Czech University of Life Sciences Prague
Institute of Tropics and Subtropics

BACHELOR THESIS

Household economy and living standard criteria of rural families living at the edge of the biodiversity hotspot: Case study of Phong Dien Nature Reserve, Central Vietnam

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Prague 6—Suchdol, April 2012

Declaration

I hereby declare, that I have written this bachelor thesis "*Household economy and living standard criteria of rural families living at the edge of the biodiversity hotspot: Case study of Phong Dien Nature Reserve, Central Vietnam*" myself with help of the literature listed in references.

Prague 6 - Suchdol, 30 April 2012

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Zuzana Nováková

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Abstract

The bachelor thesis presents a quantitative assessment of the living standard of rural households living in the buffer zone area of Phong Dien Nature Reserve, central Vietnam, as well as household characteristics. Additionally, their decision making depends on their livelihood strategies, which leads to the different levels of living standard. The aim of the thesis was to analyse living standard of different study areas and their household economy resources with respect to their location, farming systems and ethnic composition. The data collection was conducted in the period 2007 to 2009 in eleven villages in Phong My Commune through focused group discussion and semi-structured questionnaires. Results show that the lowest living standard was observed in the study area with the closest proximity to the natural reserve and the highest percentage of ethnic minorities. In contrast to this, study area in the eastern part of the commune showed the highest economic efficiency in the crop production. However the main shortage was observed in central villages in terms of social security and satisfying household needs, although the central villages were most developed in all other living standard criteria. Additionally was observed, that the farm size does not play significant role in the level of the living standard.

Key words:

livelihood strategies, living standard, household economy, buffer-zone, Phong Dien Nature Reserve, central Vietnam

Abstrakt

Bakalářská práce prezentuje kvantitativní hodnocení životního standardu venkovských domácností žijících v nárazníkové zóně ve Phong Dien Nature Reserve, ve středním Vietnamu, stejně tak jako charakteristiku domácností. Navíc, jejich proces rozhodování závisí na tzv. livelihood strategies, které následně vedou k různým úrovním životního standardu. Cílem práce bylo analyzovat životní standard různých studovaných oblastí a jejich zdroje domácí ekonomiky s ohledem na polohu, farmářské systémy a etnické složení. Data byla sbírána v letech 2007 až 2009 v jedenácti vesnicích v komunitě Phong My pomocí tzv. focused-group diskuzí a polo-strukturovaných dotazníků. Výsledky ukazují, že nejnižší životní standard byl pozorován v oblasti s nejmenší vzdáleností k přírodní rezervaci, stejně tak s nejvyšším procentem etnických menšin. Na druhou stranu, oblast ve východní části komunity ukazuje nejvyšší efektivitu v rostlinné produkci. Nicméně značný nedostatek byl zaznamenán v centrálních vesnicích v sociálních otázkách a uspokojení potřeb domácností, přestože střední vesnice byly nejvíce rozvinuty v ostatních kritériích životního standardu. Dále bylo pozorováno, že velikost farmy nehraje zásadní roli v určování životního standardu.

Klíčová slova:
livelihood strategies, životní standard, ekonomika domácností, nárazníková zóna, Phong Dien Nature Reserve, střední Vietnam

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List of Abbreviations

BFZ	Buffer Zone
CEV	Central Villages
DCs	Developing Countries
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
ICs	Industrialized Countries
IMF	International Monetary Fund
HDI	Human Development Index
HDR	Human Development Reports
NEZ	New Economic Zone
NICs	Newly Industrializing Countries
NTFPs	Non-timber forest products
PPP	Purchasing Power Parity
SEA	South-East Asia
UN	United Nations
UNDP	United Nations Development Programme
USD	United States Dollar
WB	World Bank

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1 INTRODUCTION

Rural household's decision-making system, particularly in the developing countries, depends on different livelihood strategies, through which they are surviving or improving their living standard. Some households diversify their activities into farming and non-farming sector, while the others insist to rely on few income-generating activities. Recent studies (see e.g. Babulo et al. 2008; Tesfaye et al. 2011) have documented diversification processes of the strategies according to the different motivations such as a risk reduction, reaction to crises, labour market opportunities or a natural resource management.

According to the WB (2011), majority of rural households in Vietnam are highly dependent on natural resources for their livelihoods. Additionally, poor natural resource management leads to environmental degradation and consequently to the lower levels of the living standard. This is evident particularly in central Vietnam, where the high pressure of fast economic development and rapid population growth on natural resources has been multiplied by the complicated post-conflict situation after the Second Indochina War, which left behind millions of land mines, broken social structure, polluted water and soil etc.

Thus, both Vietnamese and province governments recognized that there is a critical need to conserve or even to rehabilitate natural environment in rural areas and to conserve biodiversity hot-spots. As a result, number of natural reserves was established in the whole country during last three decades (Dzung et al. 2004). Nevertheless, people living in the buffer-zones of such reserves still derive their livelihood in close interaction with environment (e.g. water bodies, forests) that is considered as an important source of income. Government policy, development assistance as well as increasing awareness of the population on natural resource management and environmental conservation practices have brought a positive light into recent development efforts.

The bachelor thesis analyses the living standard and household economy of rural households living in one of the poorest region in Vietnam, in the buffer-zone of the nature reserve. First chapter, literature review, deals with the recent social and economic development of Vietnamese economy in the context of the South-Asian environment and it is focused on a livelihood generation and living standard conditions as well.

Methodology used in this thesis was based on participatory techniques. Farming Systems Approach (FSA) was applied in order to provide quantitative analysis of living standard criteria of focused households. FSA was based on Doppler et al. (2006), who widely used this approach worldwide, including South-East Asian countries and modified according to relevant scientific articles. Results have brought an interesting insight into livelihood strategies and living standard of rural households living in Phong My commune, Phong Dien district, Thua Thien Hue province, central Vietnam.

2 LITERATURE REVIEW

2.1 Economic and human development

2.1.1 Historical consequences: From 'Fall of Saigon' to Doi Moi reforms

On April 29 (1975), General Nguyen Van Toan started the final attack on Saigon, the capital of South Vietnam. Two days later, Second Indochina War was ended, the doors for Vietnamese re-unification[1] were opened and Socialist Republic of Vietnam became a new independent country. During the 1970s and 1980s, Vietnam was considered as one of the poorest countries in the world with low income per capita, in 1985 equal to 800 USD[2] and was facing to recovering from ravages of long-lasting wars. Nevertheless, policy of renovation, known as *Doi Moi*, that was implemented 1986 by ruling Communist Party launched one of the highest annual economic growth in the world (The Asia Foundation 2010; IMF 2011). During the upcoming periods since mid-1980s, Vietnam transformed itself from a "*basket country*" to the one of the most successful economy in the world in the terms of economic growth and the poverty alleviation (Glewwe et al. 2004; Heston et al. 2011).

The main goals of *Doi moi* were to improve living standards, economy productivity, open economy for international capital, introduce elements of the market economy and mitigate enormous inflation, which in early 1980s reached almost 500% a year. One of the first important changes were adopting agriculture reform (1986-87), where the prices controlled by government were removed and farming households as well as enterprisers were allowed to sell any of their product on private markets. Important fact is that the economic sector was driven by private capital (still partly under government supervision) and therefore attracts foreign investors. Consequently, a decree, in which the state-owned land, previously formed to cooperatives, was allotted among the rural household, was established. Through this decree, the farm households had to pay the long-term leases and taxes to have right to use the land, but all outputs from the land

[1] 2 July 1976.

[2] Such value was recognized to be the lowest among the all South-East Asian countries, instead of Cambodia, and equal to the economies from Sub-Saharan Africa, e.g. Togo, Central African Republic or Gambia (Heston et al. 2011).

belong to them (Freeman 1996; Glewwe et al. 2004; Smith and Dixon 1997). These economic reforms made Vietnam to become one of the first countries in the former Soviet bloc of nations to formally "*take the capitalist road*" (Freeman 1996).

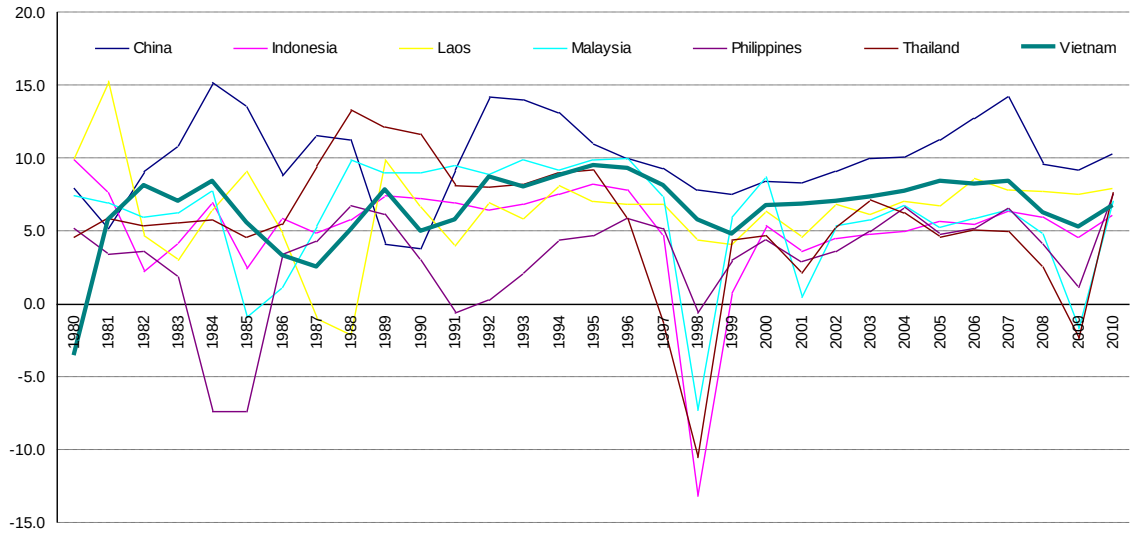

Figure 1 GDP annual change of selected countries from South-East Asia (1980-2010, in percentages)

Source: IMF, 2011

In 2000, Enterprise Law was implemented aiming to support and encourage the private sector. After the implementation, Vietnam has registered more than 120,000 private companies, which was six times higher comparing to the situation before the law was established (The Asia Foundation 2010). Nevertheless, the Vietnamese economy still remained mainly based on the agriculture and related industries, on the production, domestic consumption and export. Thus, foreign investment inflows were strongly supported by the government that led into rapid industrialization, especially in the southern provinces. Subsequently, the process of service sector development was launched as well, with special regard to banking system modernization, technology transfer etc. (Asian Info 2011). However, despite of indisputable economic development during the last two decades, the agriculture sector still performs nowadays about on fifth of GDP, 30% of export and around 60% employers work in agriculture sector (WB 2011).

2.1.2 Recent economic and social development

Based on UNESCAP (2002) report, all economies of South-East Asia (SEA) have undergone a magnificent economic growth since 1980s with positive impact on poverty alleviation as well. Average economic growth between the 1975 and 2000 is believed to be higher than 5% each year, which is significantly higher value in comparison to the rest of Asia with 3.9% average annual change of GDP.

Figure 1 shows annual economic growth of seven chosen countries from the SEA between 1980 and 2010. From the figure is obvious that Vietnamese economy was not so negatively affected by financial crisis in mid-90s in comparison to the other regional economies. Moreover, average economic growth of Vietnam was the second highest and the most stable in the whole region, after China, reaching 6.6% (±2.5) per year (based on IMF 2011).

During the Asian financial crisis in the late 1990s and subsequent global financial crisis started in 2008, the welfare of the population had been negatively affected. Nevertheless, even during those times SEA region achievements in both economic and human development remained impressive, especially in comparison with the South Asian countries. On the other hand, Thailand, Malaysia or Indonesia have experienced a strong economic growth during the 1990, however at the same time they were the most seriously affected by the Asian financial crisis and despite the recovery after the crisis, their growth rates have not met the same levels as during pre-crisis period. In contrast, countries such as Laos, Mongolia, Myanmar, Vietnam or Cambodia, have suffered less severe negative impacts during the crisis and recorded no negative GDP growth values during either after both financial crises. Those countries are considered to have experience with economic transition and with emerging domestic demand (UNESCAP 2002; Liu and Yin 2010).

2.1.3 Human development and poverty alleviation

Despite of a long-term economic growth and socio-economic development, level of human development is still not equally distributed among SEA countries. Over the last decade, the HDI rankings of SEA region have changed with some countries gaining and others losing (see Table 1).

Table 1 Changes in Human development index in selected South-East Asian countries 1980-2011

Country	Years						
	1980	1990	2000	2005	2009	2010	2011
Singapore	..	..	0.835	0.835	0.856	0.864	0.866
Malaysia	0.559	0.631	0.705	0.738	0.752	0.758	0.761
Thailand	0.486	0.566	0.626	0.656	0.673	0.680	0.682
Philippines	0.550	0.571	0.602	0.622	0.636	0.641	0.644
Indonesia	0.423	0.481	0.543	0.572	0.607	0.613	0.617
Vietnam	..	0.435	0.529	0.561	0.584	0.590	0.593
Lao (PDR)	..	0.376	0.448	0.484	0.514	0.520	0.524
Cambodia	..	..	0.438	0.491	0.513	0.518	0.523
Timor-Leste	..	..	0.404	0.448	0.487	0.491	0.495
Myanmar	0.279	0.298	0.380	0.436	0.474	0.479	0.483

Source: UNDP (2011)

High economic growth represents one of the crucial factors that significantly contributed to the rapid poverty reduction, especially in Indonesia, Malaysia, Thailand and Vietnam. As there was about 77% of the total population considered as poor in the whole SEA region, this indicator dropped to less than 17% in middle 2000s. Table 2 shows that the population below the poverty line in many countries in SEA region has continuously decreasing since 1990s (Liu and Yin 2010). Vietnam experienced the most positive results in extreme poverty alleviation by reducing number of people living on less than '1.25 dollar a day' from 63.0% to 13.1% (WB 2011).

Table 2 Percentage of population in SEA living less than 1.25 USD a day (PPP), 1990-2009

Country	Year		
	Beginning of 1990s	Latest year	
Brunei	..	..	
Cambodia	49.0	28.0	2007
Indonesia	55.0	18.7	2009
Lao PDR	56.0	33.9	2008
Malaysia	1.8 (±0.2)	0.0	2009
Myanmar	..	..	
Philippines	30.0 (±1.0)	22.6	2006
Singapore	..	..	
Thailand	5.5	0.4	2004
Vietnam	63.0	13.1	2008

Source: WB (2011)

2.1.4 Population growth and growing pressure on natural resources

During the last three decades, the earth has witnessed the largest population increase in the human history. Between 1980 and 2010 almost 3 billion people were added to the global family, which made the world's population almost equal to 7 billion people (FAO 2011). The world population grew every year approximately by 90 millions of people.

That means an extra 10,000 people every hour (Swennen 2008). At the same time, the population in SEA almost doubled (Figure 2).

Land and water are very essential natural resources for producing food crops, nevertheless are under the pressure due to the population growth, economic development and the environmental changes (Schneider et al. 2009). It threatens not only the wellbeing of each person and hence the quality of life, nevertheless the availability and/or quality of natural resources especially in the rural areas of DCs, where households are more depended on them as a source of income and subsistence (Timah et al. 2008).

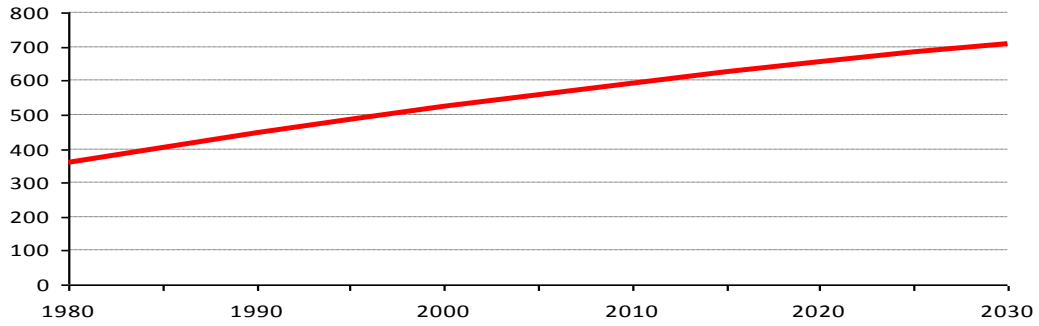

Figure 2 Population development in South-East Asia (millions inhabitants)

Source: FAO (2011)

As a result of such enormous population growth, population density of Vietnam became of the highest in the world, with its 88.8 millions of inhabitants and the area of 331,051 km^2. Vietnam also ranks to the highest densities countries among SEA region in the conception of person per km^2 of the agricultural land, where the value reaches 378 persons (FAO 2011).

The internal migration from rural to urban areas was the most rapid in East and SEA, due to the rapid economic growth in last three decades (Guest 2003). The migration in Vietnam from the rural areas into the urban centres has increased over a years. Before the implementation of *Doi Moi* policy and around five years after it was the internal

migration on a low level, however in the beginning of 1990s started to increase[3] (See Figure 3). Main reasons of migration into the cities are determined as followings: incomes from farming are not stable (price fluctuation on the market), less farmland as consequences of enormous population growth or higher level of the education and thus launching young people to the cities. Another factor involving rural-urban migration is increasing of the industry and service sector and hence increase demand for workers in this sector, which is mostly located nearby urban centres (Guest 2003; Hoang et al. 2008). The urban population in Vietnam is mostly concentrated around two major centres, Ha Noi and Ho Chi Minh City, and is necessary to add that the south part is more urbanized than the north one (Smith and Dixon 1997).

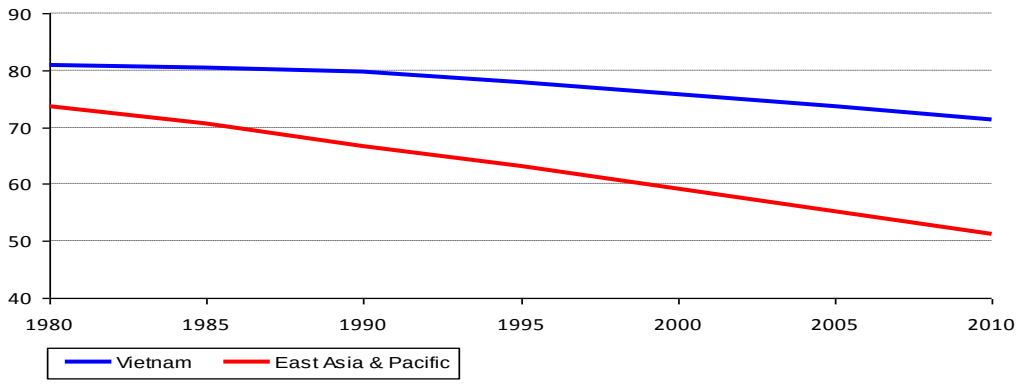

Figure 3 Rural population in Vietnam (% of total population)

Source: WB (2011)

2.2 Agriculture and rural systems development in South-East Asia

Generally, there was estimated that 70% of all poor in SEA, which counts about 475 million people, live and work in rural areas. In some countries it is even more, for instance Vietnam, Cambodia or Thailand, where more than 90% of all poor people occupy rural areas. Thus, to fight with the poverty and therefore poverty alleviation is necessary development which is concentrated in the rural areas (De Campos Guimarães 2009). It includes for instance adopting regulations on farm land use, which allows farmers better reaction for increasing demand for high quality products from the side of urban areas; planning expansion of industrial sector to the rural areas and therefore

[3] Rural population share of total population performed 80% constantly among several years (1984-1990) and afterward started to decrease. Nowadays presents 71% (WB 2011).

create new employment, or support the role of seasonal migration and increase the efficiency of natural resource management in the rural areas (Hoang et al. 2005).

Doppler et al. (2006) distinguished three main groups of farming systems in the consideration of the market orientation of rural households in SEA: (i) market oriented farming systems, (ii) subsistence and market oriented (intermediate) farming systems and (iii) subsistence-oriented farming systems. The difference in incomes is significantly higher in the market-oriented (see Table 3), however is necessary take in consideration that ethnic minorities are regarded as "traditional" population and less market-oriented. Nevertheless, based on many analyses was proved, that ethnic minorities do not differ from others in their way of livelihood decision-making process in the terms of education access or market access (Minot et al. 2006).

(i) Farmers sell more than 90% of their production in the period of several years to the market. Farms are considered as commercial with maximizing their profits and outputs and are settled mostly nearby large urban centres to sell their products. Majority of family needs are provided directly from the market.

(ii) Farmers sell around 10-90% of their production to the market in horizon of several years, however they produce for the home consumption as well. In a mountain area only around 10% of ethnic groups belong to this group.

(iii) Farmers sell less than 10% of their production to the market in the period of several years. They produce, store and process their products primary for the need of the family, thus they are determined as self-sufficient families. Their source of income is performed by farming or collecting forest products. In a mountain area of SEA around 90% of ethnic hill tribes belong to this group.

Table 3 Income difference in market, intermediate and subsistence oriented farming systems of villages in mountain zone in Vietnam (000 VND/year)

	market-oriented	subsistence and market-oriented	subsistence oriented
Farm income	17,487	8,380	6,915
Off-farm income	5,559	22,76	11,030
Family income	23,046	10,656	8,019

Source: Doppler et al. (2006)

2.3 Diversification of activities in farming and rural systems

Due to the economic reforms and development since 1980s, especially the market liberalization, has appeared new challenges and opportunities to the agrarian sector (Joshi et al. 2003), especially opportunities to diversify both farm and off-farm activities, which played an important role in rural household's income (Demurgér et al. 2010), generating employment, mitigate poverty or conservation natural resources (Joshi et al. 2003). Some of the SEAn countries chose a way of agriculture diversification as a strategy for the rural development. For instance after successful green revolution[4], the prices of cereals lowered and thus was necessary diversify labour and land resources to the other, non-cereal, sector (Goletti 1999).

Rural households with many family members and small scale farms are more likely to have multiple income sources; larger share of income by non-farm activities and higher crop value per hectare due to more diversified labour force. On the other hand, they have smaller share of outputs which are marketed due to the high share of products for the home consumption (Minot et al. 2006).

Successful diversification of agriculture sector in rural areas would need appropriate infrastructure, commercialized agriculture systems and well-working institutions, where most of those conditions are still slowly developing in countries of SEA (Goletti 1999).

According to Minot et al. (2006), income in the agriculture economic can come from different sources: crop income; non-crop agriculture income, i.e. livestock, fisheries and forestry; and non-agricultural income.

2.4 Agricultural diversification in Vietnam rural areas

Vietnam's rural economy has been diversifying at various levels. First, the agricultural share of GDP contracts[5] due to broadening income sources of the rural households, for

[4] Green revolution led to the self-sufficiency of cereal food in many Asian countries, where the best example could be Indonesia, which became from the biggest importer of rice in 1970s, to the self-sufficient country in late 1980s (Goletti 1999).

[5] According to WB (2011) agriculture sector nowadays presents around one fifth of GDP share, whilst in 1990 presented around 40% of GDP share.

instance rural industrializations of agricultural products, i.e. storage, transportation, processing or marketing (Goletti 1999). However, Vietnam's agriculture-forestry-fishery sector is growing in the relative conception, i.e. in 2010 grew for 2.75% per year, mostly due to the strong agriculture growth, which almost doubled in contrary to 2009, whilst fishery and forestry noticed just slight growth (FAO 2011).

Although growth of the rice production in Vietnam is still increasing, other cash crops as coffee, tea, rubber or sugar cane have noticed significant increase even more (FAO 2011). As can be shown on Table 4, in last 20 years, the highest increase noticed production of coffee, which was produced in 2010 twelve times more than in 1990. According to Goletti (1999), such an enormous growth in coffee and rubber production happened due to the successful active policy effort and regulations, which led to the export growth and enhanced livelihood of small farmers in Central Vietnam, one of the poorest region.

Table 4 Production of cash crops in Vietnam (tones/year)

	Year		
	1990	2000	2010
Coffee, green	92,000	802,500	1,105,700
Rubber	57,939	290,800	601,700*
Tea	32,247	69,900	198,466
Sugar cane	5,405,600	15,044,300	15,946,800
Paddy rice	19,225,100	32,529,500	39,988,900

Source: FAO (2011); UN (2011)
Note: *2007

Another product where the production enormous increased is fresh fruit and vegetable. There were produced in 2010 almost six times more in contrary to 1990, even the arable land in this time just slightly increased in that period (FAO 2011). That happened probably due to the demand for the high-value food products, such as fresh fruit and vegetable, which preceded growing integration in the international market, rapid economic growth and urbanization (Hoang et al. 2005; Goletti 1999).

2.5 Livelihood and risk coping strategies of rural households

Rural households in DCs usually face to the insecurity due to the hard weather conditions, market imperfection, price fluctuation or bad policy regulations. Based on a research by Minot et al. (2006) in the North Vietnam was exposed, that the poorer rural

households are more diversified in the crop production than the richer ones, and urban households are less diversified than the rural ones.

In fact, the main source of rural household's income in Vietnam is performed by the agriculture sector (FAO, 2011). Nevertheless, the income from the agriculture in Vietnam is becoming less stable due to two reasons, (i) increasing environmental risks and (ii) economic risks linked to rapid Vietnam's development (Waibel and Duc 2009).

(i) Natural disaster as typhoons, droughts, flash floods, saline water intrusion etc. are increasing and mostly appear in the central coastal provinces of Vietnam as Thua-Thien Hue, Dinh Binh or Da Nang. In addition, in last years Vietnam was also affected by livestock diseases as Avian Flu.

(ii) Economic risks for agriculture and rural areas are a result of open economy policy, where due to the fast integration into the international market, becomes the domestic market more exposed to the price fluctuation of international markets.

Rural households choose their strategy for agriculture diversification along to several factors. "*First is the initial conditions, i.e. how strongly his income varies and what their capacity to smooth consumption is. Second is the household's preferences towards risk and third is the cost of diversification, i.e. the amount of income reduction for reducing risk*" (Waibel and Duc 2009). Households without risky behaviour will have the tendency to diversify more, i.e. households with the limited incomes are willing to sacrifice additional incomes to mitigate the risk of their regular income (Minot et al. 2006; Waibel and Duc 2009).

The decision making of farmers in the rural areas depends on two conceptions of resources: classical natural resources and man-made resources, which are also called in the economics, productive factors. These productive factors include land, water, labour, forest, energy, machinery, financial means, knowledge, social resources etc. These resources influence the farmers in their decision-makings in the volume of the quality and availability that appear in the surrounding areas (Doppler et al. 2006).

3 OBJECTIVE OF THE THESIS

Rural households living in the close proximity to the natural reserve are both directly either indirectly interacted with its natural environment and thus it has influence on the social as well as economic development of the community. However to better understand their behaviour and decision-making, is essential to analyse their farming systems, livelihood strategies, resources or income diversification. Thus, the objective of the thesis is to identify their livelihood diversification, to document household characteristics, and, to provide a quantitative assessment of the living standard of the rural families living near or in the buffer-zone of Phong Dien Nature Reserve in central Vietnam.

4 MATERIALS AND METHODS

4.1 Study area description

The survey and data collection took place in eleven villages of Phong My Commune, which was located in the buffer-zone of Phong Dien Natural Reserve, Phong Dien district, Thua Thien Hue province, central Vietnam. Thua Thien Hue province covers the area of 5,063 km². Mountains and forest take up more than 70% of the province territory and only 10.9% remains for agricultural land (General Statistical Office 2009; Wunder et al. 2005). Province itself is divided into nine administrative units (Figure 4) while the most urbanized parts are situated into the coastal areas and in administrative centre Hue (Wunder et al. 2005; Thua Thien Hue Portal 2006). The population counts nearly one million inhabitants, of whom about 5.2% belong to the ethnic minority living mostly in the mountainous area. Nearly third of the whole population lives in or around major city Hue and in most of the interior part the population density does not reach more than 50 persons per km² (Protected Mekong Zones 2003; Wunder et al. 2005; Thua Thien Hue Portal 2006).

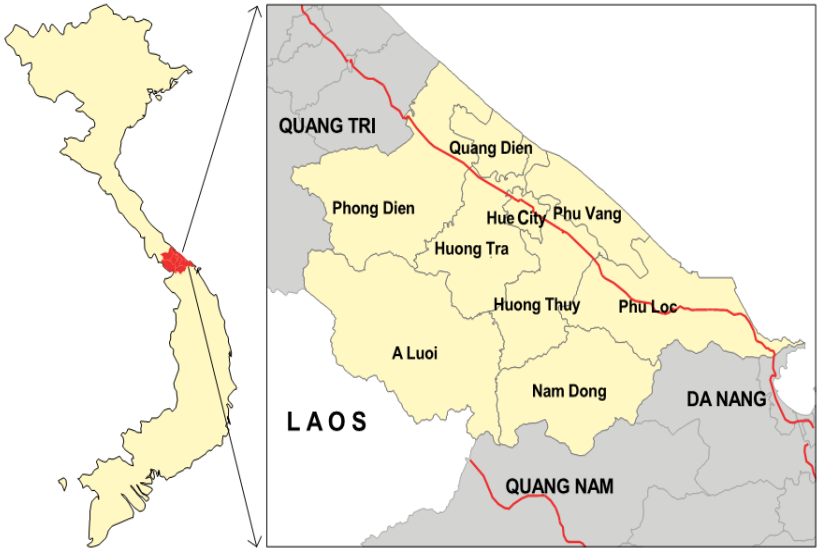

Figure 4 Administrative map of Thua Thien Hue province

Source: Wunder et al. (2005)

Phong My Commune can be characterized as a large watershed system along O'Lau river (394 km^2), where most of the population is concentrated in the valleys. Fertile soils and terrain predict that more than 90% of households depend on the agricultural production or related activities (Trai and Richardson 1999). Generally, the agricultural activities have changed over recent years, for instance due to the availability of the irrigation system, to practice wet rice cultivation (Trai et al. 2001). The majority of the population in Phong My is composed of Kinh ethnic, nevertheless in Khe Tran and Ha Long villages are found Ta-oi ethnic minority (Trai and Richardson 1999).

Target area is characterized by hot and humid climate, with regular monsoons. The rainfall ranges from 2,500-3,000 mm (Trai and Richardson 1999; Trai et al. 2001; Vlková at el. 2011). Steep slopes of the hills, which reach in some places up to 1 500 meters a.s.l. and in addition short distance to the seaside (Annex 1), can increase the risk of floods. Especially during the monsoon period (October – November), the water can easily run down the hills in the lowland. That consequences can be intensified by the deforestation (Protected Mekong Zones 2003) and poor forest management in Phong Dien Nature Reserve, which plays an important role in the impact to the downstream located communities as a result of not only floods, but moreover problems with the irrigation or unavailability of the drinking water (Trai et al. 2001).

Table 5 Socio-economic information of Phong My commune

	CEV	NEZ	BFZ	Phong My
Total population	4,246	1,183	850	6,279
Number of HHs	757	257	194	1,208
Population density per km^2	390	177	59	196
Population growth (%) *	1,1	3,1	3,2	1,6
Labor force (%) **	48	49	55	49
Poor HHs (%)	7.5	12.4	26.8	11.7
HHs no water access (%) ***	71	90.5	91	78.5

Source: Phong My commune People's Committee statistics (2007-08)

Note(s): * Average annual population growth during last 5 years (%)

** Labor force as a percentage of total population in 2007

*** HHs without access to safe water or sanitation (%)

As stated above, Phong My Commune consists of eleven villages. For the purpose of our survey, those villages were divided into three groups (Figure 5) according to their geographical location, farming systems structure and ethnic composition as follows: (i) Central villages, (ii) New economic zone and (iii) Buffer-zone villages

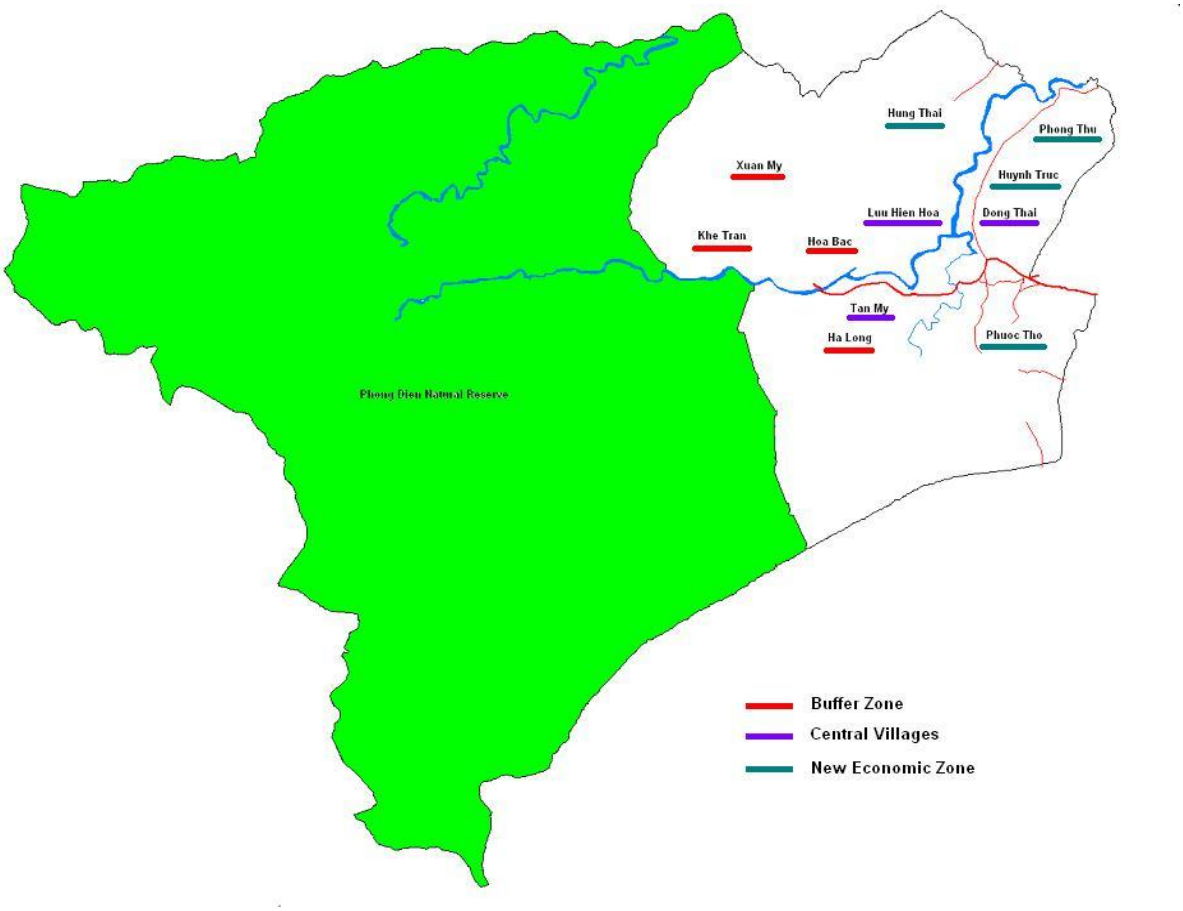

Figure 5 Phong My Commune Map

i) Central villages (CEV): Luu Hien Hoa, Tan My, Dong Thai.

ii) New economic zone (NEZ): Phong Thu, Huyen Truck, Hung Thai, Phuoc Tho

iii) Buffer-zone villages (BFZ): Khe Tran, Ha Long, Hoa Bac, Xuan My

Furthermore, BFZ villages significantly differ from the other ones in the terms of crop structure. Due to the different natural conditions, households from BFZ focus more on the perennial crops and forest products, while both CEV and NEZ rely more on annual crop cultivation, such as rice or peanuts.

Table 6 Land-use systems in the study area

	CEV	NEZ	BFZ	Total
Total area (ha)	1,089	669	1,442	3,201
Annual crops (ha)	422	166	37	624
Rice (ha)	134	68	13	215
Perennial crops (ha)	567	407	1,352	2,325
Rubber (ha)	354	236	175	765
Natural or buffer-zone forest (ha)	0	0	649	649

Source: Phong My People's Committee (2009)

4.2 Data collection

Data were collected in the cooperation with Hue University of Agriculture and Forestry (HUAF) during the period 2007 to 2009. Firstly, informal interviews with representatives of Phong My Commune and all village heads were conducted in order to understand the main livelihood strategies and future expectations. Afterwards, 83 questionnaires were collected in all villages, representing 10% of all households. Respondents were selected randomly from different parts of villages. Consequently, data focused on household characteristics, livelihood strategies, farming systems, market strategies etc. were collected. Finally, 148 questionnaires were collected in order to extent the database on living standard criteria, particularly household oriented.

4.3 Data processing

The data were statistically processed via MS Office Excel®. For the purpose of livelihood strategies analysis studies, surveys of Doppler et al. (2006) or Cramb et al. (2004) were followed. For quantitative assessment of living standard, Farming Systems Analysis (FSA) was applied (Doppler et al. 2006) (see Table 7).

Table 7 Living standard criteria

Criteria	Indicator	Definition
Economic success	crop production	structure of crop production in terms of food and cash crops; efficiency of cultivating cash and food crops
	animal production	structure of animal production; purpose of use
	using fertilizer	amount of fertilizer or manure used per sao
	using machinery	percentage of farmers using mechanization
	farm profitability perception	percentage of farmers who consider farming as profitable activity; most profitable crops
Economic security	cash income	total annual income (farm and off-farm activities)
	cash expenditures	percentage representation of particular expenses
	perception of prices	percentage of farmer's perception of prices on the market
	obstacles in selling products	percentage of farmers experienced obstacles in selling products; most common obstacles
	obtained price for products	obtained price for products selling on the market
Independence from resources	hiring labour force	percentage of farmers who hire labour force
	beneficiary of any development projects	percentage of farmers who are beneficiary of any development project
	taking loan	percentage of farmers who take loans
Household needs	problems in agriculture systems	percentage representation of most crucial problems which occur in agriculture systems
Food and water supply	water supply	percentage representation the type of source of water; distance from source of water
	food supply	percentage of farmers who felt secure in the terms of food sufficiency
Health conditions	opinions on healthcare	opinions on doctor and hospital
	days of illness	days of illness during one year
	expenses on healthcare	amount of cash expenditure for healthcare
Education	education level	reached level of education
	expenses on education	amount of cash expenditure for education
Social security	member of any association	percentage of farmers who are member of any association
	grouping to cooperatives	percentage of farmers grouped to cooperatives
	own bank account	percentage of households owning bank account

Source: Doppler et al. (2006)

5 RESULTS

5.1 Livelihood strategies

Table 8 indicates the main livelihood strategies that were collected in all three parts of Phong My Commune regarding to the both financial and subsistence security of rural families. Generally, the livelihood of all three study areas is based particularly on the crop production and any other farm or off-farm activity play only a minor role. Furthermore, based on farmers' perception, acacia (*Acacia mangium*), peanut (*Arachis hypogaea*) and rubber (*Hevea brasiliensis*) were identified as the most important products in all areas.

Table 8 Main livelihood strategies of households in Phong My

	CEV	NEZ	BFZ
Most important products	- peanut, rubber	- rice, peanuts, acacia, rubber	- rubber, acacia
Main activities	- rubber, acacia, rice, peanut - timber processing - homegarden - services/business	- rubber, acacia, peanut, rice - firewood/timber collection - livestock - homegarden - iron-scrap collection	- rubber, acacia, peanut - homegarden - NTFPs collection - firewood/timber collection
Main source of income	- peanut, rubber	- rubber, acacia - homegarden - livestock - fishing	- rubber, acacia, peanut - homegarden - NTFPs - fishing
Other sources of income	- services/business - homegarden - bamboo - livestock	- iron-scrap collection - firewood collection	- financial transfers

Certain differences were observed in the main activities as spectrum and diversification of activities. Not surprisingly, rubber, acacia and rice perform very important products. However, CEV are more focused on off-farm activities, NEZ rely on collection of firewood or iron-scrap as well as on the livestock production. BFZ focus on nearby forest through gathering of NTFPs. Generally, the role of homegardens is very specific and is also very positively perceived by our respondents in all study sites.

The most significant difference was observed in terms of income sources diversification. CEV, generally, rely on both annual and perennial cash-crops only, while the other areas diversify their sources into broader spectrum of products.

5.2 Household characteristics

Figure 6 indicates the differences in the farm size among focused study sites. BFZ have in average the largest farm size, followed by NEZ. On the other hand, farm size of CEV is almost two-times smaller. The farm size structure differs among study sites as well. In BFZ and NEZ consists particularly of rubber and/or acacia plantations, while in CEV farmers grow particularly rice and peanuts (see Table 6).

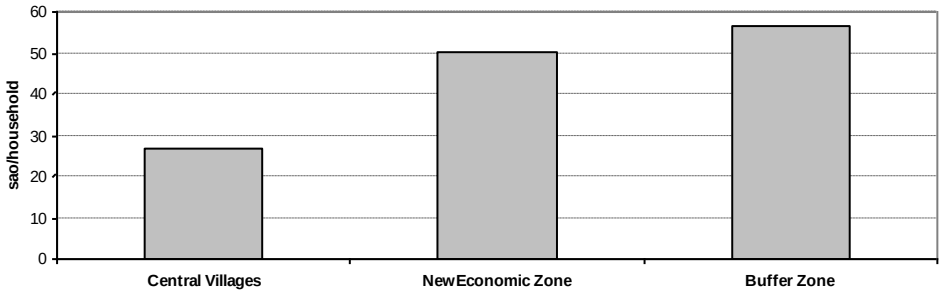

Figure 6 Farm size (in sao per household)

Note: 1 ha = 20 sao

From the demographic point of view (Table 9), our survey documented that average household size in all study area was very similar and varied from two to ten members (mean=5.7, SD=1.9). Correspondingly, other demographic indicators, such as average age of household head (mean=47.5, SD=14.2) and amount of labour force (mean=2.9, SD=1.7) showed very similar values. On the other hand, focused villages differed in the terms of dependency members, particularly children.

Table 9 Demographical characteristics of surveyed households

Indicator	CEV		NEZ		BFZ	
	Mean	SD	Mean	SD	Mean	SD
Household size	5.54	1.88	5.94	2.02	5.29	1.85
Children (<14 years)	1.84	1.42	2.10	1.17	1.36	1.54
Adult (>60 years)	0.27	0.55	0.23	0.61	0.29	0.44
Farmer's age (years)	48.27	15.83	46.55	13.01	47.50	12.10
Labour force	3.46	2.06	3.58	1.90	3.57	1.75
Hire labour force (%)	27.03	…	35.48	…	20.00	…

Regarding to the both decision-making process and gender perspective, following findings were observed. 73.2% of selected households were identified as male-headed, particularly in the buffer-zone villages. In contrast to this, both CEV and especially NEZ

villages showed higher percentage of female-headed household, 27% and 32% respectively (see figure 7).

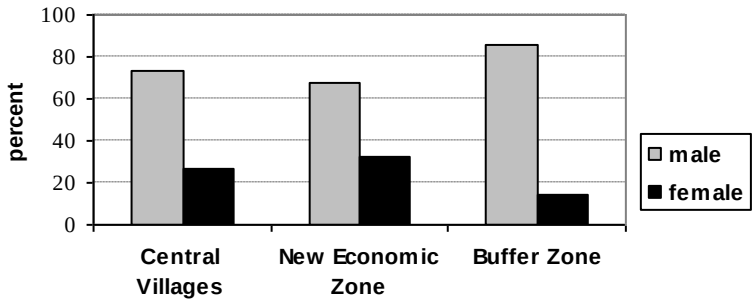

Figure 7 Gender structure of household heads (%)

5.3 Living standard assessment

5.3.1 Economic success

Crop production

The structure of the cultivated crops differed among villages. In NEZ, almost 94% household cultivates rice as a main food crop, which is in comparison to BFZ, where only half of households did so. No significant differences were observed in planting of cassava, both for cash or subsistence purposes. Nevertheless, cassava together with peanuts was observed as the most important cash crops, mainly in CEV.

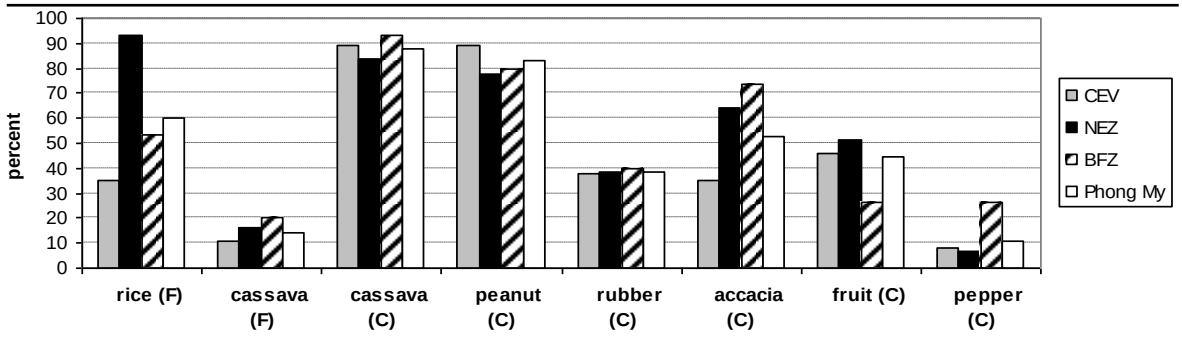

Figure 8 Main cultivated crops with special regard to cash and food purposes (% of interviewed households planted particular crop)

Note: C – Cash crops, F – Food crops

Certain differences were observed in the terms of perennial crops. CEV households tented to produce fruit, while in BFZ planted more acacia and pepper. NEZ production from perennial cash crops was focused on acacia (similar to BFZ) and fruit (similar to CEV). No significant differences were observed in the terms of rubber planting among all three study areas as number of households who claimed themselves as rubber producers.

Table 10 shows the efficiency of cultivating cash crops. Gross margin is significantly higher in CEV. Fertile soils and irrigation system lower total variable costs, e.g. seeds, fertilizers, machinery etc. This is obvious particularly in comparison with BFZ villages. NEZ practiced an input-intensive farming ensuring higher yields only through high investments into agricultural inputs.

Table 10 Gross margin of rice and peanuts planting

	MU	CEV	NEZ	BFZ
Rice (food crop)				
Total variable costs*	000 VND	1,776.53	2,799.76	1,701.97
Production	kg	1,128.47	2,012.82	882.50
Gross income	000 VND	2,821.18	5,032.05	2,206.25
Gross margin	000 VND	1,044.65	2,232.29	504.28
Efficiency	%	32.83	40.11	20.06
Peanuts (cash crop)				
Total variable costs*	000 VND	1,605.49	2,954.36	2,054.22
Production	kg	421.71	1,175.63	425.71
Gross income	000 VND	2,741.10	7,641.60	2,767.14
Gross margin	000 VND	1,135.61	4,687.24	712.92
Efficiency	%	40.63	42.99	21.54

Note: *Total variable costs are represented by seeds, fertilizers, pesticides, insecticides and machinery.

Animal production

As stated above, Phong My commune is generally based on the crop production, however most of the households breed any kind of animal. Pigs and chickens are the most common animals, however the purpose of animal husbandry is mostly for selling (as in NEZ 74% is bred for market), following by home utilization (consumption or work) and only 4.8% in average for reproducing or breeding (Figure 9).

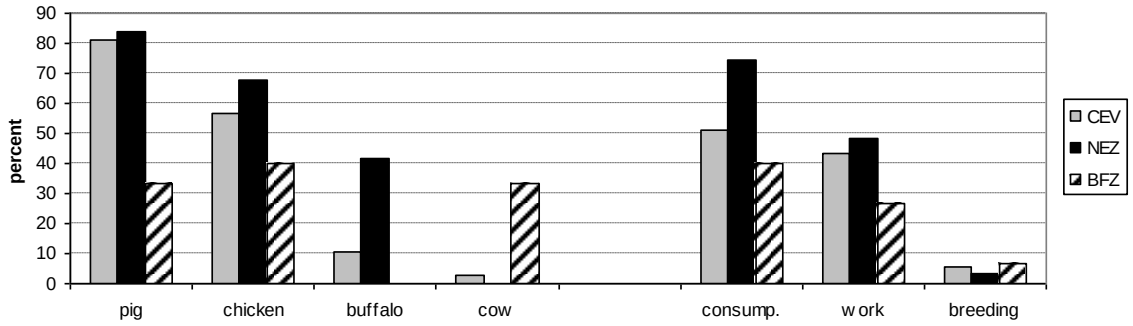

Figure 9 Animal husbandry and its purpose of use (%)

Using fertilizers

Figure 9 shows, that CEV is the leader in using fertilizer and manure for farming purposes. Remarkable is the fact, that in BFZ, 100% respondents use fertilizers, but the amount per sao is two or three times lower comparing to other villages. On the other hand, most of the farmers from NEZ use manure as result of the highest results of owning pig or buffalo.

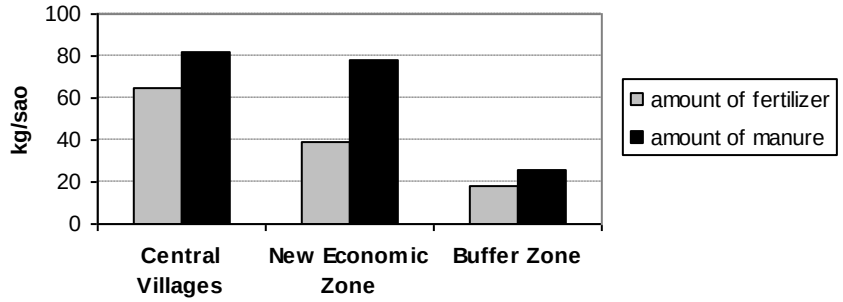

Figure 10 Using fertilizers and manure (kg/sao)
Note: 1 ha= 20 sao

Using machinery

Agriculture activities in Phong My Commune are already almost at full mechanization among all villages, even main part of them are rented machines, only 20% in BFZ own machinery. In most cases are used land preparation machine, in CEV and BFZ more than in NEZ.

Farm profitability perception

More than the half of respondents believed that agriculture is profitable sector, particularly in NEZ (68%), depending on the different cultivated crops. Peanuts, followed by cassava and rubber were identified as the most promising products. In BFZ, rice was perceived as a profitable product as well.

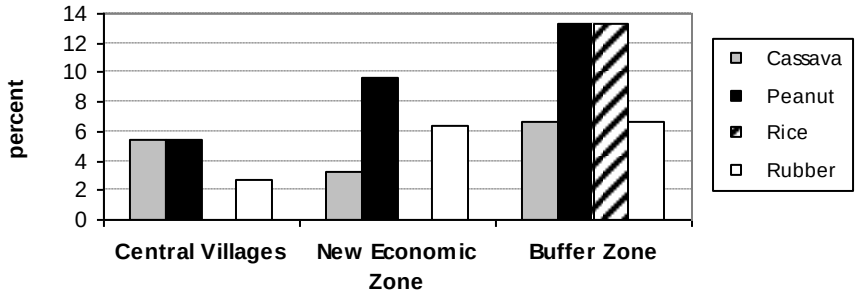

Figure 11 Perception of economic success from agricultural products (%)

5.3.2 Economic security

Cash income

The average annual cash income in the study area is equal to 23.99 million VND (mean=23.99, SD=25.88) and it differed among villages. The lowest annual income was observed in BFZ, where also the lowest income inequality was documented. However the off-farm income is nearly equal between NEZ and BFZ, which means the income from farming in NEZ creates major part of all annual income, which is linked to their large farm size.

Table 11 Annual cash income per household (VND)

Source of income	CEV		NEZ		BFZ	
	Mean	SD	Mean	SD	Mean	SD
Total annual cash income	22,453	30,596	28,768	24,294	17,474	9,346
Income from farming activities	12,922	15,947	21,981	21,275	9,138	8,827
Income from minor farm activities	4,222	8,939	2,684	5,128	4,186	5,563
Income from off-farm activities	5,309	10,020	4,103	11,657	4,150	6,049

Cash expenditures

In average, the highest ratio of total expenditures are spent for household (e.g. taxes, clothes, energy etc.), followed by all agricultural inputs. However, BFZ has the lowest percentage of inputs as a result of more extensive oriented farming system. Expenses for the education together with the healthcare creates in average more than one fifth of all cash expenditures.

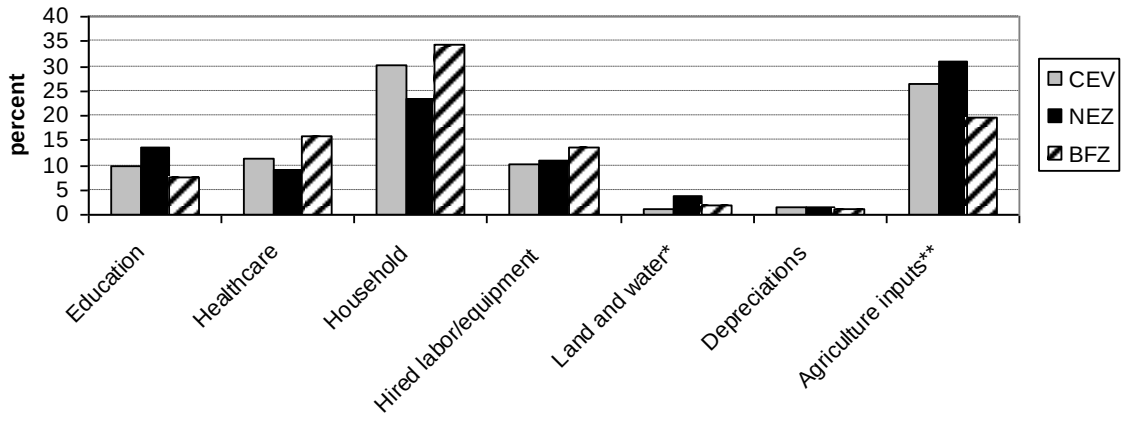

Figure 12 Ratio of total cash expenditures

Note: * land and water, e.g. taxes, rent etc.
**agriculture inputs, i.e. fertilizer, pesticides, insecticides, seeds, fodder for animals, ¨vaccination for animals etc.

Perception of prices

On Figure 13 is demonstrated the high economical orientation of NEZ, where two third of respondents wish the prices on the market would be higher and only 6% are satisfied with the prices. However NEZ usually obtain the highest price in compare to the other groups of villages (Table 12). Opposite situation occurs in BFZ, where is not big jump between the perception of low and acceptable prices.

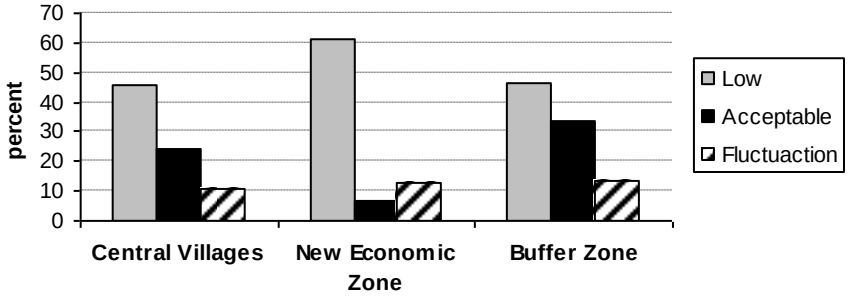

Figure 13 Perception of prices on the market (%)

Obstacles in selling products

In general 71% has experienced obstacles with selling their products. However, BFZ shows the highest results in contrary to CEV, 86.6% and 62.2% respectively. In most cases are caused by the middleman, who controls prices, followed by the price fluctuation or changing weather conditions.

Obtained prices for farm products

Farmers can obtain different price from the products among the villages, depending on their skills to negotiate, using middleman or be grouped to cooperatives etc. The biggest different in obtained price appeared in selling beans, pepper and chicken (however in BFZ the indicator of chicken data is not so determinant as a result of the only one respondent). The highest obtained price from the agricultural products reaches NEZ, which is linked to their highest perception of economic profitability and their annual income. However BFZ is only one, which is grouped to cooperatives, does not help in obtaining better price.

Table 12 Obtained price for products (VND)

	CEV		NEZ		BFZ	
	Mean	SD	Mean	SD	Mean	SD
Cassava	411	71	426	44	412	88
Rice	2,540	326	2,542	420	N.A.	N.A.
Bean	7,333	942	6,333	3,197	4,750	1,250
Peanut	6,484	814	7,024	670	6,541	983
Pepper	50,000	0	56,666	2,357	52,500	2,500
Rubber	8,900	538	9,111	314	9,000	0,00
Pig	15,307	721	15,250	1,089	14,666	471
Chicken	40,000	7,071	33,333	6,666	30,000	0

5.3.3 Independence from resources

Hiring labour force

In average 29% hire a labour force, mostly for harvesting or taking care of plantation. The lowest percentage of hire labour force is demonstrated by BFZ as a result of lower economic income (Table 11).

Beneficiary of any development project

There is significant contrast in the area of beneficiary of any development project. In BFZ 47% of respondents took part in any developing project.

Taking loan

In NEZ was observed that more than 65% of households take a loan, as a result of the highest annual income, even the results do not significantly differ among villages.

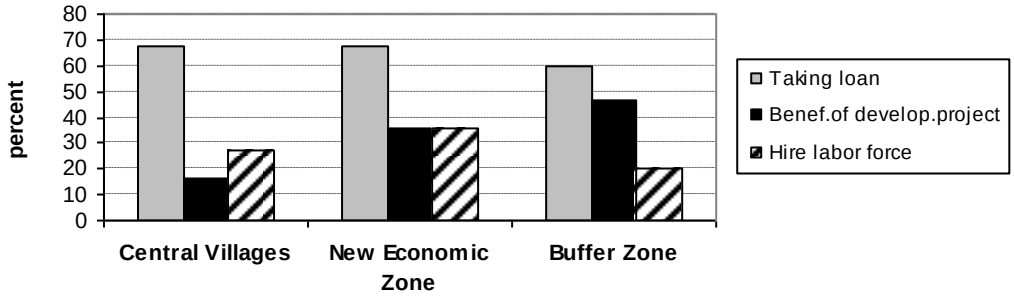

Figure 14 Independence of resources

5.3.4 Food and water supply

Food supply

In average 47% respondents feel secure regarding to the food sufficiency. Figure 15 shows visible difference among the study areas. Only 20% households in BFZ feel safe to have enough food for their consumption, in contrary to CEV, where it is almost three times more. It is connected with BFZ's lower income (Table 11), lower education level (Figure 17) or less economic profit from agriculture products (Table 12.)

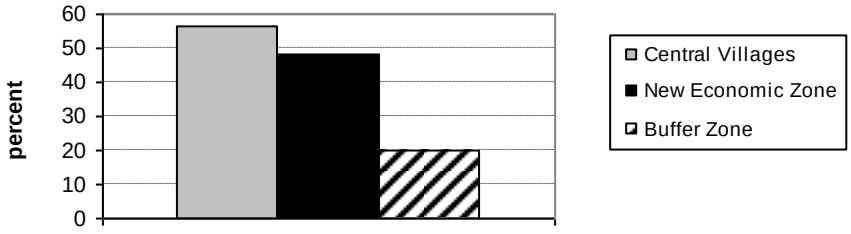

Figure 15 Feel secure regarding to food sufficiency (%)

Water supply

The best quality of water both in dry and rainy season occurs in BFZ as a result of its upstream location of O Lau River. There are different approaches to the source of water; whilst in CEV and NEZ most of the households have wells, in BFZ majority use pipes directly from the stream. That is linked to the distance from household, where 67% households of BFZ have water supply farther than 20 minutes walking and wells in other groups of villages are usually close to households, thus less than 5 minutes. Nobody from respondents buy the water in the shop.

Table 13 Overview of water supply (% of households)

	CEV	NEZ	BFZ
Source of water			
Wells	67.86	86.15	25.00
Tap	23.21	0.00	16.67
Piped from stream	1.79	0.00	58.33
Buying in shop	0.00	0.00	0.00
Distance from household			
< 5 min	44.64	35.38	8.33
5 - 20 min	37.08	42.61	29.16
> 20 min	23.21	24.62	66.67

5.3.5 Health Conditions

The quality of the healthcare was not part of the survey, however are shown respondent's opinions and other facts about healthcare. BFZ is ranking the highest post in using traditional medicine, where 41.7% use it. In BFZ 16.6% people still practice worshipping, two times more than in other villages.

Days of illness

Highest number days of illness per family member occur in BFZ, which is connected with more days spent in hospital and place to heal themselves, 83% heal themselves in hospital. In addition it should be noted, the statistical deviation in BFZ is two times higher in comparison to other data (Table 14).

Opinion on healthcare

Respondent's opinions on healthcare in general vary among villages. More than half respondents from BFZ and CEV consider doctor too far from their households as a result of their location. In the case of hospital more than 70% farmers in all villages consider

hospital too far. Surprisingly, only in BFZ most of the people do not consider doctor or hospital too expensive, totally opposite than in CEV.

Health expenditures

Expenditures for healthcare differ among study areas. Even BFZ has the lowest annual income, they spent more than 50% than CEV, nevertheless it is linked to the higher ratio of days of illness and days spent in hospital.

Table 14 Health conditions

	CEV		NEZ		BFZ	
	Mean	SD	Mean	SD	Mean	SD
Days of illness *	12.49	22.29	10.54	28.12	32.09	43.37
Type of treatment (%)						
Using traditional medicine	26.79	…	20.00	…	41.67	…
Calling local medicine man	21.43	…	21.54	…	20.83	…
Calling graduated doctor	17.86	…	23.08	…	12.50	…
Worshipping **	7.14	…	7.69	…	16.67	…
Opinion on health care (%)						
Doctor too far	57.14	…	33.85	…	58.33	…
Doctor too expensive	83.93	…	15.38	…	16.67	…
Doctor poor quality	1.79	…	12.31	…	8.33	…
Hospital too far	76.79	…	73.85	…	75.00	…
Hospital too expensive	39.29	…	30.77	…	16.67	…
Hospital poor quality	7.14	…	7.69	…	12.50	…
Health expenditures (000 VND)	1,951	2,264	2,259	2,459	3,402	2,910

Note(s): * per family member, ** Making offerings and worship

5.3.6 Household needs and supply balance

Results of household needs are determined by problems and obstacles appearing in agriculture systems regarding to their main income comes from agriculture activities. Remarkable is fact that CEV do not have in general high requirements for the problems in agriculture systems (Figure 16). There are more reasons why it happens, mostly due to feeling with enough food for themselves (Figure 15), highest percentage of using fertilizer or manure per sao, or the most of diversification in crops and animal husbandry. Last fact is a reason of their highest need, wish to control diseases.

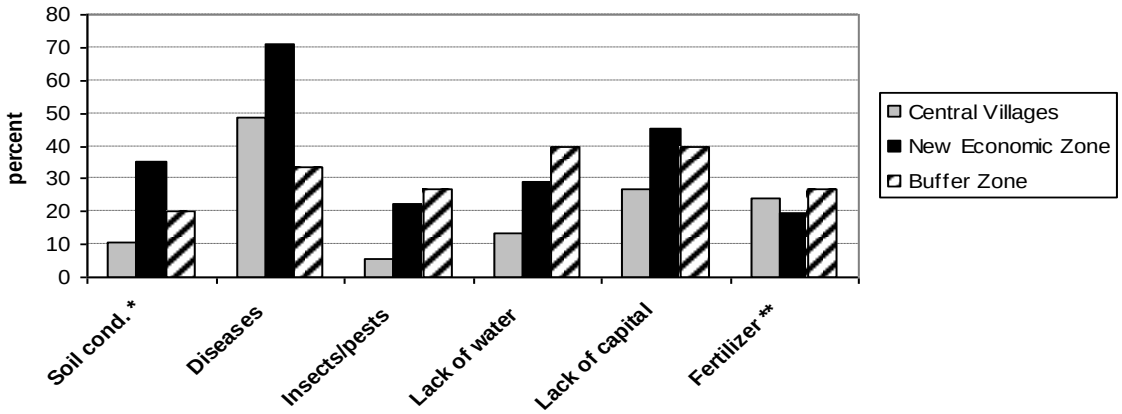

Figure 16 Problems in agriculture systems (%)

Note(s): * bad soil conditions, ** lack of fertilizer or high price of fertilizers

5.3.7 Education

Education level

In all three groups of villages, the average of the education level is slightly under 6 years, which means successfully finished primary education (Figure 2). There was not observed significant different among the villages. Nevertheless, the secondary education, at least 7 years (Runckel 2010), reached in NEZ almost 42% in comparison to BFZ only 26%.

Expenses for education

The highest amount of expenses for education presents NEZ, followed by CEV and BFZ, which spend 3.39, 1.73 and 1.66 millions of VND respectively. The higher education is, the more expenses are spent for it.

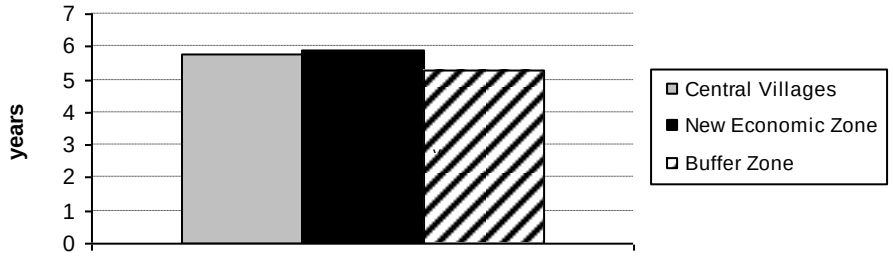

Figure 17 Average years of schooling

5.3.8 Social Security

Member of any association

In all villages more than 70% respondents are members of any association, mostly Farmer and Women Union, which provides them benefits as protecting women's rights, gender equality etc. (Vietnam Women's Union 2005).

Grouping to cooperatives

One of the important need and as well social security can be considered grouping farmers to the cooperatives or collectives. Interesting fact is that from all Phong My Commune, only BFZ is grouped into cooperatives and all of them (27%) think grouping is necessary.

Own a bank account

Nobody from all respondents owns a bank account.

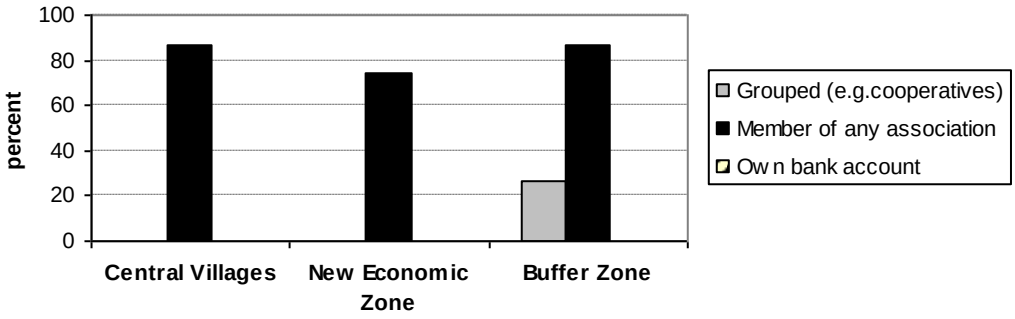

Figure 18 Social security (% of households)

5.4 Quantitative analysis of living standard

As show the final graphs of living standard assessment (Figure 19), there are significant different among villages differ by living standard criteria (see Table 7).

CEV is ranking the first position almost in all criteria, with the best result of food and water supply regarding to the good location in terms of water. Even the crop diversification is not as high as in NEZ, due to using fertilizer seems to be higher yields and therefore feeling to be sufficient with food. Even CEV has the highest possible result in criteria household needs vs balance, it is not much determinant due to there is only one indicator.

BFZ has all indicators more or less on the middle stage with the only one exception, healthcare. BFZ spent most expenses for it as well as the highest percentage of farmers healing themselves in a hospital.

NEZ shows the highest results in comparison to the other study areas in economic success. It seems to happen due to their higher both crop as well as animal diversification and thus using more manure per sao. As a result of already mentioned factors, their products are more profitable. NEZ reaches the best post in education, due to the highest level of education and therefore highest expenses for it seems households from NEZ cares about education of their children. The only one indicator with very low level of results, even in comparison to other study areas is shown in social security as a result of nobody is grouped to cooperatives, nobody owns a bank account and in addition occurrence of low percentage of farmers, who are member of any association.

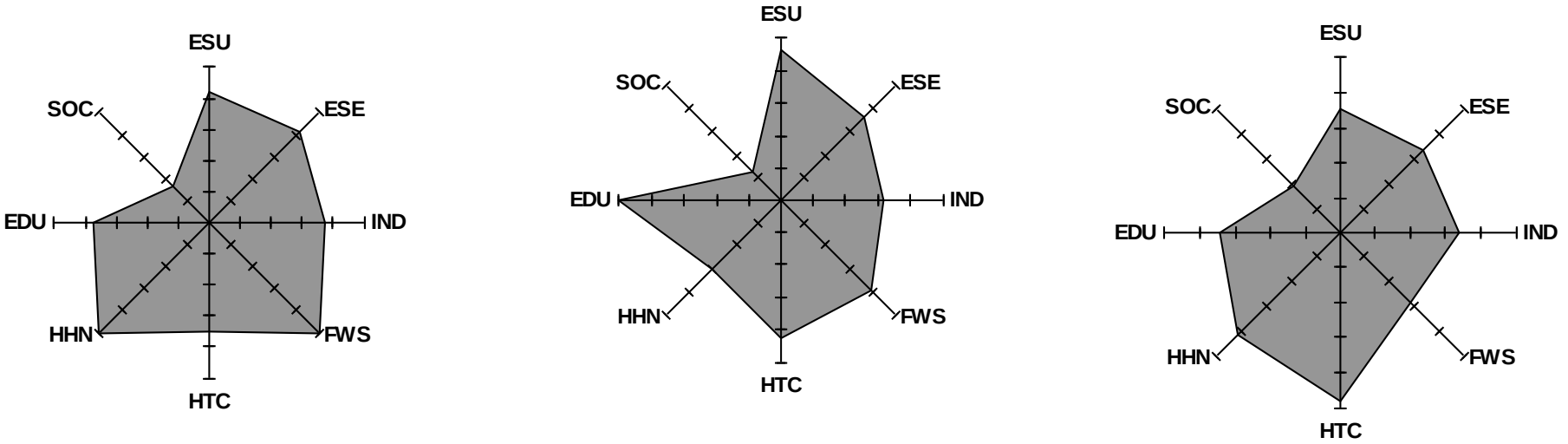

Figure 19 Comparison of living standard according to living standard criteria

Note(s): ESU – Economic Success, ESE – Economic Security, IND – Independence of resources, FWS – Food and water supply, HTC – Health conditions, HHN – Households needs, EDU – Education, SOC – Social Security

6 DISCUSSION

Livelihood strategies

Rural households pursue different livelihood strategies, some of them rely on few activities, as in case of CEV, others differ their activities in wide range, i.e. NEZ and BFZ (Babulo et al. 2008). All three study areas differ by the elevation level and thus natural conditions, which are the reasons for cultivating different types of crops (Boissière et al. 2006) and therefore are considered as different livelihood strategies.

As a result of almost four times higher number of population in CEV and thus population density, there occurs higher pressure on the availability of natural resources (Timah et al. 2007), than in NEZ and BFZ. Possible solution lies in the scientific and technological innovations improving limiting land capacity (Ammisah-Artur and Miller 2002) or implementation of sustainable technologies, which do not harm the land quality and availability; and in addition to follow the agronomic principles (Swennen 2004).

Household characteristics

Even most of the households in Phong My are male-headed, as a result of the post-conflict period in Vietnam in general occurs significantly higher percentage of female-headed households in context of SEA region (Chant 1998). It has been generally observed, that female-headed households are more vulnerable in terms of a food insecurity (Mallick and Raffi 2010) determined by following reasons, for instance lower number of workers and earners and thus lower earning power (Barros et al. 1997; Mallick and Raffi 2010) or females have to in addition take care of children and maintain the household. On the other hand, female-headed households has better impact on intra-household allocation that the men-headed one. Relative share of income by female-headed households is more spent in health and nutrition of children as well as housing (Barros et al. 1997, Duflo 2005).

Living standard assessment

From the results is visible, that BFZ has in average lower living standard in comparison to CEV and NEZ. Especially economic success of BFZ and other indicators with low results can be determined by different factors, for instance ethnically mixed population and thus different traditional thinking or different natural and geographically conditions (Boissière et al. 2006; Bradshaw 2006). On the other hand, partly thanks to natural conditions and resettlement government program, BFZ has significantly higher area of cultivation perennial cash crops as rubber or acacia (Goletti 1999; Boissière et al. 2006), which can lead in future to higher profitability.

Rural households use a wide range of assets in a variety of agriculture and non-agriculture activities as a part of their livelihood strategies (Zezza et al. 2009). Even though Wouterse and Tayolor (2011) note, that the income diversification in non-crop production is the critical livelihood strategy for rural household, households in BFZ diversify their income by two almost equal half from farm and non-farm activities, although still having lower living standard in terms of economic success. It seems to happen more likely due to their farther distance from the city and therefore higher dependency on natural resources. As Hamilton (2009) notes; the poorer country is, the higher dependency on natural resources has, can be apply to Phong My as well.

The education level does not significantly differ among villages. However NEZ has the highest level of educated people and the highest expenses for it as well. It seems, the higher level of education is, the higher expenses for it. Additionally it seems to happen as NEZ has the closer proximity and thus availability for better quality of schools as a result of their location.

Grouping to cooperatives is very essential, it allows farmers to have better bargaining power, lower transaction costs in getting loans or can better control their production (Motiram and Vakulabharanam 2007). Only in BFZ were observed farmers grouped in cooperatives. It can be explained, that due to their lower economic success, they are more likely to be grouped in cooperatives to bring them additional benefits.

Even BFZ is losing almost in all idicators of the living standard, in healthcare reached the best position. It seems that farmers from BFZ take care about health conditions due to their high expenses for it. However it can be explained by two reasons; first, more days of

illness and spent in hospital; second, due to their location are higher cost for calling doctor or transport patient in the hospital.

The farm size of households does not play significant role in living standard. Even BFZ has the largest farm size per household, at the same time lowest living standard. In BFZ area households are more extensive oriented due to the closer location to Phong Dien Nature Reserve and hence less population pressure. The yield on the larger farm is lower than in the smaller farm (Masterson 2005) as a result of using less fertilizer and manure per sao in comparison to NEZ and CEV. Another reason can be explained by lower level of crop diversification and thus more risky behaviour.

Implication for further research

Even there were identified livelihood strategies, farming and non-farming activities and living standard assessment, in further research would be essential to focus on the specific activities of the commune. However in BFZ it would be NTFPs and more diversification of the crop production to lower the risk possibility, in CEV and NEZ would be suitable to focus on off-farm activities, cash crops processing or impact of further intensification on environment. This thesis can be used as a supplementary material for such research.

Recommendations for stakeholders for further development

Local communities should be involved and advised how to protect their environment due to their high dependency on it. Farmers have to be instructed in all environment- and development-oriented activities, which help to the local economic development and protection of the environment and thus the natural resources. Furthermore the collection of forest products has to be regulated and appropriate technologies has to be implemented to ensure sustainable development (Banout et al. 2009). Additionally is essential to follow the agronomy techniques as crop rotation system, fertilizing, weed control etc. in order to reach high yields (Swennen 2004).

7 CONCLUSION

This bachelor thesis documented that the livelihood strategies do not significantly differ among the study areas. However there were observed certain differences especially in number of activities. Villages, situated in the centre part of the study area (CEV) rely on few activities, however western located villages (NEZ) depend mostly on annual crops and therefore are more exposed to the price fluctuation. Villages with close proximity to the natural reserve (BFZ) more rely on the perennial crops and exploitation forest products as a result of the higher altitude and thus different weather conditions. Additionally, it was observed, that the household's farm size does not play significant role in the higher living standard. Even BFZ has the largest farm size per household, at the same time lowest living standard.

In terms of the living standard assessment, there were observed significant differences among the study areas differ by living standard criteria. In general, the highest level of living standard reached CEV due to having the best results almost in all criteria as water and food supply, economic security or independence of resources. On the other hand, even BFZ presents the lowest living standard, shows the best result in health care. One of the shortages lies in social security indicator in all three study areas, however BFZ had the best result of all, in comparison to the other villages.

Due to the evaluation of living standard and identification the livelihood strategies and household characteristics of local dwellers in Phong My, this thesis can be used as a supplementary material for further research and studies.

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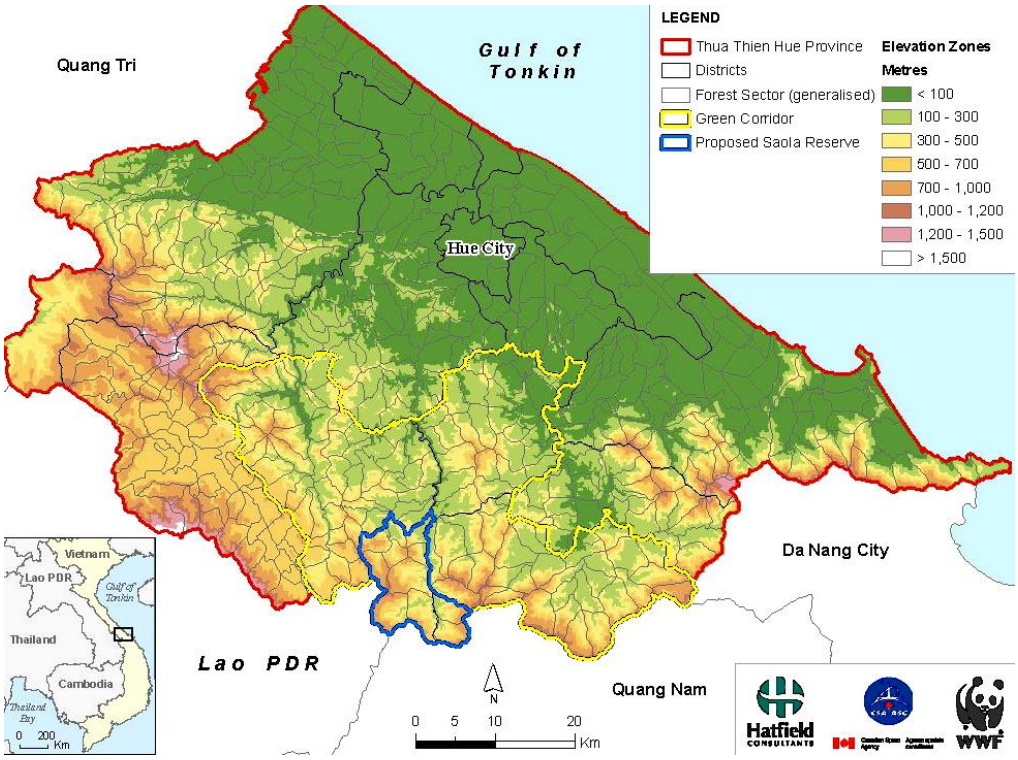
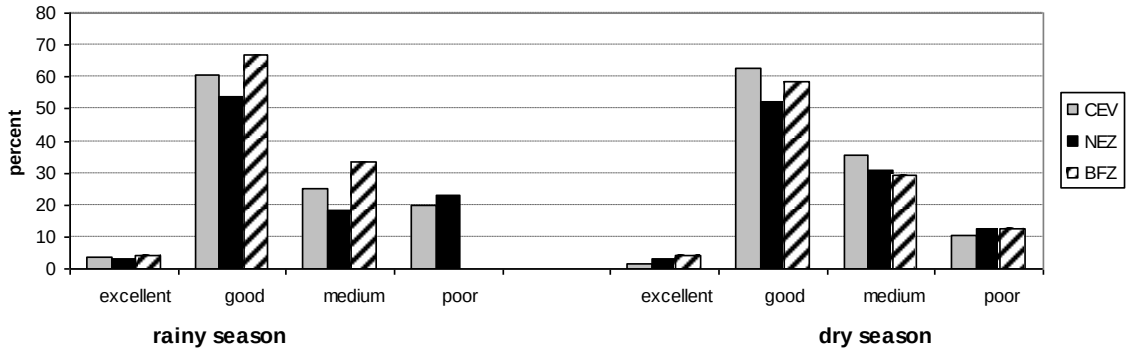
ANNEX

List of annexes

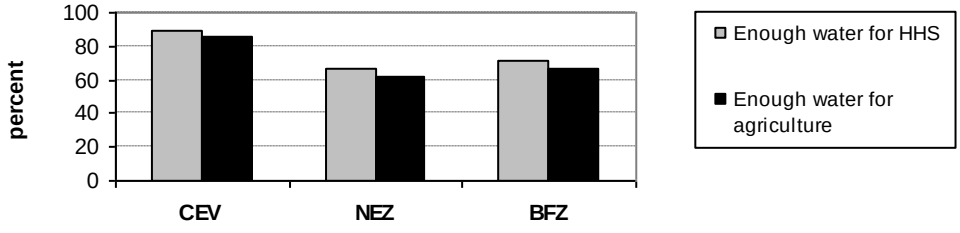


Annex 1 Map of elevation zones in Thua Thien Hue Province

Source: Hue Green Corridor, 2012



Annex 2 Water quality in dry and rainy season in Phong My (%)



Annex 3 Sufficiency of the water in Phong My (%)

English name	Latin name	Vietnamese name	Main purpose of use
Acacia	Acacia mangium	Tràm	firewood
Betel palm	Areca catechu	Cau	stimulant
Black pepper	Piper nigrum	Tieu	spice
Banana	Musa spp.	Chuoi	fruit
Bamboo	Bambusa guadua	Tre	vegetable, construction material
Cassava	Manihot esculenta	San	starch crop
Coconut palm	Cocos nucifera	Dùa	fruit
Guayava	Psidium guayava	Oi	fruit
Jackfruit	Artocarpus heterophyllus	Mit	fruit
Litchi	Litchi chinensis	Vai	fruit
Lolot	Piper lolot	La Lot	vegetable
Longan	Dimocarpus longan	Nhan	fruit
Maize	Zea mays	Ngo	cereal
Mandarin orange	Citrus reticulata	Quyt	fruit
Mango	Magnifera indica	Xoai	fruit
Mangosteen	Garcinia mangostana	Mang cut	fruit
Papaya	Carica papaya	Du du	fruit
Peanut	Arachis hypogaea	Dau lac	pulse
Pineapple	Ananas comosus	Dúa	fruit
Pomelo	Citrus grandis	Buoi	fruit
Rubber	Hevea brasiliensis	Cao su	material
Star fruit	Averrhoa carambola	Khe	fruit
Sugar cane	Saccharum officinarum	Mia	sugar crop
Sweet potato	Ipomoea batatas	Khoai lang	starch crop
Taro	Colocasia esculenta	Mon kho	starch crop
Tea	Camelia sinensis	Che	stimulant

Annex 4 The most important crop species planted in the local homegardens

Annex 5 Rubber production presents one of the main activity and source of income especially for farmers in Buffer Zone area (Hoa Bac)

Annex 6 Typical household in Khe Tran village surrounded by homegarden

Annex 7 Due to the close proximity of tropical forest, households of Phong My are very dependent on its products (Khe Tran)

Annex 8 Typical homegarden with cultivating annual and perennial crops (Khe Tran)