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Hydropower Development, Forest Degradation and Livelihoods of Affected People (Case Study in Yaly Hydropower, Gia Lai Province, Viet Nam)

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**HYDROPOWER DEVELOPMENT, FOREST DEGRADATION AND
LIVELIHOODS OF AFFECTED PEOPLE
(CASE STUDY IN YALY HYDROPOWER, GIA LAI PROVINCE, VIETNAM)**

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ABSTRACT

Hydropower systems in Vietnam have been built on the many portions of the river basin to supply energy for industrial growth as the best solution to meet the energy demand of the national economy. Besides the significant economic benefit, scientists, government agencies and stakeholders have assessed the impacts of hydropower construction on the social and environmental aspects. These assessments are inadequate. Forest degradation and the livelihood of affected communities impacted by hydropower development were not cautiously considered. Therefore, this study will illustrate how livelihood changes have taken place among affected people. It will analyze vulnerabilities and threats that they have been facing, including forest degradation, and show gaps in the compensation and reforestation policies and programs related to hydropower development.

Household survey, group discussions and interviews were conducted to collect data. A sustainable livelihood approach was used in this study. The study found that after a long period of resettlement, affected people still faced unemployment, lack of land to cultivate, reduced forest access, lost traditions and culture and increased conflict. More than two decades have passed, but compensation activities have not yet been completed, despite numerous complaints from people affected by resettlement. Many affected communities have become isolated and fallen into poverty, as they live without support from hydropower investors, contrary to recommendations in previous research studies.

A big forest area, which was destroyed when the reservoir area was built, has not yet been re-forested as initially planned. Monitoring and regulation related to reforestation were insufficiently implemented. As result, upstream natural forest cover was reduced which indirectly led to increased incidents of drought and flooding. Social and environmental impacts of hydropower development that should have been critical considerations from the first, have not been adequately addressed, leading to the view that hydropower development is neither the best energy solution nor would contribute to sustainable development.

Vietnam has built an excess of hydropower systems in the country, and must address their negative impacts on social and environmental aspects. Draw up a compensation policy that would increase the compensation benefits and extend the support period after resettlement. Reforestation must be completed, followed by water storage. In the future, government should carefully appraise new hydropower projects before approval.

Key words: Hydropower Development, Livelihood, Forest Degradation, Re-forestation policy, affected communities.

I. INTRODUCTION

1.1 Statement Problem

Harnessing water energy through dam and hydropower building was very popular around the world since the 19th century. Hydropower plays an important role in energy production, flood control and agricultural irrigation and drainage (WCD, 2000). By the end of 20th century, there were over 45,000 large dams in the world, built across 140 countries. As many as 40 to 80 million people have been displaced by dam development (WCD, 2000). Undoubtedly, hydropower development is important, especially as a necessary and clean solution to global warming. It has been recognized as a clean development mechanism in the use of natural resources (WCD, 2000). With a crowded river system, hydropower development was an important part of the economic development strategy in Vietnam. Up to now, about 450 hydropower projects have been built, with 268 hydropower plants already generating electricity. Up to 40 percent of hydropower was allocated in the central and highland location of the country (ICEM, 2008). According the electric development plan of the government until 2020, hydropower will contribute 23.1 percent of the country's electric energy supplies (Hoach, 2012).

However, hydropower development is not easy and simple. Apart from the technical issues of construction and operation, it is closely associated with displacement and resettlement, and changing the natural resource access of affected people. The access of people to natural resources has an impact on livelihood strategies and diverse natural resource access can provide people with an exit route from poverty (Frank, 2004). This means that hydropower development would bring difficulties, or if managed well, opportunities to local people as they access natural resources and develop their livelihood. Identifying these difficulties and opportunities is a necessary step to plan for hydropower development in the future in particular and for a sustainable development and access to natural resources in general.

Furthermore, forest coverage in Vietnam has declined from 43 percent in 1943 to 33 percent in 2014 (Vietnam administration of forest, 2014). There are many factors leading to this degradation, including the war, changing of land policy, increasing timber product demand, and infrastructure development. Hydropower development has led to a loss of 20,000 ha of natural forest (Vietnamnet, 2014). To avoid losing more forest area, article 29 of the decision 23/2006/NĐ-CP required investors to re-forest in other places. However, according to a report of the Ministry of Industry and Trade, hydropower investors have only reforested six percent of forest area. This situation will have a critical impact on the environment and the lives of effected people, especially in the context of climate change.

The government has not come up with solutions to speed up re-forestation. Resettlement progress has also been slow. The lack of database may be a reason for the slow progress in these aspects. Hence, assessing the real situation and its impacts on affected people in the context of climate change is necessary. The study will show the gaps of natural resources management policies and based on the findings of the study, solutions may be set forth and government would obtain the database to revise and complete policies.

1.2 Objective Of Study

General objective: To assess the forest degradation and livelihood of affected people associated with hydropower development.

Specific objectives

To review the existing programs of re-forestation and resettlement policy and programs associated with hydropower and identify the gaps in these policy and programs.

To evaluate the forest rehabilitation and resettlement program associated with hydropower projects.

To estimate the impacts of hydropower construction on changing of livelihood of affected people, change in forest and forest degradation (both negative and positive impacts).

To formulate policy recommendations for forest rehabilitation or restoration management in the study area.

1.3 MATERIAL AND METHODS

This research was conducted from June 2015 to December 2016, which used three methods for collecting data, namely: focus group discussion, individual interview and household survey.

The focus group discussion was used for collecting data from the affected communities in Gia Lai province and Kon Tum province with four groups.

One group, including all stakeholders, discussed forest degradation associated with hydropower development, and re-forestation policy and program that hydropower investors have implemented. In a stakeholder meeting, we also analyze the gaps of the re-forestation program and discuss solution to speed up re-forestation.

Another group discussed with affected people and hydropower investors gaps of resettlement policy and programs associated with hydropower. We also identified key needs of affected people to develop their livelihoods.

The individual interview is used for collecting data from affected people, key persons in the communities, provincial officers, officers of DoNRM, officers of the Department of Trade and Industry, and forestry department. Total interviewees are 10 persons.

The household survey is used for collecting data from affected households in Ngoc Bay commune with a total are 50 households. All data are analyzed by excel and using formulates including (Thang, 2005):

$$+ \text{Average} = (X_1 + X_2 + \dots + X_n) / n$$

X₁, X₂, X_n: Value of variable

n: Number of sample

n ≤ total number of sample survey.

$$+ \text{Percentage} = \text{Number of sample of variable} / \text{Total number of sample}$$

$$+ \text{Income of cultivation} = (P \times Y - C) \times A$$

P: Price of product (Vnd /kg)

Y: Yield/ha/season (kg)

A: Area/HH (ha)

C: Total cost/ha/year without labor cost (vnd) (fertilizer, seed/sampling, insecticide)

$$+ \text{Income/HH/year (Forest exploitation, employ, enterprise) (Vnd)}$$

$$= (\text{Income/labor/day}) \times (\text{number working days/year/labor}) \times (\text{number of labor/household})$$

$$+ \text{Income of husbandry/ HH/year} = (P \times Y - C) \times S$$

P: Price of product (Vnd /kg)

Y: Yield/unit (kg/unit)

S: Total unit/year

C: Total cost/unit/year without labor cost (food, medicine, and breeder)

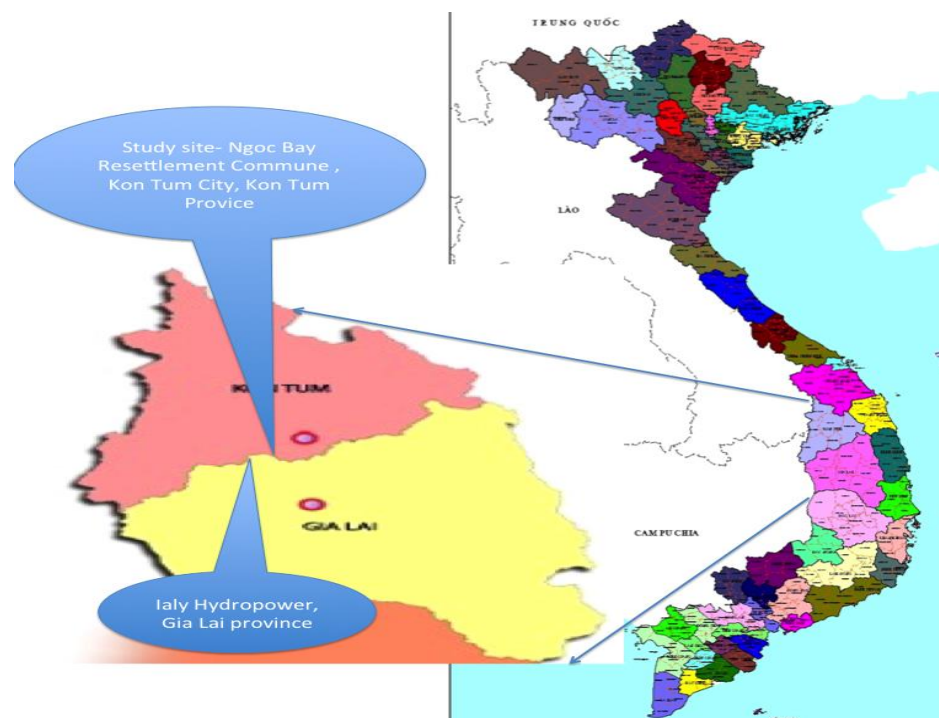
We also collected all reports, documents, papers and statistic data related to re-forestation policy and program and livelihood support programs. These data are mixed or completed with primary data.

In argument and analysis information about livelihood of affected people, we apply the Sustainable Livelihoods Approach (SLA) (Scoones, 1998) because SLA evaluates the livelihood, risks, vulnerabilities and strategies of affected people within the context of changes to natural resource management.

To show the impacts of hydropower on the livelihood of affected people, we collected data before and after displacement of affected people for comparison. Qualitative indicators that were compared include income, number of income activities, land area, and number of working days, and cost of each income activity. Quantitative aspects that were compared include satisfaction level of affected people about compensation and supported policies after resettlement, living quality, vulnerability, social evils, sustainability of income activities, and cultural change.

1.4 Study site

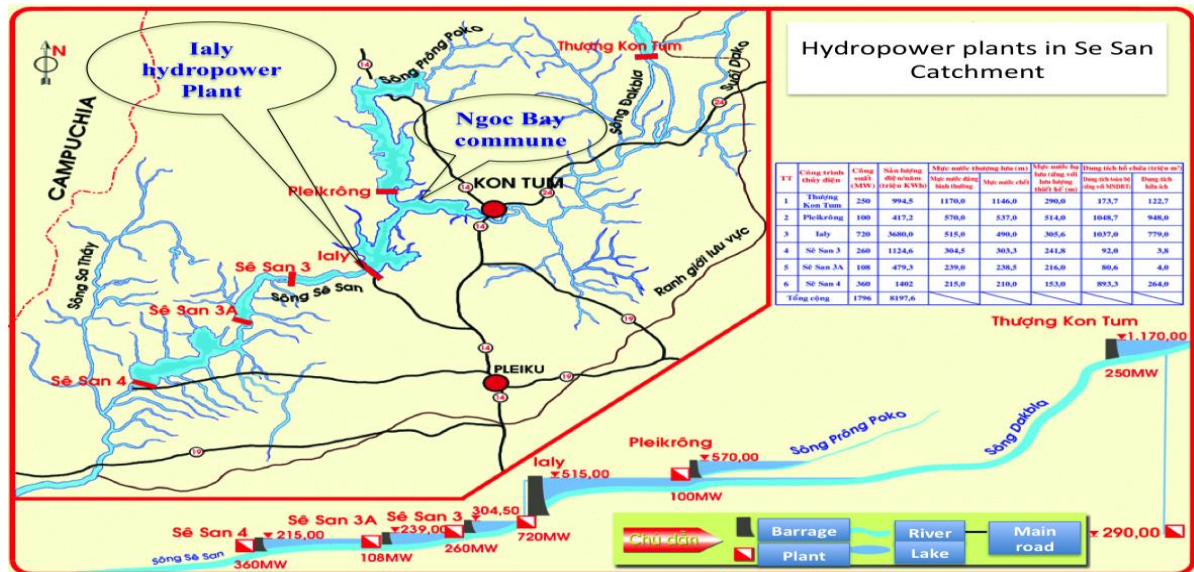
Gia Lai is one of highland provinces in Vietnam. It has the most hydropower plants in the country, with 113 hydropower plants, and total capacity of 549,781MW generated by over 20 hydropower plants in operation. Most of the hydropower plants are small and were built by private investors.



Map of Ialy hydropower, Gia Lai province and Ngoc Bay Commune, Kon Tum province

(Source: http://fipi.vn/Portals/0/StaticHTML/BD_Rung.html)

The Ialy hydropower plant was located on Gia Lai province and affected eight communes, with only one commune affected in Yaphin in Gia Lai province and other communes in Kon Tum province. Three of these communes, namely, Ngoc Bay, Kroong and Lachim in Kon Tum City; and four communes, namely, Sa Binh, Yaxier, Yatang, and Yali fall in Sa Thay district. There are a total of 5,381 people from 1,149 households resettled due to the dam since 1992 with 59 percent of the total population being ethnic minority people (Ba Na 6%, Ro Nga 19% and Gia Rai tribes 35%) (SFRI, 2013).



Map of Ialy hydropower plant and Ngoc Bay Commune

(Source from Internet: <http://ialyhpc.vn/?php=about&basic=detail&id=34>)

Ngoc Bay commune belongs to Kon Tum City, Kon Tum province, 91 percent of the people is ethnic minority, with the poor rate at 25 percent. Ngoc Bay is one of affected communes, and was chosen for collection of data such as household survey and group discussion.

1.5. Overview

1.5.1 Hydropower Development

From a Vietnamese perspective, dams are becoming an important means to meet the needs of a modern society (Nga, 2010). Dam development aims to provide electricity and to supply water for agricultural activities and industrial and urban consumption, as well as create strategic investments that deliver multiple social and economic benefits for country (Yen, 2003). Dam development, however, transforms natural habitats and displaces human, flora, and fauna communities (WCD, 2000). At present, Viet Nam's hydropower sector constitutes a large portion of the country's electricity production. According to the Swedish International Development Co-operation Agency, hydropower contributes 75 percent of total electricity production. Hydropower development (especially small hydropower) is identified as a priority in the country's electricity sector strategy for 2006 to 2015; this strategy shows no signs of being changed for 2016-2025. By 2020, it is estimated that hydropower will generate 13,000 – 15,000 MW for Viet Nam. In the long term, the Institute of Energy estimates that the percentage contribution of energy from hydropower will decrease markedly in comparison with other energy sources. By 2025, power generation from hydropower will contribute an estimated 14.1 percent to national electricity production, compared with 30.8 percent in 2005 (PanNature, 2008).

1.5.2 Resettled Communities Associated With Hydropower Construction.

Involuntary displacement is a process in which people have to move from one place to another due to natural disasters, environmental degradation, conflicts or development projects (WB, 2011). It also involves a process to assist displaced people to replace their housing, land, assets, livelihoods, access to resources and services and to restore their socioeconomic and cultural conditions (WB, 2011). Involuntary displacement and resettlement are complex processes that affect not only the displaced group, but the host communities to where they are relocated. It impacts all aspects of the economy, society, environment and health of resettled host communities (Nga, 2010).

Vietnamese Government allows three resettlement types, including alternating resettlement, concentrative resettlement and free resettlement. Alternating resettlement means affected people will move on and live alternately with natives at host communes. Concentrative resettlement means all affected people will move on and live separately with natives at host commune. With free resettlement, affected people can move on and live anywhere they are accepted by local authorities. However, the most popular type is the concentrative resettlement because this type is easiest and is the most selected by affected people (Nga, 2010).

Dam construction has been a major cause of involuntary resettlement (Tortajada, 2001). In Vietnam, about 500.000 people have been resettled by hydropower construction (Ly, 2009). Generally, rural transport systems, medical centers, schools and markets in resettled areas were greatly enhanced. In some areas, water supply is problematic because the RAs are located in high hills. Hence, in the dry season, people have no water supply and have to spend about three hours a day collecting water. In addition, the houses provided are too small (often as small as 40 – 60 sq m), while the average size of rural households is often five to eight people (Tuyet, 2011). Most of the affected people do not have or lack sufficient land to cultivate. RAs in KonTum province are a typical example. There are 800 households needing replacement but investors only reclaimed nine ha of land. There are still 64 households without productive land (Tuyet, 2011). Most of the projects did not allocate enough land because they failed to have a precise count of the number of affected people, the average land area allocated was too small (about a hectare per household), the soils are poor, and the slope gradients too steep. Many people do not get, or receive land that they can cultivate, such as in the case of the resettlement of the Ban Ve and Pleikrong hydropower projects. In addition, most resettlement areas are located far from natural forests, and hence people no longer have access to forest, as well as other natural resources and common property. Prior to the construction of the dams, 75 percent of household incomes were based on forest exploitation (CODE, 2011). With resettlement as a result of dam construction, livelihood activities have been turned completely upside down. Quality of life in the new place seriously declined, with not enough food to eat. Some areas lack food from six to eight months (UBND, 2003). On the other hand, the report of the Japan International Cooperation Agency (JICA) in resettlement areas of Yaly dam states that many families suffer from serious food shortage, especially ethnic minorities that can no longer make a living by selling grain which they exploit from the forest as before. In case of the Ta Trach reservoir resettlement, the severe food shortages occur although the state has supported the initial six months of food; many households had to borrow rice and make loans, and even some older people had to beg (Luyen, 2010).

According to Viet Lam (Union of Science and Technology Hoa Binh), Hoa Binh hydropower projects that was constructed 30 years ago, had impacted the lives of affected people without much progress. Livelihoods activities are still based on agriculture such as raising food crops and livestock. This situation clearly shows that livelihoods, with limited capital, have not generated enough income for people. The support and improvement program for livelihood as well as agriculture and forestry extension activities are not timely and not suitable with the production level of people. Many people return to old places to continue cultivation, or when these programs end, they leave from communities and people stop all of livelihood activities.

1.5.3 At Downstream Community After Operation Hydropower

In theory, hydropower plants keep water in flood season and releases water in dry season and

therefore, it does not provide economic benefits but only control water for irrigation. In practice, most hydropower systems in Vietnam store water in dry season, or else insufficient water volume would not be enough to generate electricity. Dams release water in flood season, or they would break. A study in Dak Lac province showed that these issue leads to soil erosion in the rainy season, and lack of water for irrigation and daily activities downstream. Fish stocks have also been declining due to fluctuations in water levels (Long, 2013). A research downstream in the Mekong River also concluded that fish stocks have decreased by 40 percent when the hydropower system in the Mekong operates. Furthermore, the culture style of the local people has gradually changed to adapt to new livelihood activities (Van, 2011). Hydropower also leads to inundation in the Delta, coastal erosion and increased salinity. These harm agricultural production and force farmer have to migrate to other places (Baker, 2012).

1.5.4 Effects On Deforestation

Deforestation is caused by the growing demand for forest products and the conversion of forest to agriculture as human population continues to expand. It is estimated that the world is currently losing over nine million ha per year (Richard, 2010). Deforestation not only affects the climate by increasing the atmospheric level of carbon dioxide but also affects the environment by inhibiting water recycling, triggering severe flooding, aquifer depletion, soil degradation, and the extinction of plant and animal species. Clearly, deforestation contributes to global warming and ocean acidification. Today, deforestation, especially in the tropics, decimates plant and animal life. Tropical rainforest contain about seven percent of land surface and over half of plant and animal species on the planet. If tropical rainforest deforestation continues at the current rate, it is estimated that by the first part of the 21st century about half of the remaining rainforest will be lost along with about five to 10 percent of all the species on the planet. Global warming directly affects humans because everything about our life is tied to the climate, such as food production, water supplies, health and well being (Richard, 2010).

According to IPCC, forest degradation causes 18 percent of emission gas, which leads to the greenhouse effect on the world. Forest coverage of Vietnam declined from 43.2 percent in 1943 to 33.2 percent in 2014 (Vietnam administration of forest, 2014), losing 26,000 ha per year. There are many reasons for this degradation such as the war, changing of land policy, increasing timber product demand, infrastructure development. Forest degradation is one of the factors that has affected climate and weather around the country and has led to increasing natural disaster such as flood, storms, drought, and landslides. Furthermore according to the Ministry of Agriculture and Rural Development, climate change causes diseases to plant and animal and to reduced productivity. Forest degradation also directly threatens livelihoods and sustainable development.

1.5.5 Re-Forestation and Resettlement Policies Related To Hydropower Development

The Vietnam government has recognized negative impacts of hydropower development on natural forest. However, energy demand for industry development is very important and hydropower development still is an important option. In order to reduce negative impacts, the government has enforced the decision 23/2006/NĐ-CP about hydropower development. In article 29 of this decision, it is required of investors to undertake re-forestation. Then, the government enforced a 363/TB-VPCP document to guide reforestation to compensate for losses in forest areas covered by hydropower development. Following that, all hydropower projects have to plan to reforest areas equal in size to lost areas. This plan has to be shown and approved before construction. There are two ways to reforest; one is when investors

reforest themselves, and the other is when investors compensate by paying the Forest Protection and Development Fund.

Decree 22/1998/ND-CP has replaced decree 90/CP 1994, which defines resettlement-related issues in large infrastructural projects. The land for compensation is the land to be defined for common purposes. The principle 'land for land' is applied. The resettlement area should be suitable with urban and rural planning and criteria for construction in these areas. Infrastructure such as road, electricity system, school, health station should be made available at the relocation site before transferring households and individuals. Some important and detailed articles of the decree are relevant for people affected by hydropower projects as follows: cultivated land lost should be compensated by an equal or bigger amount of land for cultivation in the receiving area.

On the contrary, if Project Affected People (PAPs) receive less land than they had access to previously and/or the land is of lower quality, the balance shall be compensated in cash, at current rates. In addition, each household should receive between 400-1,000 sq m of land for their house and domestic garden, with additional cash compensation if the household receives less and/or lower quality land than they had previously. All legal documentation regarding the transfer of land rights should be handled and passed on to PAPs without any charge. All households should be provided with drinking water in suitable amounts and quality. Affected people have the right to access electricity. Where the national electricity grid passes in the vicinity of the resettlement, connecting the community to it should be done quickly. If the resettlement is too far from the national grid, alternative electricity supply – a small hydropower system, for example – should be made available. The provision of health care and education to the resettlement is prioritized.

III. RESULTS

3.1 Displacement and Resettlement Program Associated With Ialy Hydropower Project

The resettlement plan of Yali Project was very well prepared and could serve as an example for other dam and reservoir projects in Vietnam (VESDI, 2000). Since the Yali Fall dam resettlement project was implemented more than two decades ago, the resettled people have been facing many challenges, which stemming from displacement and resettlement program.

3.1.1 Compensation Scheme

Compensation is required and project investors have to pay and support affected communes before a project is implemented. The compensation scheme has to ensure affected communes will quickly overcome the changes and restore their lives. Compensation includes housing, cash compensation for lost perennial crops, fishponds, cultivation land, ancestral tomb and cost of moving to the new area. In addition, the affected people were supported financially and provided other services to restore livelihood activities in their resettled area.

Housing

Resettled households were compensated with housing. There are two types of houses to choose from, a house on the ground and a house on stilts. While the Kinh people (Kinh or Viet people make up almost 90 percent of Vietnam's population) chose houses on the ground, there are both types of houses in the villages of the ethnic people. The total area of a house (40 sq m) remained the same for all households. Eighty percent of households felt inconvenienced with their houses in the resettled area because the floor area is not only small, but did not have a separate bathroom or kitchen. Furthermore, the quality of house is very bad. Many households had to spend their own money to build a kitchen and toilet, and

to repair their houses; some even had to build new houses next to the houses provided.

Cash compensation for the loss of crops and fishponds

Crops and fishponds of householders that had been lost with the dam construction were compensated by cash. The crops for compensation included sugarcane, coffee and perennial fruit trees. However, the amount of cash received was different between Kinh and ethnic people groups. In 1996 the Yali Project's Board of Management allowed people to grow crops but not perennial trees on the land around reservoir. However, only Kinh people continued to grow sugarcane. Therefore, they were compensated for the crops that were lost. Many of them even converted rice paddies into fishponds as a result of which they received compensation for fishponds that had been constructed just a night before the Yali Project's Board of Management arrived (Hai et al, 2013).

Table 1: Summarize Yaly compensation scheme

Items	Description
Housing	A house with 40 sq m including kitchens, bathroom and latrine, total cost is VND 36 million (USD 2600 in 1992)
Cash compensation for the loss crop and fishponds	On average, the Kinh households received about VND 20 million (1300usd) for nine crops and fishponds lost, while the ethnic minority people got only VND 60,000–70,000 (equivalent to USD 40-50)
Rice supply	Resettled people received rice in two first years, six months per year, or 20kg per month per person.
Shortage of drinking water	The Yali Company was to dig up wells for resettled households. And a group of six to eight households were to share a common well.
Agricultural extension support	Resettled households also received agricultural extension support in the newly resettled villages. According to CRES survey in 2001, on average each household was to receive VND 3 million VND (USD 206) after moving to the resettlement sites. This included seedlings, fertilizers and VND one million for animal husbandry

(Source: Data from data CRES, 2011mix report of Yaly company, 2011)

Rice supply

According to key informants, each person was provided rice for six months at 20 kg of rice per month. However, this supply did not meet their needs and many households had rice shortage.

Shortage of drinking water

The Yali Company had to dig wells for resettled households, or one well for each group of six to eight households. However, in reality only 30 percent of wells were able to supply water and others did not have water, especially during the dry season.

Agricultural extension support

Resettled households also received agricultural extension support; on average each household was to receive VND 3 million (USD 206) after moving to the resettlement sites. This included seedlings, fertilizers and VND one million for animal husbandry. In the first year of resettlement, the Yali Company hired extension workers to grow several models of hybrid maize in the semi-flooded land.

3.1.2 Satisfaction Level of Affected People About Displacement And Resettlement Program

Besides the difficulties of implementation the satisfaction level of people about the compensation program and schemes had to be addressed. A high satisfaction level of people represents policies and schemes that have met the needs of people. When their needs are solve, implementation of policies will be easier.

Table 2: Satisfaction level of affected people about displacement and resettlement program

Unit: %, N=50

Items	Satisfied	No idea	Unsatisfied	Very unsatisfied
Damaged assets compensation	80	10	10	0
Land compensation	0	6	90	4
House compensation	80	12	0	8
Position of resettlement area	10	8	80	2
Explicit level of policies	76	0	24	0
Period of supported program	6	8	86	0
Agricultural extension support	40	20	40	0
Development infrastructure	100	0	0	0

(Source: Data from household survey, 2015)

The satisfaction level of households about the resettlement program associated with dam construction is an index which presents efficient aspects of policies and schemes. Based on the satisfaction level of people, decisionmakers can revise policies and schemes to implement a more efficient resettlement programs in the future.

Basically, satisfaction levels of people exist at two levels - satisfied or unsatisfied. The aspects of the resettlement program that received a rating of “satisfied” more than “unsatisfied” are compensation for damaged assets, house compensation, explicit level of policies, and development infrastructure. The rate of satisfied households varied from 76 percent to 100 percent. This may be a reflection of policies that have ensured equality on compensative price.

However, there are also aspects that do not yet respond to the desire of people such as land compensation, position of resettlement area, and period of supported program. Rate of unsatisfied household in these aspects is high and varies from 80 percent to 90 percent, with some four percent and eight percent of households giving a rating of “very unsatisfied” with land compensation and house compensation. Land compensation is always difficult in most resettlement programs, especially when the program is associated with dam construction (CODE, 2010). A big issue is the quality and area limitation of land resource at resettlement areas. Land compensation and position of resettlement areas are often allocated in high land and small areas. Many people could not accept when they have to move from low areas with good land and big areas up to high land with high slope and poor land quality.

3.2 Impact on Resettled People

Ialy hydropower is the second biggest in Vietnam and the biggest one on Se San catchment, originating from the North of the Central Highlands, Vietnam. The Se San River flows through Cambodia, where it enters the Mekong River. It was built in 1993 and operated in April 2002. To build Ialy hydropower plant, a total of 8,475 people and 1,658 families were displaced. Total land area that was inundated was 6,450 ha, of which 1,933 ha was

agricultural land.

Table 3: Land area was acquired and household was relocated by Ialy hydropower construction

ITEM	UNIT	AMOUNT
1. Acquired land	Ha	6,450
1.1 Agricultural land	Ha	1,933
1.2 Forest land	Ha	3,492
1.3 Residential land	Ha	85
1.4 Other land	Ha	940
2. Relocated household		
Number of household	Household	1,658
Population	Person	8,475
Percentage of ethnic minority (Ro Ngao, Ba Na, Gia Rai)	Percent	59

(Source: Report Ialy hydropower company, 2011)

3.2.1 Reducing Natural Resources Accessibility

Land resource plays a very important role in all economies of the world, especially in terms of means of production. In agriculture, land is a main factor, which directly determines income of household. In the diversified rural livelihood, land plays a key role as a main asset (Frank, 2004).

Table 4: Change land area of resettled household

Land types	Land area per household (ha/household, N=50)			Quality Comparing
	Before resettlement (1992)	After resettlement (1995)	2015	
Building land	0.05	0.04	0.04	Better
Cultivation land	1.12	0.84	0.84	Worse
Planted forest	2.66	0	0.5	
Average total	3.83	0.88	1.38	

(Source: Data from household survey, 2015)

Land is the main and important capital of resettled people both before and after resettlement. Having moved to new place, their land area has been sharply reduced. Unlike the promise of Yaly Company, data from the household survey shows that each household just received 0.88 ha in the new place while their land area is 3.82 ha in the old place. Land area increased from 0.88 ha to 1.38 ha in 2015 because people bought more forest land. Compared to the old place, the new place has poor soil quality and high slope.

Besides that, water resource access is more difficult and most of affected people had to face drought longer after resettlement. Result of water access for resettled people is shown in table 5. Yaly Company had to dig wells for resettled people, so that each well could support water needs for five to six households. However, resettlement areas were located in a hilly slope, so that many wells did not supply enough water to support the daily activities of the people. A hundred percent of the households said that surface water accessibility for cultivation is worse then before resettlement because they often face the lack of water for cultivation; there were only three water pumping stations, which was not enough for irrigation.

Table 5: Change water accessibility of resettled people

Items	Water accessibility (% , N=50)		
	Better	Unchanged	Worse
Well-water for daily activities	30	40	30
Surface water for cultivation	0	0	100
Water supply system for daily activities	30 water wells		
Water supply system for cultivation	3 water pumping station		

(Source: Data from household survey and report, 2015)

3.2.2 Changing Livelihood from Forestry Activities to Working in Industrial Companies

Most of the affected people depended on natural forest exploitation and planting forest before resettlement but after resettlement, the most available labor has been in industrial companies in the province as workmen. The rate of unemployment is higher because only the young labor force had the capacity to work in companies.

Table 6: Change income activities of resettled household in Ngoc Bay commune.

Income activities	Percentage of household participate in (% , N=50)			Average number of labor/household (labor/household, N=50)			Average number of working day per labor per year (day/labor, N=50)		
	Before	After	2015	Before	After	2015	Before	After	2015
Cultivation	100	100	100	2.5	1.8	1.5	100	55	30
Husbandry	80	50	32	2.1	2.2	1.5	60	65	100
Forest exploitation	100	0	0	1.5	0	0	100	0	0
Fish catching	56	0	12	1.5	0	1.1	60	0	60
Hired labor	8	20	30	1.2	1.5	1.1	30	100	150
Working in companies	0	28	29	0	1.3	1.1	0	150	290

(Source: Data from household survey, 2015)

3.2.3 Reducing the Livelihood Diversity

Before displacement, income activities of affected households were diverse and included natural forest exploitation with non-timber product, rice cultivation, aquaculture and fish catching, forest plantation, and husbandry. People can control and manage themselves in all their livelihood activities, but after resettlement, their livelihood activities become more monotonous and more dependent on companies or other partners.

Table 7: Change income and income structure of resettled household

Income activities	Average amount (Million VND/year/HH, N=50)			Income structure (% , N=50)		
	Before (1992)	After (1995)	2015	Before (1992)	After (1995)	2015
Cultivation	6.3	2.5	6.8	37.00	31.37	16.30
Husbandry	2.0	1.4	4.8	11.94	18.13	11.59
Forest exploitation	7.5	0.0	0.0	44.40	0	0
Fish catching	1.0	0.0	1.2	5.97	0	2.87

wage labor	0.1	1.8	12.5	0.68	22.82	30.13
Working in companies	0	2.2	16.2	0	27.68	39.11
Total income	16.9	7.9	41.4	100	100	100

(Source: Data from household survey, 2015)

To understand clearly about income activities, we discussed with affected people about the advantage and disadvantage of each income activity. Results are shown in table 8.

Table 8: Importance level, advantage and disadvantage of income activities

Income activities	Important level		Advantage	Disadvantage
	Before	2014		
Cultivation	2	3	Technical & sapling support	Lack of land Land quality is bad
Forest exploitation	1			
Fish catching	4	5	Technical & sapling Support	Lack surface water
Husbandry	3	4	Technical & breeder support	Lack capital
Wage labor	5	1	Available labor	Seasonal work Lack of job,
Working in companies		2	Available labor	Lack skill and capacity

(Source: Group discussion, 2016)

There are some changes about the importance level of each income activity. At present, wage labor is the most important even if it brings less income than working in companies. People say that wage labor is suitable with them and they find it easy to accept this work. However, wage labor is seasonal and not available throughout the year. They often take this work only from August to December.

Adaptation strategy is the way that people maintain and develop livelihood as well as adjusting to living conditions in a new place. To find out effective adaptation strategy is not easy. This issue also closely depends on the capacity of people and on external support. After many decades, the livelihood strategy of affected households seem to be stable, with new characteristics that are different in the past. The adaptation strategy has changed as shown in table 9.

Table 9: Change of livelihood strategy of affected household

	Before resettlement	2015	Characteristic
The ethnic household	Both men and women participate in cultivation. In the free time of the dry season (from April to September of year) they exploit the natural forest	Only men can be employed around the resettlement areas, and some young people are working in farms in outside communes or companies. Women take care of the children and do housework	- Have many children. - Not in good health - Lack labor

The Kinh household	-Women participate in cultivation and husbandry. Men takes care of the planted forest, - At their leisure after harvest time during the dry season (from April to September) they exploit the natural forest.	Women participate in enterprise at the market or at home with a small shop, such as husbandry (raise pigs). Men are employed working for companies outside.	- Have a few of children - Good health - Have labor - Have means of transportation
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(Source: Data from group discussion, 2015)

3.2.3 Food Security, Conflict, Unemployment and Gender Equity Issue

When natural resource access of affected people is limited, they have to face many problems such as unemployment, food insecurity, poverty and shortage of clean water. According to the report of Gia Lai PCC, the rate of household in shortage rose in 2001 with 33.33 percent of households lacking food for seven to nine months. The rate of poor is 70 percent. However, many programs from government and NGOs have solved this situation, and in 2015 the rate of poor is at 25 percent.

Table 10: Food security situation of resettled people over periods

Month in shortage	Percentage (% , N=50)		
	Before (1992)	2001	2015
No shortage	40.5	9.5	60
From 1-3 months	25.4	21.4	32
From 4-6 months	20.5	19.1	8
From 7-9 months	13.6	33.33	0
From 10-12 months	0	16.7	0
Poor rate	30	70	25
Total	100	100	100

(Source: Data Report of Gia Lai PPC, 2001 mix with household survey, 2015)

When people have to move to a new place, they have to face with conflicts about land with local people. These conflicts are shown in Table 11.

Table 11: Main conflicts occurring with resettled people at resettlement area.

Conflict	Description
Conflict between resettled people with Trung Son Rubber Enterprise	- In 1997, the Kon Tum Provincial People's Committee and the Thanh Trung State Rubber Enterprise drew up a policy for converting the swidden land to rubber plantation. The enterprise held meetings with the local people to negotiate and take the land for rubber plantation. In addition, the local people were also paid a reclamation fee of VND 390,000 VND per ha. Subsequently, the province and the enterprise encouraged the locals to collaborate with them to plant rubber under a 40: 60 contract, meaning 40 percent of the product value would be given to the locals and 60 percent would be kept by the enterprise. Out of the people having swidden land in the area, about 80 percent of the resettled people agreed to participate in the program, while 20 percent, most of whom were ethnic minorities and female-headed households (43 households in Ngoc Bay commune) did not participate. This is due to the fact that the ethnic minority people do not know much about the plantation techniques of industrial crops, such as rubber and coffee. Therefore, around 45.79 ha of their land were allocated to the workers of the enterprise for planting rubber. Since then, the

	enterprise has not contacted and discussed any details of the arrangement with the local people.
Conflict between resettled people and people outside commune.	- From 1993 to 1994, resettled people in Ngoc Bay commune went to Dakrode village of Dak Ha district to clear the forest for swidden fields since they knew that the hydropower dam would flood their land. In 1995, the commune People's Committee rented 27.5 ha land of these people to 17 Kinh households from Kon Tum city to plant coffee. Soon afterward, these 17 households were allocated the land with land use certificates. In December 2012, 37 resettled households of Ngoc Bay commune requested the provincial People's Committee to return their land to them, but until now there has been no resolution in sight. The officials from the provincial, district and commune People's Committees highlighted the issue of land conflict and land purchase during the key informant interviews. Based on the report of Ngoc Bay commune's People's Committee, 42 complaint forms regarding land conflict were submitted to the committee in 2012. Out of the 42, 37 forms had complaints that could not be resolved through the powers vested in the commune. These have therefore been submitted to the higher level for redress. Our informants said that since there was no resolution in sight to the land conflicts between the native people and the state agricultural and state forest enterprises, the locals have started destroying rubber trees of the company, and selling rubber latex to small dealers in Ngoc Bay commune.

(Source: Data of CRES, 2001 mix with group discussion, 2015)

Rate of unemployment is high at 15 percent, while 80 percent of them are women. Most women cannot take a new job, and they depend more on men, so their decisionmaking rights and their voice in the family were diminished.

3.2.4 Loss Traditional Culture

Traditional culture such as prayer rituals for new rice crop, traditional songs of ethnic people (Ba Na, Ro Ngao) are no longer maintained, traditional houses were changed, and their spiritual lives were less plentiful.

Table 12: Change traditional culture at resettled area.

Traditional culture	Percentage of household want to remain (% , N=50)	Status of traditional culture
New rice festivals	40	No longer remain because rice crop is neither main crop nor main income of people in resettlement.
Traditional houses	30	Only 20% of houses in resettled area are traditional house because when people moved most of them chose modern houses. After resettlement, some households had money and they rebuilt traditional houses beside the modern houses.
Traditional songs	32	Most young people working in industrial companies like to sing modern songs, and when they come back home, they buy modern music records to bring home.
Traditional mean of production	36	64% of households answered that they want to use modern mean of productions for the convenience.
Traditional clothes	18	Only some people wear traditional clothes during

		special events.
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(Source: Data from household survey, 2015)

3.3 Impact on Forest Degradation

The total natural forest area destroyed to build Yaly hydropower plant is about 2,000 ha, but until now, reforestation have not been carried out. Besides loss of forest area, the quality of forest has also been reduced because of pressure in livelihood activities. Affected people go into the forest and cut down timber illegally because they cannot find good jobs after resettlement. Furthermore, the value of the forest was ignored in compensation and the environmental impact assessment also did not take this to account. Most of the forest that was inundated was rich with species diversity but compensation only considered the value of the forest area.

3.3.1 The Re-Forestation Situation

Losing natural forest

According to the Forest Management Bureau, Forestry coverage in Vietnam increased from 33.3 percent to 40.43 percent in nearly two decades through the effort of the Vietnamese government in forest development since the end of the war. During the period 2006-2014, the Vietnamese government sped up industrial development including building industrial zones, highway, infrastructures and hydropower systems all over the country. Therefore, forest land was changed to industrial land, with 309,954 ha of natural forest disappearing during this period.

According to the Ministry of Industry & Trade (MoIT), there are 51,000 ha of forest around the country, including 20,000 ha of natural forest and 30,000 ha of planted forest, which had disappeared due to hydropower development. Gia Lai province has the second largest area of forests in Viet Nam, but the forest area has been decreasing due to changes in land use and urbanization. The statistics data from the forest management bureau in table 11 shows the natural forest area severely reduced from 980.975 ha in 2002 to 555.807 ha in 2014. As a result, forest coverage has gradually been reduced from 47.9 percent in 1999 to 40.1 percent in 2014, with 30 percent of forest area disappearing in Gia Lai due to hydropower development. Most of forest area has been lost due to reservoir construction, and others due to infrastructure construction such as offices and roads.

Table 13: Changing forest area and coverage from 1999-2014 in Vietnam and in Gia Lai province

Year	Gia Lai Province			Vietnam		
	Natural forest (ha)	Planted forest (ha)	Forest coverage (%)	Natural forest (ha)	Planted forest (ha)	Forest coverage (%)
1999	728.372	14.300	47.9	9.444.198	1.471.394	33.2
2002	980.975	13.507	50.8	9.865.019	1.919.568	35.8
2005	727.036	34.811	48.6	10.283.173	2.333.526	37
2006	717.916	35.545	48.4	10.410.140	2.463.710	37.7
2014	555.807	72.143	40.1	10.100.186	3.696.320	40.43

(Source: Data from forest management bureau, 2015)

Delay reforestation process

According to the Ministry of Industry & Trade (MoIT), until 2015, there were 28 out of 55 provinces and cities implementing reforestation with a total area of 7,191 ha, including 2,445 ha from hydropower projects and 4,746 ha from other projects. Many hydropower investors

did not implement reforestation as the primary plan (MoARD, 2012). Percentage of reforested area associated with hydropower projects is very low and slow, from 3.7 percent in 2009 to 10 percent in 2015. In a case study, Yaly hydropower was built in 1994, at which time there was no requirement for reforestation; therefore, 20,000 ha of forest land were not reforested. Most of the later hydropower projects in Gia Lai also do not implement reforestation in their plans.

There are two reasons for the delay of reforestation. First, a reforestation plan was built but it did not show how or where investors can reforest. Second, when payment for forest environmental service (PRES) was applied in 2010, hydropower investors could compensate and contribute money for PRES fund. This fund will be used to reforest, but in reality, reforestation was not completed. Finally, investors delayed both reforestation plan and paying contribution money for the PRES fund.

Forest degradation

According the Ministry of Agriculture and Rural Development, most of the hydropower projects were located upstream, where natural forest had high quality and biodiversity. There were 30 percent destroyed forest areas which are also classified as special and protected forest. Mr Nguyen Viet Dung, director of policy and education program said that on average every 2.5 hydropower projects were located in one conservation area. These forests have high biodiversity and control the water stream for the river basin; therefore losing these forests leads to forest degradation and losing water source. Furthermore, when affected people lose their income activities, they could attempt to illegally enter forest areas and cut down timber, hence degrading the quality of remaining forest areas. Recovering the quality of forest cover is very difficult because biodiversity in natural forest takes a long time to grow.

3.3.2 Re-Forestation Policy Associated With Hydropower Development

Reforestation policy associated with hydropower development was enforced and improved many times, but until now, there are still gaps that exist. These main points of policy are reviewed in table 12.

Table 12: List of documents relate to re-forestation policy

Documents	Main points	Gaps
Forest protection and development law 1991 and resolution of council of ministers 17/HDBT, 1992 - about the implementation of Forest protection and development law 1991	- Individual and organization that receive forest land to use with non-agricultural objectives have to compensate value of forest, land, products and infrastructures on land following price of market and quality of forest.	- There exists no rule about compensation of State and solution to mitigate social and environmental impacts when land and forest was changed to use for non-agricultural objective such as building hydropower, highway roads, industrial zones, etc. - There is no rule about the way to calculate compensation level for value of forest and land.
Forest protection and	- If land user changes land	There is no rule about

development law 2004	with natural forest to use for other objectives, they have to plan reforestation in other places to ensure sustainable development in each province and around the country.	restoring planted forest area of local people (product forest).
Decree 23/2006/ND-CP was enforced by Vietnam Government on 3/3/2006 to guide and implement Forest Protection and development Law 2004	- Allow user to convert forest land to other land but have to ensure reforestation process.	There is no rule about method for enforcement if land user do not reforest.
Decree 48/2007/ND-CP about forest appraisal principle and methods. Circular 65/2008/TTLT-BNN-BTC guide implement Decree 48/2007/ND-CP	- Rules and forest assessment methods in order to calculate compensation associated with hydropower projects	There is no assessment method for payment forest environmental service (PFES), especially assessment method to compensate for lost or destroyed forest associated with hydropower projects
Decree 99/2010/ND-CP of Government about PFES); Circular 80/2011/TT-BNNPTNT and Circular 20/2012/TT-BNNPTNT of MoARD guide calculate method PFES and procedure to implement PFES, Circular 85/2012/TT-BTC of Ministry of Finance about financial management plan for PFES fund.	-Rules and guidelines to implement PFES. With hydropower company, they have to pay with an amount of VND 20 per one kwh	

IV. DISCUSSION

4.1 Livelihood of Affected Household

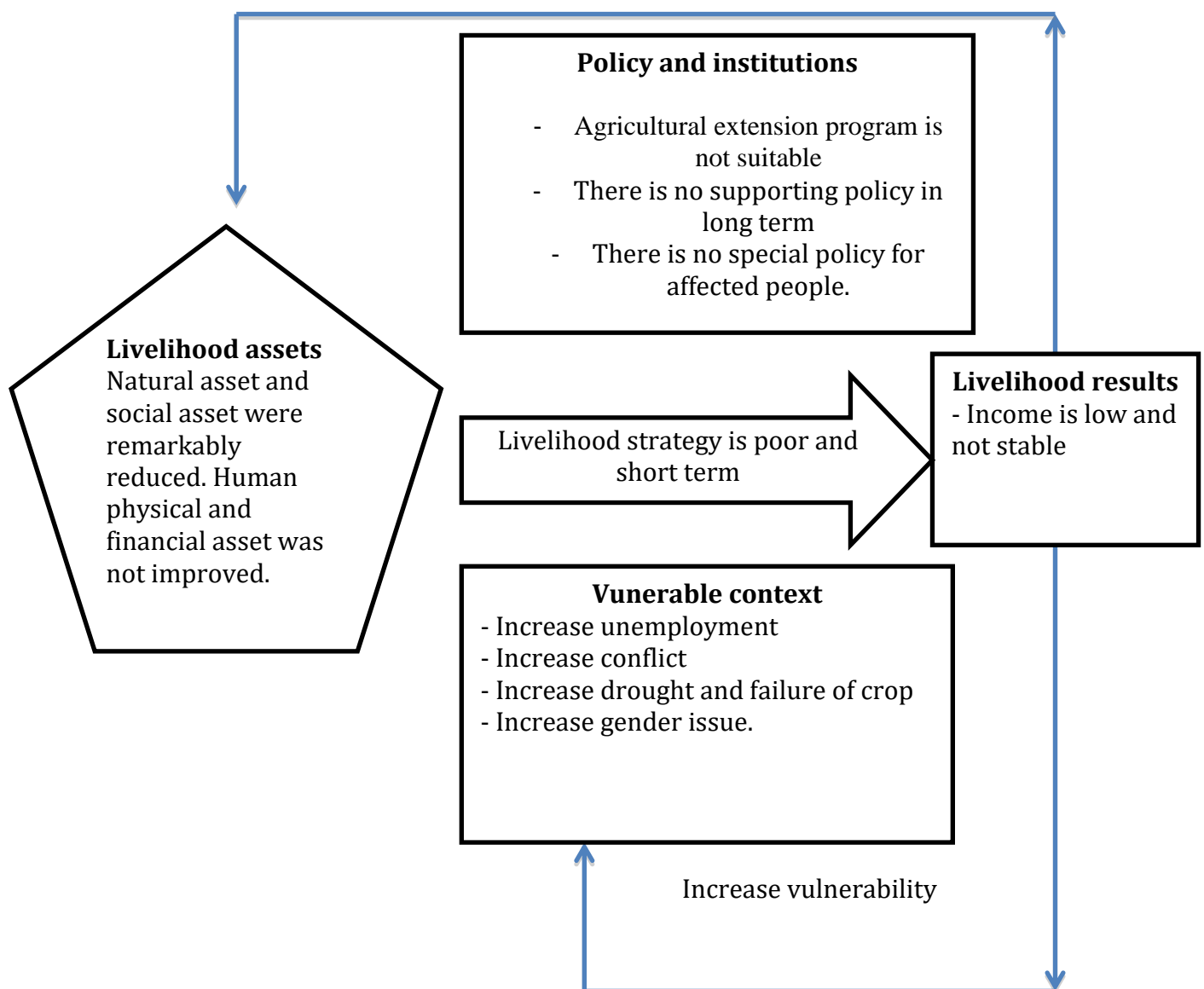
At present, livelihood of affected households was changed and less depends on natural resources but is still unstable. Income increases but not significantly, after more than two decades. Income of households increases from VND 16.9 million in 1993 to VND 7.9 million in 2000 and further increase to VND 41.4 million in 2015. Most laborers cannot identify their work in the future and totally depend on their boss or companies.

Livelihood assets of affected people were remarkably changed after two decades of resettlement. Despite the existence of a compensation program that has supported and compensated for affected households such as provision of housing, infrastructure and agricultural extension, these activities were not effective and did not meet the needs of people as well as meet the real situation in resettlement areas. After resettlement, land area per household was reduced from 3.83 ha to 1.38 ha and soil quality was very poor. Their natural forest accessibility was no longer possible while their livelihoods before resettlement

depended almost on the forest. Cultural erosion has been occurring and social relationships among members in commune were gradually loosened, Culture is the main factor for spiritual life, but after resettlement and with economic pressure, people could not remain sustain traditional cultural activities. Moreover, young laborers go into cities to work and they gradually absorbed modern culture, leaving out traditional culture. In the long term, traditional culture will be disappear in the commune, and will make people forget their origin; cultural diversity will also be lessened. This shows that livelihood assets, especially natural and social assets of affected people may change negatively. This situation leads to disadvantages in life because livelihood assets are a basis to develop livelihood activities and bring income for households.

The vulnerable context also elicits new problems such as conflict among affected people with host commune, rubbish companies and local authorities, increasing drought, crop failure and unemployment. While the vulnerable context is a factor that often impacts negatively on livelihood activities, new serious issues have arisen among affected people, such as lack of food, increasing disease incidence and poverty.

Livelihood assets are more and more poor



(Source: Data from group discussion, 2016)

Diagram 1: Change livelihood framework of affected people

The policy and institutions, which affected people received since resettlement, did not bring benefits for their livelihood. The agricultural extension program that Ialy company implemented did not meet the needs of affected people. Most agricultural extension activities focused on crop development such as seed, fertilizer and technical training. There was not any training course relating to skills development and capacity for labor to help them get jobs in industrial companies.

Therefore, until now, finding and holding jobs in industrial companies would still be a difficulty with people, especially for women and old laborers. Until now, there is no support activity from Yaly companies for affected communes. This has put them in poverty and made them vulnerable to social inequality. While hydropower investors get billions of benefit, affected communes have to change their lives from stable to unstable.

4.2 Reforestation Program Associated With Hydropower Project

At present, many documents related to reforestation were enforced and applied in the real situation, but the efficiency of these documents were not as expected. The reforestation program has been delayed for a long time and at present there is no effective solution being offered. This leads to negative impacts to environment and livelihoods such as, lost biodiversity, increased drought, floods and reduced income from non-timber product exploitation. As a result, livelihood activities of local people are not stable and vulnerability increases.

There are many reasons why reforestation associated with hydropower projects has been a failure. Firstly, there was no plan for reforestation. Investors were required to reforest but they were not guided on how to do it or when and where. Some investors had to face difficulties in their desire for reforestation. Secondly, the monitoring scheme of reforestation is not clear. Whose responsibility is it to monitor and how would investors be punished if they do not implement reforestation? These were not considered in any documents. Therefore, investors did not implement reforestation in their plans. In addition, almost all investors compensated for losing forest by paying money based on the scale of forest and not based on its value. Even when reforestation was implemented, the quality of biodiversity was not considered when this issue would be very important in terms of environment protection.

In the 1992 Yaly case, there was no required reforestation and therefore, investors did not undertake it. But now, they would have to implement the payment forest environmental service policy with billions of VND per year going to the PRES fund. However, using this fund for reforestation was not shown in the report.

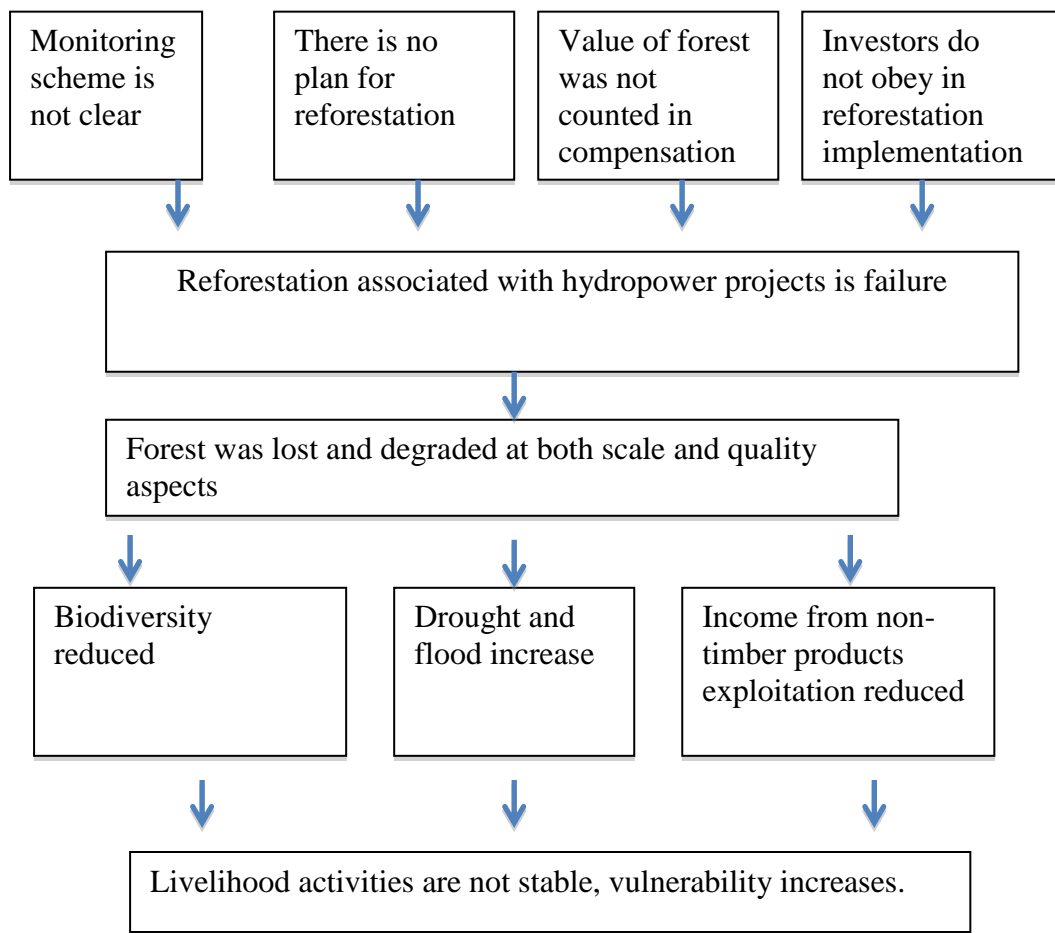


Diagram 2: Causes and results of reforestation associated with hydropower projects

V. CONCLUSION

Hydropower development is very necessary in Vietnam and Yaly hydropower is one of the most important energy suppliers for the country. However, besides its economic role, its impact on affected communes and forest degradation need to be regarded more closely.

With affected communes, they were put in a more vulnerable position such as losing income activities, losing traditional culture, increasing conflict, reducing income, and increasing unemployment. We do not avoid these problems when implementing displacement and resettlement, but after more than two decades have passed, affected communes still have to bear negative impacts.

Hydropower development is one of many economic development programs contributing to forest degradation. Most of forest area lost due to hydropower is of critical importance because of its upstream location and high-value biodiversity. This forest area can directly affect the hydrography regime, and when this forest was lost, drought and floods occurred. In addition, reforestation was delayed because there were many gaps of policy including unclear monitoring scheme, the absence of a reforestation plan, ignoring the value of forest in compensation and the irresponsibility of investors. At a result, livelihood activities of local people have become unstable.

VI. RECOMMENDATION

Development of hydropower systems should be carefully reviewed, identifying negative impacts for affected people and making sure of solutions before making the decision of building them.

Compensation policy need to consider the long term impacts and a support program must be in place to be offered to affected people. Compensation and supporting program need to be flexibly changed based on the characteristics of affected people. Livelihood support should focus on improving working skills and development in non-agricultural activities at resettlement areas. Supporting time should be over 20 years from resettlement; supporting fund should be raised from the annual benefit of the company. By doing this, affected communes will quickly ease negative impacts.

A reforestation program should be plug policy gaps by identifying all stakeholders, building the clear PRES regime, and having a realizable reforestation plan. Reforestation should be identified clearly with regards to timelines, space and area. At best, reforestation should be implemented at the same time with dam construction and have to be completed before operation of hydropower. Space of reforestation should be uninhabited land around the hydropower grid. Reforestation and restoring quality of forest should be done through extending forest management based on a community model because this model was successfully implemented in some provinces. Reforestation is not only ensuring scale but also quality. Investors should take firm responsibility for forest loss through PRES with the reward and punish regime in place.

LIST OF REFERENCES

Baker, C.G. 2012. Dams, power and security in the Mekong: A non-traditional security assessment of hydrodevelopment in the Mekong River Basin. NTS-Asia Research Paper No. 8, Singapore: RSIS Centre for Non-Traditional Security (NTS) Studies for NTS-Asia.

CODE. 2011. Displacement, resettlement, ensure life and environmental protection in hydropower projects in Vietnam. *Vietnamnet*.

Frank, E. 2004. Livelihood, diversification and natural resource access. Food and Agriculture Organization of the United Nations.

Hai, T.T., et. al. 2013. Hydropower dam development and local communities' livelihoods: A case of Yali hydropower project. Vietnam.

Hoach, N.H. 2012. Vietnam hydropower - current situation and development plan. *UNFCCC*.

ICEM. 2008. *Strategic environmental assessment of the Quang Nam province: Hydropower plan for the Vu Gia-Thu Bon River Basin*. Prepared for the ADB, MONRE, MOITT & EVN. Hanoi, Viet Nam.

Nga, D. 2010. *Dam development in Vietnam: the evolution of dam-induced resettlement policy*. *Water Altern.* 3 (2): 324–340.

Luyen, N.T. 2010. *Problems of implementation process of resettlement policy for ethnic minorities in dam construction*. Thua Thien Hue province: Hue University.

Ly, L.V. 2009. Displacement and resettlement policy for national projects in highland and ethnic areas: Problems need to solve.

<http://cema.gov.vn/modules.php?name=Content &op=details&mid=9264#ixzz19kI2eoZm>.

Long, C.T.M. 2013. Impacts of hydropower on downstream communities: A case study in Srepok River. *LAP Lambert Academic Publishing*.

Pannture. 2008. *Hydropower trend in Vietnam: The less mentioned social and environmental side-effects*.

<http://www.nature.org.vn/en/features/hydropower-trend-in-vietnam-the-less-mentioned-social-and-environmental-side-effects/>.

Richard, H. 2010. *The effect of deforestation on the climate and environment*.

Sconnes, I. 1998. Sustainable Rural Livelihoods a Framework for Analysis. Ids working paper 72.

SFRI, 2013. MK1 Report

Thang, V.D. 2005. *Agricultural economy*. Ha Noi Publication.

Tortajada, C. 2001. Environmental sustainability of water projects. *Envi Royal Institute of Technology, Stockholm. Sweden*.

Tuyet, D.T. 2011. Small dams a big cause for concern in Vietnam. *Int. Water Power Dam Construction*. 63, 18–22.

UBND, 2003. Hội thảo cộng đồng về dự án hồ xả trạch có sự tham gia của người dân tại T.T Hue. *Ta Trach Project*.

Van, H.L. 2011. Tác động của đập thủy điện Xayaburi và chuỗi các đập bậc thang xây trên dòng chính sông Mekong. *Tập San ĐN&CL Số 6*.

VESDI. 2000. Study on public participation in resettlement plan related to the Yali Hydropower Project. Hanoi, Vietnam: The Vietnam Environment and Sustainable Development Center

WB. 2011. Involuntary resettlement.

<http://web.worldbank.org/wbsite/external/topics/extsocialdevelopment/extinvres/0,,menupk410241~pagepk149018~pipk149093~thesitepk410235,00.html>.

WCD 2000. A new framework for decisionmaking.

Yen, C.T.T. 2003. *Towards sustainability of Vietnam's large dams resettlement in hydropower projects*. Stockholm, Sweden: Royal Institute of Technology.