25,000
Price (USD)/kg	1.19
Income (VND)	3,750,000
Income (USD)	178.57
Expenses (VND)	865,000
Expenses (USD)	40.76
Profits (VND)	2,885,000
Profits (USD)	137.38

(Sources: Author – based on questionnaires, 2013; Jandová, 2011)

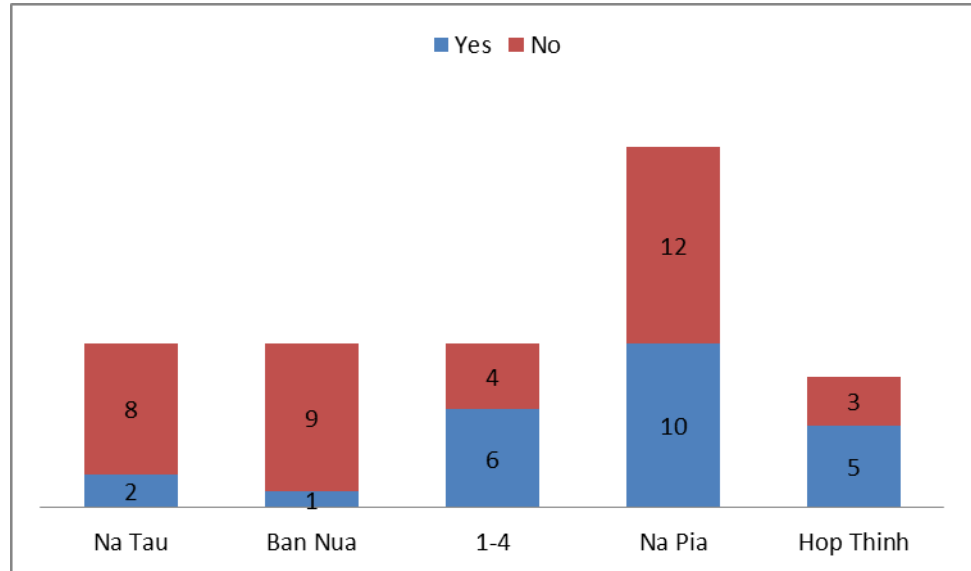
During the implementation process, the project has brought significant improvements to the economic life of the local people. All cooperatives were profitable from fish farming with the method that project bring. That profit contributed to increase in income and provided a better life for the local people.

5.4 Current fish production in Cao Bang and Lang Son

Cao Bang and Lang Son provinces have potential aquaculture production. In the selected areas where the project is being conducted, there are not many households with growing fish. Geographical location, the unfavorable natural condition and lack

of farmers' knowledge about fish are the main reasons that led to a reduction in the number of aquaculture farmers.

Graph 10: Number of aquaculture farmers (Unit: person)



(Source: Author – based on questionnaires, 2013)

The graph above shows us that the number of farmers currently growing fishes is very limited, especially in Ban Nua, Cao Bang only one farmer grows fish. The reasons for this situation were mainly cage damages and the improper management of cooperative. Profit was low because most of production was divided for the members in this cooperative.

Silver carp, rohu, common carp, grass carp and tilapia are the main types of fish that are growing in Cao Bang and Lang Son.

Table 16: Kind of fishes in Cao Bang and Lang Son

	Silver carp	Rohu	Common carp	Grass carp	Tilapia
Na Tau					
Ban Nua					
1/4					
Na Pia					
Hop Thinh					

(Source: Author – based on questionnaires, 2013)

The local farmers choose to feed these fishes because they fit the natural conditions here. They can live in extreme difficult conditions, such as carp can withstand from 0-40°C (Nguyen and Ngo, 2001). They can be farmed in ponds or reservoir and do not require any complicated techniques.

Besides that these types of fish are very favored in Vietnam. Because of these fishes on the market, the income of farmers is also improved.

Based on the result of questionnaires the local farmers usually harvest once a year with the amount from 50 to 100kg. Due to the cold weather and the low water level, the farmers can only feed and sell fish to market once a year. Therefore, though the price of fish in Cao Bang and Lang Son provinces is quite high in comparison with other regions in Vietnam, it plays just a small part in the income of the farmers here.

Table 17: Price of fish in Cao Bang, Lang Son and Hanoi (1 USD = 21 000 VND)

	<i>Silver carp</i>	<i>Rohu</i>	<i>Common carp</i>	<i>Grass carp</i>	<i>Tilapia</i>
Cao Bang					
VND/1kg	35 000	40 000	60 000	60 000	30 000
USD/1kg	1.67	1.9	2.9	2.9	1.4

Lang Son					
VND/kg	35 000	50 000	75 000	70 000	28 000
USD/1kg	1.7	2.4	3.6	3.3	1.3
Hanoi					
VND/kg	40 000	60 000	80 000	90 000	40 000
USD/kg	1.9	2.9	3.8	4.3	1.9

(Source: Author – based on questionnaires, 2013)

Based on the research, the current fish production in Cao Bang and Lang Son can be summarized with SWOT analysis as follows:

STRENGTH	WEAKNESSES
<ul style="list-style-type: none"> • Farmers are able to use package for products • Worm culture • Farmers have more knowledge about cage culture • Satisfied local demand 	<ul style="list-style-type: none"> • Cage damage • The improper management of cooperative • Harvest once a year • Limited transportation • They are liable to pay rent for reservoir
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • New road which could lead to better accessibility of area • Implementation of high value species such as <i>Hemibagrus guttatus</i> • Higher price of fish 	<ul style="list-style-type: none"> • Cold weather • Strong rainfalls • Inaccessibility of the area. • Fish diseases • Premature harvest, because of low water level • Often blackouts

(Source: Author, 2013)

Although Cao Bang and Lang Son provinces have the potential to produce fish but the current situation in these targeted areas is not satisfactory. The farmers are no longer considered seriously about fish production because it plays only a small part in their income. If the Government and Agricultural organizations concern about the fish production here, this situation would be improved.

5.5 Recommended solutions of fish production

Aquaculture is one of the major export items of Vietnam. Moreover Cao Bang and Lang Son provinces are the potential areas of fisheries but the difficulties are limiting the development of areas. Therefore overcoming these difficulties and developing fishery production not only improve the lives of the local people but also contribute to improving the position of Vietnam aquaculture in the world.

Firstly, improvement the knowledge of local people via training courses with fisheries is essential head.

Construct more vocational institutions in fisheries sector. The Government needs to promulgate policies to encourage research institutions and training associated with the businesses, farms and production facilities to provide rapid technical advances and new technology into production.

Focus on training highly qualified staff, scientific staff and managers; socialization training in fish workers, the training aims according to market demand.

Secondly, the protection of the environment, focusing on the protection and development of renewable fisheries resources is also essential. Promote the application of environmentally friendly technologies helps to minimize pollution during the manufacturing process of fishery.

Strengthen inspection, control and management organizations, monitoring community to environmental management and the application of sanctions for the production facility does not comply with the provisions of the Law on Environmental Protection.

Thirdly is that the Government should have polices to encourage the strengthening quality of products as well as stabilize the market prices of products so that the farmers can guarantee their income.

Finally, toward the farmers, upon receiving the attention and investment from the Government should have a positive attitude. They need to seriously engage and implement the policies during the manufacturing process. They should positively self-learn to improve the lack of knowledge of the self.

6. DICUSSION

Comparison the project “Support of freshwater fish farming in mountain areas, Vietnam” with other projects and researches

The purpose of this thesis is to evaluate the impact of the development project which was implemented in Vietnam from 2008 to 2010 named “Support of freshwater fish farming in mountain areas, Vietnam” financed by the Ministry of Agriculture of the Czech Republic and coordinated by the Czech University of Life Sciences Prague (CULS) and by the Research Institute for Aquaculture No.1 in Vietnam. The main objective of the project was to introduce sustainable approach of freshwater fish production. To accomplish this purpose, the activities of the project focused on capacity building (workshops and practical trainings) and technical support of these cooperatives (e.g. fish fry, feeding for fish, tools). “Culture-based fisheries” and “cage culture” were chosen to introduce for the farmers with hope to improve the productivity of fish. As a result, people’s income and the living standard have been improved.

To evaluate the impact of this project, the result of study carried out in five cooperatives Hop Thinh, Ban Nua, Na Pia, Na Tau and 1/4 has some similarities with the results of other projects carried out in other part of Vietnam. The results of this study will be compared with the results obtained from the implementation “cage culture” in Son La province from 2006 until now.

The same as Cao Bang and Lang Son provinces, Son La is also located in the northern mountainous area of Vietnam. It has a lot of potential in fishery development. Besides large surface of the Hoa Binh Plant and Son La Plant, Son La province has over 500 hectares of surface water reservoirs and 2,440 hectares of small ponds and 5,000 hectares of rice fields where can be combined with developing

fish farming (Huy Ngoan, 2013)¹². However, due to extensive farming practices and lack of skills, Son La has not exploited all of the potential. In addition farmers in Son La do not have access to the technical improvement and are lack of knowledge for aquaculture hence fish production is unstable and low economic efficiency.

Development of sustainable aquaculture is content of the “Support program of fisheries Phase II” which has been implemented in Son La since 2006 with the focus on poor farmers. The project has received the support of non - governmental organizations and Vietnam Sturgeon Group.

The same as “Support of freshwater fish farming in mountain areas, Vietnam” project, the activities of “Support program of fisheries Phase II” are also training staffs, training and technical processes in the field, associated with deploying technical demonstration for poor farmers. In addition the latter program has organized research activities and encouraged studying experience from other efficient models. These training programs can help farmers to organize themselves and apply technical progress into practice in order to develop aquaculture, improve productivity, product value and at the same time increase income and reduce poverty. Theory is associated with demonstration in the community. The combination of theory and skill training are consistent, easy to understand so that many people are interested in. Many models have been replicated such as prawn farming, fish breeding on the field.

Since 2010 Son La province has deployed the project in development of the “cage culture” in fisheries in Chieng Bang cooperative with 20 cages, equivalent to 360m³. The cages are made of bamboo by the farmers. The size of fingerling is 150 – 250g/fish. Grass carp and common carp are two types of fishes which are mainly feeding in the cooperative. The local farmers began feeding fishes in 8/2010. The food for fish is available locally such as grass, cassava and bananas, sweet potatoes, corn, rice. After 6 months of feeding, fish is growing well without disease. The survival rate reached 90%, the average weight gain of 1.5kg/1 grass carp and 1.7kg/1 carp. Total collected fish was 6,750kg, the price was 60,000 VND/kg, equivalent to

¹² <http://thuysanvietnam.com.vn/son-la-nuoi-trong-thuy-san-ben-vung-article-3895.tsvn>

405,000,000VND. Minus the cost of seed, feed, cages and the care fee the profits earned 175,000,000 VND (National Agricultural Extension Center, 2012)¹³.

Table 18: Chieng Bang fish production in comparison with Na Pia and Ban Nua fish production

<i>Cooperative</i>	<i>Grass carp</i>			<i>Common carp</i>		
	<i>Amount (kg)</i>	<i>The average weight (kg/grass carp)</i>	<i>Price/kg (VND)</i>	<i>Amount (kg)</i>	<i>The average weight (kg/grass carp)</i>	<i>Price/kg (VND)</i>
Chieng Bang (Son La)		1.5	60,000		1.7	60,000
Na Pia (Lang Son)				150	1.5-2.5	20,000
Ban Nua (Cao Bang)	80	1.5-2.5	40,000			

(Source: Author based on the survey and the research)

The two cooperatives Na Pia (Lang Son) with common carp and Ban Nua (Cao Bang) with grass carp are selected among five cooperatives in the project “Support of freshwater fish farming in mountain areas, Vietnam” to compare the effectiveness with the cooperative Chieng Bang (Son La). It can be seen that the quality of the fish after feeding was equal in all three cooperatives with the average weight of one fish was 1.5 – 2.5kg. However the amount and the price have a large difference among the three cooperatives. The amount gained of grass carp and common carp in Ban Nua and Na Pia was 230kg while this number in Chieng Bang was more than 29

¹³ http://www.agroviet.gov.vn/pages/news_detail.aspx?NewsId=21261

times (6,750kg). The price for 1kg of fish in Chieng Bang was also higher than Na Pia and Ban Nua. This led to efficiency obtained in Chieng Bang up to hundreds of millions VND while the number in Ban Nua and Na Pia stopped with millions VND. While Chieng Bang obtained 400,000,000VND, Na Pia obtained 3,000,000VND from the sale of common carp and Ban Nua earned 3,200,000VND from the sale of grass carp.

Comparing the project “Support of freshwater fish farming in mountain areas, Vietnam” with other research made in Binh Phuoc province. Binh Phuoc is in the Southeast Vietnam, located in the key economic region of the South. Binh Phuoc has two reservoirs (app. 30ha area) also uses the “cage culture” system for fishing. The average aquaculture production in Binh Phuoc was reflected around 7,1475kg/ha/year (Tuan *et al.*, 2008). The figure in two provinces Cao Bang and Lang Son was 350 times lesser than in Binh Phuoc. Lang Son and Cao Bang obtained only 20.5kg/ha/year.

According to other research in reservoirs (4-30ha) in Yen Bai and Thai Nguyen provinces, where culture based fishery was adopted, the average yields were 242kg/ha/year (Nguyen *et al.*, 2005), which is 10 times bigger than that in Cao Bang and Lang Son.

Fish cage culture system

Today the “cage culture” system is a new effective direction which is being implemented by many farmers to contribute for increasing income for local people and promote local economic development. According to National Agricultural Extension Center, the Northern provinces have potential areas to develop aquaculture cages with more than 200,000ha of water surface area. Total area of fish cages in the Northern provinces is estimated at 300,530m³, the number of cages is nearly 5,000 cages with capacity of more than 2,000tons/year (Hung *et al.*, 2013)¹⁴. The advantages and disadvantages of this method in Vietnam are reflected in the following SWOT analysis.

¹⁴ http://www.nhandan.com.vn/mobile/mobile_kinhte/mobile_tintuc/item/21761702.html

STRENGTH

- Easier fish farming (harvest, feeding)
- Using of valuable fish species
- High yield, short production cycle
- Protection against predators
- Protection against elopement.

WEAKNESSES

- Premature harvest (low real sizes of fish), caused by low water level
- Most farmers do not have opportunity to participate in learning, technical consulting about cage new design
- Technical proficiency and farming technology in different regions are unequal
- Possibilities of cage breakage.
- High fish mortality due to low water level
- Weak of management

OPPORTUNITIES

- Interlaced rivers system and large reservoirs
- River was formed on the natural spawning grounds
- Increase a number of cages
- Implementation of new species such as *Hemibagrus guttatus*.
- Duck breeding with combination of fish production in cages.
- Using of fish medicaments to prevent diseases.

THREATS

- Strong rainfalls and flooding
- Fish diseases
- Unfulfilled renewal of reservoir's rentals or high rental

(Source: Author, 2013)

“Cage culture” system is an effective method thus the Government and the farmers need to always pay attention to overcome the difficulties and limitations to improve the productivity. In recent years, the disease appeared in fish by increasing the number and size of farms. Therefore, prevention of disease is always necessary for improving productivity. The farmers have to regularly examine the environmental factors, clean the cages, and ensure the quality of food for fish. Using drugs and

chemicals to prevent disease is also an efficient method. The farmers can use each type of chemicals or combine various types, but they must understand how to use it. On the other hand, in order to improve the efficiency of this method the State should invest more in developing some cages and advanced technology. Combination between the State and the farmers will result in a significant boost for the “cage culture” system in Vietnam.

The successes and criticisms of the project “Support of freshwater fish farming in mountain areas, Vietnam”

Looking back on the project along with its results, and then comparing the results with other projects’ and researches’ results, we can see the success as well as the criticism of the project.

Firstly, the choice of “cage culture” method of the project is absolutely right. With the advantages which were analyzed above, the “cage culture” is fully capable of increasing efficiency productivity which the project desired. The second thing to mention is the project also wise to choose varieties of fish. The fishes such as grass carp, common carp, tilapia, rohu are easy to raise, in accordance with natural conditions and is particularly suited to the needs of the market.

In addition the project included several activities which have been good combined together. The cooperative members have practiced and applied the skills and theories that they were learned in the training of aquaculture and they also obtained the support of infrastructure and a large number of fish stocks. Ichthyologic research brings information about biodiversity and other possibilities for promoting fish breeding. The project also contributes to the construction management plan for the cooperative parallel with the study of socio – economic and market analysis. The improvement techniques were applied to activities on the lake and fish farming. Finally, the focus on food (such as worm farming and food production) as well as processing and storage of fish were also mentioned.

The project created an opportunity for experts from different countries to work together for improvement of people’s livelihoods in participating areas. A close relationship between the Czech team and Vietnamese team has been established during this project.

Although the project has achieved success but there still exists some limitations which have affected the results and made the productivity of the fish was not as high as other areas. These criticisms were done by both of the farmers and the project's members. According to the local farmers, the main problems were premature harvest and low marketing sizes of fish connected with lower profits. These problems are foremost because the project had not foreseen all the difficulties to take the measures promptly. For example, the project has unforeseen the difficulties from natural conditions of Cao Bang and Lang Son, which has led to reduce the quality of fingerling. The first round of fishing in Na Tau (Cao Bang) was unsatisfactory because too many fishes dead (the farmers could not remember the specific number). The management of the cooperatives was not really good, which led to the fishes were often stolen. Some of farmers said that it was necessary to provide the relevant methods of farming, drugs to fight the disease and protect the fish against poachers and predators.

Answer to the review question about the success of the project, almost the local farmers said that the project did not succeed as expected. The economic efficiency was not achieved in the comparison with the level of investment. On the other hand, all the people want to continue to receive the support and investment to improve the fish farming in these targeted areas.

7. CONCLUSION AND RECOMMENDATION

In 2008, the project "Support of freshwater fish farming in mountain areas, Vietnam" financed by the Ministry of Agriculture of the Czech Republic was implemented by the Czech University of Life Sciences Prague (CULS) and on the Vietnamese side by the Research Institute for Aquaculture No.1 with the purpose of introducing sustainable approach of freshwater fish production and thereby help the local farmers improving their lives. From the start of implementation, the project has faced many difficulties, but the experts and the project members tried to pass it and the project was successfully ended in 2010. The success of the project was evaluated on the change on the number of fishing farmers, the knowledge of local people, the socio – economic life and the profitability from fish production. As the results show,

the impact of the project “Support of freshwater fish farming in mountain areas, Vietnam” in Cao Bang and Lang Son provinces is positive.

The project was implemented in 3 cooperatives (Na Tau, Ban Nua, 1/4) in Cao Bang province and 2 cooperatives (Na Pia, Ban Nua) in Lang Son province. These are the poor regions where the majority of citizens are the ethnic minorities. They live on crop production, fish production plays a minor role in economic development of households in these areas. However, if the fish production is improved, the living standards also have improved. The local farmers decided to participate in the project with the hope of improving income, ensuring nutritional needs and acquiring the necessary knowledge about fishing.

During the implementation the project had to face with many difficulties during the implementation. The main problems encountered by the project have been summarized into 4 main difficulties: natural conditions, lack of initial capital, lack of knowledge and experience with fishing, and no government support. However with the support from experts and the positive response from the participating local people, the difficulties gradually were solved, led the project towards success with the significant impacts on the local farmers lives.

Since the project was done, the lives of the local people have changed markedly. The percentage of fishing farmers in cooperatives has increased around 60 – 70% (Author, 2013). All cooperatives were profitable from fish farming with the method that project brings. The local farmers have used these profits to cover and improve their lives. The farmers have used to buy items to enhance their lives as beds, wardrobes, televisions, bicycles or motorcycles. Not only brought economic profits, the project also gave the changes in social life. During the project implementation, the local farmers and the extension workers were actually working together, so they had the opportunity to understand each other better. The local people have become convinced of the extension workers. Economic life was improved, the confidence with the extension workers was enhanced, these are basic steps, which help for the development of fish production in particular and socio – economic development of the regions in general.

The project “Support of freshwater fish farming in mountain areas, Vietnam”, which was implemented from 2008 to 2010, has brought positives impact to the

farmers in Cao Bang and Lang Son provinces. However when we compared this project with other similar projects, the results of this project were not really successful. The process of evaluation of the project showed that the criticisms were done by both of the farmers and the project's members. These criticisms have affected on the results and made the productivity of the fish was not as high as other areas. Although the economic efficiency was not achieved in the comparison with the level of investment, but the local farmers still want to continue to receive the support and investment to improve the fish farming.

Recommendations

Besides evaluating the impact of the project "Support of freshwater fish farming in mountain areas, Vietnam", this thesis also analyzed and evaluated the fish production in Cao Bang and Lang Son provinces. The thesis realized that fish production plays an important role in ensuring food and it also helps the local people to improve their income. Fish production is one of the proper ways to accelerate the process of poverty reduction in the targeted areas. Cao Bang and Lang Son provinces have potential aquaculture production but in the selected areas where the project is being conducted there are not many households with growing fish. Geographical location, the unfavorable natural condition and lack of farmers' knowledge about fish are the main reasons leading to a reduction in the number of aquaculture farmers. If these difficulties are overcome, fish production will increase and bring an entirely new social and economy perspective for the targeted areas.

It can be seen that the project was very successful in the selection of improving fish production to improve the local people's income. Approaches, the problem solving as well as the activities of the project were great. However the project still had some limitations which have affected the results and made the productivity of the fish was not as high as in other areas.

With the hope to help similar projects in the future can reap more successes, the author of this thesis offered some recommendations as following :

- To overcome financial difficulties, the Government of Vietnam needs to more consider and coordinate investment. If the project received the financial support from the Government of Vietnam, the project would have used more modern equipment,

the farmers also had the ability to purchase new equipments to replace what had been damaged.

- The project experts have to assess more accurately and clearly the difficulties that the natural conditions of the targeted areas brought. Thus, when an incident happens, everyone knows what need to do and what should do, the problem will be solved quickly.
- The marketing activities as well as the connection between product and market should be more promoted. So that more and more products will be consumed in the faster way.
- The Vietnamese extension workers need to improve their knowledge and understanding, thereby they can communicate and explain for the farmers the tasks and activities correctly.
- About the farmers, they also have to be more proactive. They need to change, not just sit and wait for the help from outside, they should learn and improve their knowledge. In addition, they need positive trust and cooperate with the project staff.

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9. APPENDIXES

Appendix 1: Cao Bang province map - location of cooperatives



(Source : Jandova, 2011)

Appendix 2: Lang Son province map - location of cooperatives



(Source : Jandova, 2011)

Appendix 3: Vietnam's map



(Source: <http://www.vva992.org/MAP.html>)

Appendix 4: Interview with the local farmers



Appendix 5: Sample of questionnaire

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE
Faculty of Tropical AgriSciences

This questionnaire is used for Master Thesis: "Evaluation impacts of the development project in Vietnam." All this data will be anonymous.
Thank for you cooperation.

Questionnaire:

1. **Do you feed fishes ?** Yes No
2. **What kinds of fishes do you feed?**
 - Silver carp Rohu
 - Carp Grass carp
 - Tilapia
3. **How often do you usually harvest your fish production?**
 - a) Once a year
 - b) More often – please specify:
4. **How many kilograms do you harvest?**
 - 50 kg 50 – 100 kg
 - more than 100 kg – please specify:
5. **How often do you usually go to sell your fish production at the market?**
 - once a month
 - more often – please specify
 -
 - less often – please specify
 -
6. **For how much do you sell 1 kg of fish for each kind?**
 - Silver carp.....
 - Rohu.....
 - Carp.....
 - Grass carp.....
 - Tilapia.....
7. **Before the project, did you grow fishes?** Yes No
8. **Before the project, do you know about the cage culture and the culture based fisheries?** Yes No
9. **Before the project, what were the difficulties in aquaculture?**
 - Lack of technology
 - Lack of money
 - Enviromental problems
 - Others
10. **Why did you dicide to participate to the project?**

11. How did the project supported you in resolving these difficulties?

- Training course about „cage culture“
- Provide fish seeds
- Provide food for fish
- Provide cages
- Provide money

12. What were the major problems for you when you joined to project?

13. How did you use the money from fishing?

14. Did you feel satisfied with the extension workers before the project?

15. Did you feel satisfied with the program of the project?

16. According to you, this project is successful and effective as expected or not?

**17. Now do you want to improve or change anything about fish production?
What and why?**