My Ly - Nam Mo Hydropower JSC

Environmental and Social Impact Assessment

MY LY HYDROPOWER PROJECT

Volume X
Executive Summary- English
27 October 2017

ENVIRO-DEV
with input from
PECC1

Volume X

Environmental and Social Impact Assessment
My Ly Hydropower Project

Date 2017	Revision History	Document No. and Name	Issued by Name and Signature
27 October	First Issue	ENVIRO-DEV Doc003-2017: Volume X ESIA Executive Summary - English	 Shivcharn Dhillion

International Consultant:	Input from National Consultant:
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LAYOUT OF THE ESIA REPORT

VOLUME I Environmental and Social Impact Assessment (ESIA)

VOLUME II Agreements, Approvals and Specialist Reports

- ANNEX 1 Agreements and Approvals
- ANNEX 2 Appendices, Specialist Reports on (a) Biology, and (b) Water Quality Resources

VOLUME III Social Baseline

- ANNEX 3 Social and Livelihoods Reports

VOLUME IV Communication

- ANNEX 4 Consultations before 2017 (pre-ESIA)
- ANNEX 5 Informed Communication and Participation (ICP) Process Reports

VOLUME V Public Communication and Disclosure Plan (PCDP)

VOLUME VI Resettlement and Ethnic Minority Livelihoods Restoration Plan (REMLRP)

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EXECUTIVE SUMMARY

THE PROJECT

The Vietnam National Power Development Master Plan for 2011-2020 (revised and approved on 18 March 2016) states that there is an urgent need for more power with higher reliability and competitive electricity prices in all regions of Vietnam. One of the key changes in the revised masterplan is the emphasis on renewable energy development. It is estimated that there will be approximately 235-245 billion kWh of commercial electricity in 2020 and 265-278 billion kWh of electricity will be produced or imported in the same year. The Ca River basin, where the proposed Project is located, is one of the main ones identified for renewable – hydropower energy sources.

The My Ly Hydropower Project ('the Project') is a peaking project designed to have a capacity of 180MW with a storage reservoir of approximately 1248ha (1094ha of land). My Ly-Nam Mo Hydropower Joint Stock Company (JSC), a private Vietnamese enterprise was incorporated by Vietracimex to develop the Project.

The Project is situated in two of the nations in the Indochina region of Asia. Both the governments of Vietnam and Lao PDR have an agreement to develop hydropower projects on the Ca River. Ca River is located in Nghe An Province of Vietnam and most of the left bank is within the Laos territory in Houaphan and Xiangkhoang Provinces.

My Ly - Nam Mo Hydropower JSC, the Project Proponent, later engaged Hydropower Engineering Consultancy and Construction Company to prepare the Feasibility Study in June 2012. An agreement between the two Governments was signed in 2016 which stipulates the cooperation of the two countries to develop the My Ly HPP including its agreement terms on investment, construction, operation and management of the Project. After which, a more detailed FS has been carried out including procurement of primary permits such as national environmental clearances for both Lao PDR and Vietnam. One of the conditions of the agreement is the preparation of an Environmental Impact Assessment (EIA). Two national EIAs were prepared, one for each country and are subject to each country's respective national procedures and compliance. The approval from Vietnam has been obtained in 20 November 2016, while that of Laos is still under review.

My Ly-Nam Mo JSC, intends to acquire a loan to finance the development of the project. The Proponent plans to apply for a political risk guarantee from the Multilateral Investment Guarantee Agency (MIGA, World Bank Group) to secure the loan. The National EIAs were found not to be compliant with MIGA policy thus requiring upgrading. One of the requirements for a loan agreement is to prepare an international Environmental and Social Impact Assessment (ESIA) based on MIGA Performance Standards.

My Ly-Nam Mo Hydropower JSC engaged ENVIRO-DEV (based in Norway) to develop the ESIA in accordance with the requirements of MIGA Performance Standards (2013). Logistics, input on previous work and field assistance was provided by the Power Engineering Consulting Joint Stock Company (PECC1, EVN).

The salient features of the ESIA of My LY HPP are summarized here.

TECHNICAL CHARACTERISTICS

The main components and auxiliary work areas are all located in the My Ly Commune, Ky Son District, Nghe An Province, Vietnam (Table 1). These were proposed through optimization studies including dam structure, installed capacity, number of powerhouse unit, water head, and quantity and dimension of spillway gate, among other technical features (Table 2). The Project's direct impact area includes four villages in Vietnam and five villages in Laos that will be subjected to relocation (Figure 1).

Table 1. Salient features of My Ly Hydropower Project

Project Location	Vietnam	Lao PDR
Region	North-Central Vietnam	North – East
Province	Nghe An	Houaphan, XiangKhoang
District	Ky Son	Kouan, Nonghed
Communes	My Ly, Keng Du	No commune unit is used in Lao PDR
Villages	Total of four villages to be relocated	Total of five villages to be relocated

The main features of the Project head works, reservoir and river are provided in Table 2.

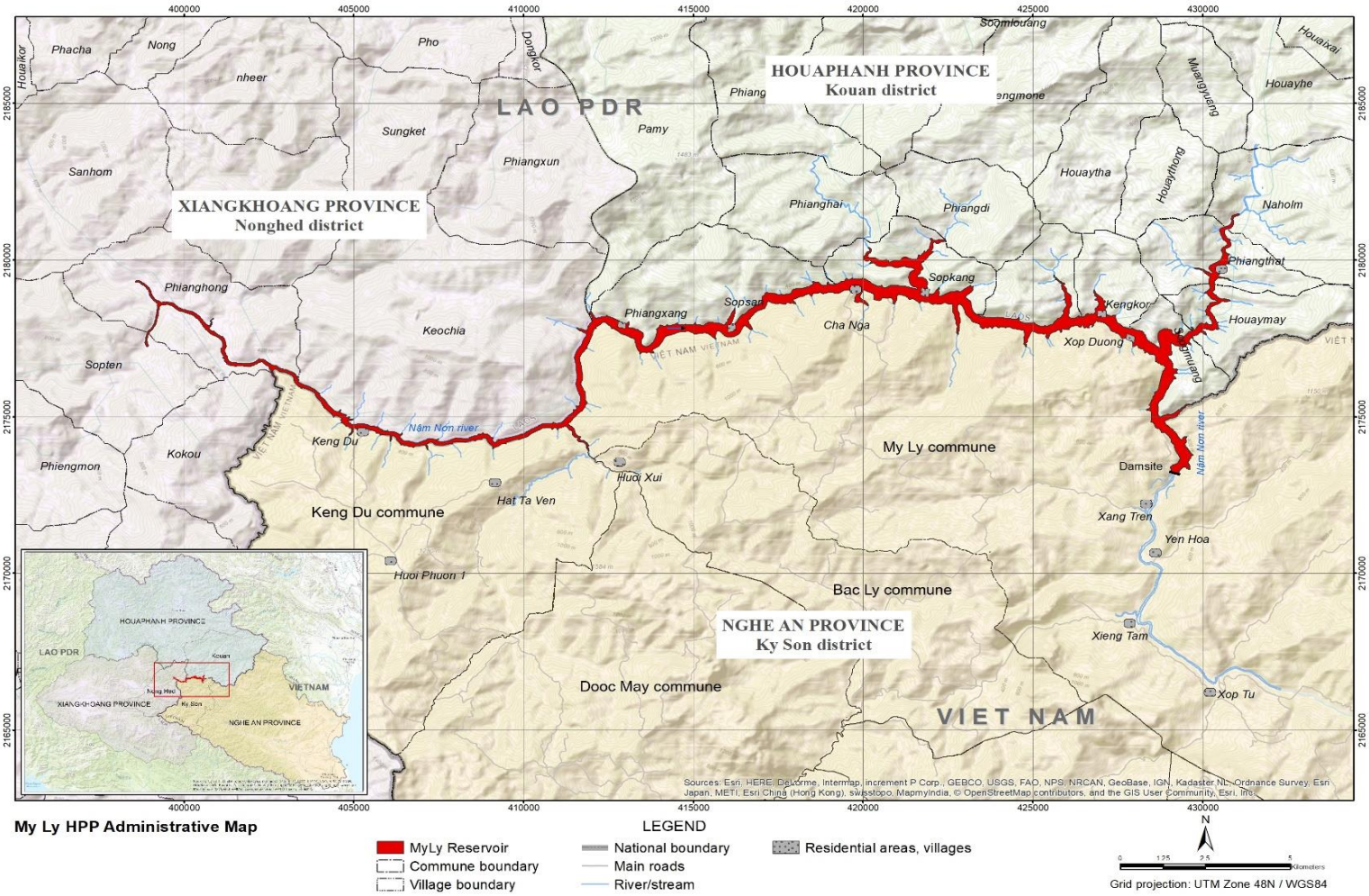

Figure 1. General map showing the project location and villages

Table 2. Main features of the Project

Project area	
Hydrology at intake	
Annual mean flow	107.2m^3/s
Other features	
Installed capacity	180MW
Firm capacity	32MW
Annual energy production	660.2GWh
a. Headworks	
Location Latitude / Longitude	My Ly Commune, left bank and right bank in Vietnam N : 19^{o}39'10.2" E: 104^{o}19'27.3"
Dam type	RCC (gravity rolled compaction concrete)
Dam height	118.6m
Crest length / width	270.86m / 8m
Approximate reservoir length	42km
Calculated head	80.6m
Reservoir gross storage (total reservoir volume including dead storage)	391.1 million m^3
Reservoir active storage	197.8 million m^3
Reservoir Full Supply Level (FSL)	300m
Reservoir Minimum operating level (MOL)	280m
Reservoir area at FSL (full supply level)	1247ha
Maximum powerhouse discharge	253.5m^3/s
Highest regulated water level	310.0masl
Lowest regulated water level	304.8masl
Spillway Weir total length Stepped spillway - Step height/width	6 bays (10mx12m each) 77.5m 12m / 10m
Distance of powerhouse from dam site	350m
Distance of tailrace from dam site	350m
Potential total length of river expected to be affected due to reservoir	42km (length of reservoir) + 2.8km (low flow stretch) (+ 28.2km (Ban Ve HPP FSL to MOL stretch))
b. Headrace Tunnel	
Tunnel inlet elevation	264.5masl

During the construction of the dam, the river will be diverted through a twin tunnel. In addition to the construction of the dam, the tunnels and the power house, the Project will need new roads/upgraded roads, spoil tip areas, sand quarry areas, rig areas, permanent housing, temporary and labor camps, and transmission lines, among other areas, to complete the development. Some of these planned construction areas and structures will be permanent while others will be temporary. Transmission lines will be the subject of a separate ESIA and thus has not been included in this assessment. The construction areas (auxiliary works) are located clustered next to the dam site concentrating all activities. The only areas not located in the same site is the quarry.

Project site related roads. There are a number of district roads and local roads in the area that are linked to the main national roads. At necessary points in the project area, new project access roads will be built and connected to the existing road system. Most of these will be permanent roads, some will be upgrading of existing roads, and some may be temporary for use during the construction period. Permanent roads remaining will be 8km long and temporary construction area roads will be 3.7km long.

Quarry site. The Project will utilize the 11ha Sop Tu quarry for its source of rock aggregates. The Sop Tu quarry is located downstream of the dam site, approximately 13.58km in distance. Access to the quarry is through the Tay Nghe An Provincial road. Road surface will be rehabilitated to cater for delivery trucks to the project construction site. Three villages namely Xop Tu, Xieng Tam and Xang Tren in My Ly Commune are found along the access road to the quarry site.

Spoil disposal areas. The Project proposed four disposal areas with a total area of 31.36ha to accommodate the estimated spoil materials from the various excavation works for construction. Details on amounts needed will be assessed during the detail design phase. The disposal areas will be a temporary functional area of the Project, until the construction ends or until the area contains spoil at maximum volume capacity. Some of the disposal areas are designed to support structures (e.g., employees' accommodation) once the required height and flatness are achieved. The disposal areas will also be shaped and managed to maintain good and safe conditions such as slope, height and flatness.

Operation of plant. It is envisaged that the Project will store excess water in the reservoir during high flow to be utilized during low flow. The height of the dam will be 118.6m above the existing river bed and the FSL will be 300masl creating a reservoir length of 42km with a total volume of 391.1Mm^3. The water will be diverted through a twin tunnel down to a power station located adjacent to the dam. The water will be released back in the river, 72m downstream (tailrace) of the power station and 350m of the dam site. The release comes at about 2.5-2.8km from the FSL of the downstream Ban Ve HPP during the wet season and about 29km from the MOL of Ban Ve HPP during the dry season.

The Plant is optimized for maximum energy generation throughout the year. During the dry season, the Plant will run only as a peaking plant during daytime, while in the wet season, the Project will generate approximately 24-hours at full capacity. Details on planned operation are provided in the next section on salient features.

The dam will create a reservoir that will extend up to 42km upstream of 12 villages (communes of My Ly and Keng Du of Ky Son District, Nghe An Province). The flow in the river between the dam and the outlet, will be considerably reduced, particularly during the dry season. Below the outlet, the river will be subjected to daily flow fluctuations due to the peaking operation of the power plant. The detail design of operation will determine the degree of fluctuation and length of the river that may be impacted.

The proposed Project is planned with installed capacity of 180MW. Based on the planned installed capacity, the total annual energy generation in an average year will be approximately 660.2GWh. My Ly HPP has an active storage volume of 197.8Mm^3 and is a long-term regulation reservoir.

Environmental flow. The final operation regime will be confirmed during the design phase. There is a stretch of about 2.8km that will need to be assured to have ample flow of water to sustain biota and human use needs. In addition, the reservoir operating downstream will have its water level receding gradually reaching a distance of about 28km downstream the My Ly dam site. Monitoring and data collection on the water flow and needs will need to be conducted to decipher the likely impact on the added stretch which may not be wetted during a period of three months, at least. A discharge from My Ly HPP should take this regime into account in determining the required environmental flow.

Construction manpower. The estimated required manpower for construction is approximately 3400 persons. Ten to fifteen percent of the total estimated work force is expected to be local. Temporary and permanent camps will be constructed to provide accommodation for the workers and it is envisaged that the design is in-line with MIGA's standards with reference to IFC/EBRD Guidance Note on Worker's Accommodation.

In addition, an influx of new settlers and small businesses will normally establish themselves at such large construction sites. Unregistered persons and "camp followers" could come to the area, whose numbers should be held at a minimum.

Construction schedule. Start of construction is assumed to be 2018, i.e. preferably at the beginning of the dry season, and last for four years. The construction schedule is based on the construction procedures and corresponding rates of progress described in the Feasibility Report.

The development of the hydropower Project will commence with detailed technical design of the Project works and the elaboration of the environmental and social plans, including all safeguards at the pre-construction phase. The construction will essentially start once the resettlement implementation process is complete. It is possible that a staggered resettlement time-line may be employed with the households closest to the dam relocating before the construction commences, given that the ones further away will be affected when the reservoir is filled. Regardless of timing of physical relocation, all agreements for resettlement must be completed before construction begins.

PHYSICAL ENVIRONMENT

General topography. The Ca River basin within the Project stretch is characterized by a rugged terrain with sharp variation in elevation. The few flat or gentle-sloped lands by the river banks, are either used as settlements and/or cultivation areas. Most of the settlements and agricultural lands are on hill slopes and at small flat highland areas. Areas with gentle slopes are used for agriculture, while the steep areas are common grazing lands, cropland or covered with limited secondary forests. Within the Project Area of Influence (AI), the elevation ranges from minimum of 218masl to maximum of 403masl. The average elevation of the river stretch is 302 masl. Slopes range from 15^{o} - 45^{o}.

Land use in the Project Area of Influence. The land use analysis shows that the Project's Direct Impact Area (DIA) and proposed buffer zone is highly influenced by human activities. Eighty percent of the DIA of 1333.8ha is vegetated (Table 3). Approximately 21% of the vegetation cover to be taken by the Project comprises a combination of mixed forests (Figure 2).

Precipitation and seasonality. The mean annual rainfall in the Project area is estimated at 1400mm. History of flooding has been reported in Ca River basin (e.g., May 1989). Annual rainfall changes along the Ca River basin as indicated in the following records:

- 1100 - 1700mm - Upstream area, where the Project construction will be;
- 1800 - 2500mm - Middle reaches of Ca River; and
- Over 2500mm - Downstream reaches

Table 3. Land use and main cover of Project Direct Impact Area (DIA)

No.	Land use and cover (land take of project)	Permanent area (ha) - DIA		Temporary area (ha)[1] in DIA	Total (ha)	Buffer area (ha)
		Reservoir	Main works			
I	**Total vegetated area**	**988.3**	**31.2**	**47.3**	**1066.5** (80%)	**692.8**
a	Forests	629.3	17.5	22.5	*669*	*425*
b	Scrub and grassland	327.0	13.4	17.6	*357.8*	*251*
c	Shrub/bamboo/cultivated/uncultivated land	32.0	0.3	7.2	*39.5*	*17*
II	**Built-up areas/residential/ others**	**51.0**	**0.2**	**3.4**	**54.6** (4%)	**12**
III	**River/stream**	**208.0**	**2.7**	**2.0**	**212.7 (**16%)	**2.7**
Total		**1,247.3**	**34.1**	**52.7**	**1,333.6**	**707.7**

1-axilliary areas to be used during construction are included in total land take of project.

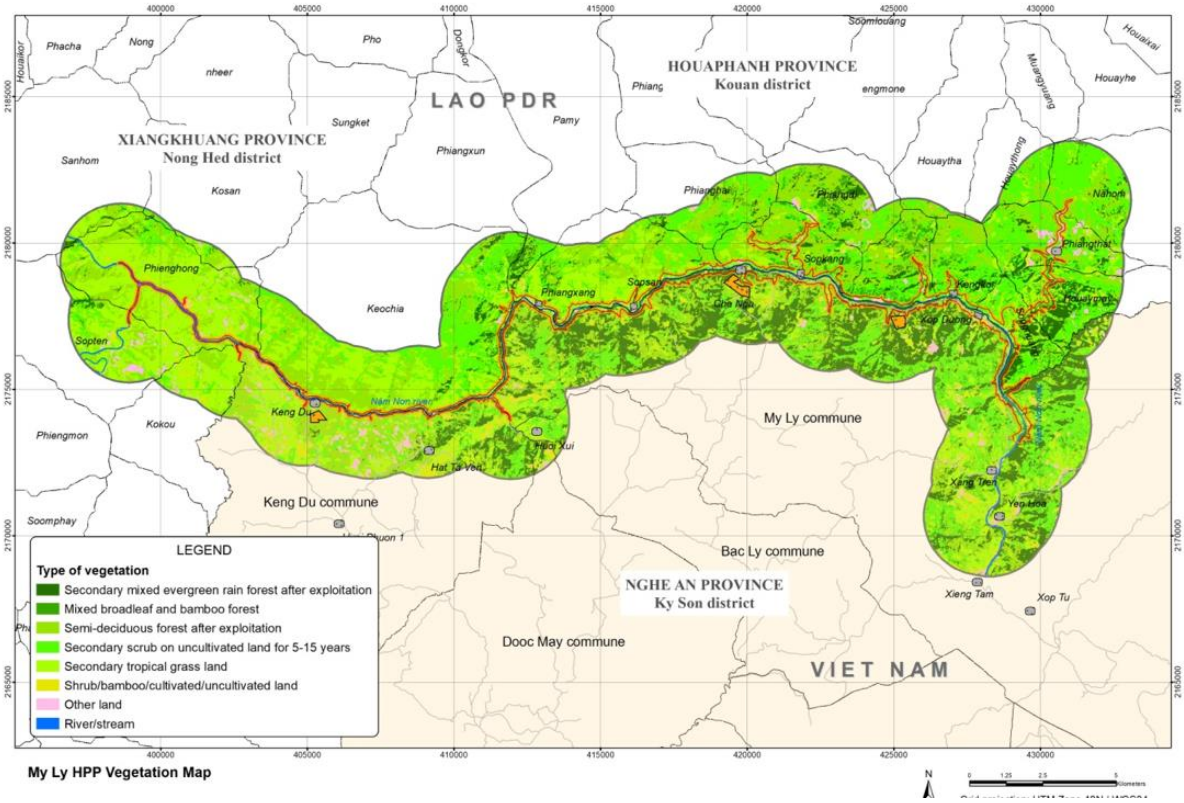

Figure 2. Land use map of My Ly HPP Project Area of Influence

Lao PDR has less variation in climatic conditions and is characterized by two distinct seasons, the wet and dry. Part of the Project reservoir area in Laos is dominated by both southwest and northeast monsoons forming the two climate regime, the wet and dry seasons similar to that in Vietnam. The annual rainfall distribution is approximately 80% from May to September, 10% from October to December and about 10% from January to April.

Geology. The proposed dam site is considered as the optimum location with favorable condition in terms of engineering geological conditions. The IIA rock zone can support the foundation at a design of 140m high concrete dam, where rock zone/layer to be excavated is not more than 10m. The permeability of overburden and bed rock also pass the design requirement.

The Project area also exhibits some tectonic broken zones, from grade 3 to even higher faults. The powerhouse base is founded on IIA hard rock (see next section for description). Since the soil/rock layer is weak and a failure zone exists, attention shall be paid to the stability of slopes and surface flow drainage into the foundation.

The geological mapping has shown that the slope stability in the reservoir area is mainly controlled by the geological structures, as would be expected. Steep areas with slopes in excess of 45 degrees will be at risk of erosion. Such areas can be observed within the Project area. There is however very thin overburden and rock foundation is considered stable.

Earthquake and hazard assessment. Based on the preliminary seismic investigation for the My Ly HPP[1], the fault lines within the Project area may generate an intensity 8 (MSK-64 scale) and trigger a 6.75 magnitude earthquake. The dam therefore has been designed to withstand the predicted earthquake magnitude, and the detail design will need to explicitly address this need.

The annual flow discharge at the planned dam site is 107m^3/s (Table 4). The table also shows discharge from tributary location downstream of the dam. Table 4 presents the various tributaries located in villages downstream of the proposed dam and their discharge contribution. Based on the table above, at the Lauan Mai Security Post, a total of 118.99m^3/s is estimated to currently feed unto the Ban Ve HPP.

Table 4. Tributaries downstream of the My Ly dam site and their discharge contribution

No	Tributaries located in downstream*	Annual discharge Qo (m3/s)
	At Mỹ Lý Dam	107.2
1	At Xàng Trên Village	0.53
2	At Yên Hòa Village	1.37
3	At Xiềng Tắm Village	3.17
4	At Xốp Tụ Village	0.75
5	At Xốp Tược Village	0.44
6	At Hòa Lý Village	0.29
7	At Tổm trên Village	0.09
8	At Piêng Mựn Village	1.60
9	At Xén My Village	1.33
10	At Tổm Village	0.06

[1] Geology Institute – Institue of Science and Technology of Vietnam, December 2012

No	Tributaries located in downstream*	Annual discharge Qo (m3/s)
11	At Cha Luân Village	0.27
12	At Xốp Pe Village	0.12
13	At Luân Mai Security Post	1.83

*Note: The tributaries are associated with settlements or a landmark, thus named accordingly.

Sedimentation. Sedimentation process of the My Ly reservoir was assessed under different scenarios (e.g., FSL/MOL alternatives and without flood storage). Results of the study showed that: after 30 years of operation, total sediment volume can reach up to 28.2 million m^3, occupying about 3.06% of the reservoir storage. At 50 years of operation, total sediment volume will increase up to 46.4 million m^3, occupying about 5.05% of the reservoir storage.

Water quality. The water quality of Ca River within the stretch of the Project area has no indication of industrial pollution, except from the tributaries coming from the Laos territory where elevated turbidity is visual which was attributed to the gold mining activities upstream of the river. Most of physo-chemical properties and heavy metal concentrations conform to the national water standards. Total Suspended Solids (TSS) showed a slightly elevated levels although still within the allowable limit. Elevated levels of coliform (up to three times higher) than the national water standard were also reported. This is expected when domestic sewage is haphazardly disposed off along the rivers and stream. In addition, raising of animals along the river banks is also common at the Project site.

Air quality. Air quality at the Project area is typical of a rural environment and no indication of air pollution. Among the three established air quality stations, two sampling sites, the village of Xang Tren and upstream of the proposed dam site, where traffic activities are still limited, air quality is clean and way below the national air standards. Also typical of rural areas, burning firewood for cooking meals has been the main source of air pollution at the household level. Exposure to indoor air pollution increases the risk of illnesses such as respiratory tract infections, pneumonia, chronic obstructive pulmonary disorder asthma and lung cancer.

Due to dirt roads there is a certain amount of temporary suspended particulate matter in the air which is seen as negligible.

Noise and vibration. Background noise in the Project area is low and inherent to a rural area where population density is low with limited economic activity (e.g., limited traffic noise, absence of industrial and/or commercial activities).

BIOLOGICAL ENVIRONMENT

Vegetation. My Ly Commune has altogether 17,731ha of forest land of which 2,520 is classified as Production Forest and 15,210ha as Protection Forest. Production forest area has been allocated to households for planting trees and some fast growing *Acacia sp*, teakwood species, *Chukrasia tabularis (*Indian mahogany*)* and *Erythrophleum fordii* (a legume species) are planted. However, most of the Production Forest area is farmed with rain-fed upland paddy, maize crop and cassava due to the lack of arable land. Protection Forests have poor quality due to past illegal exploitation and now are covered with secondary forest vegetation and tropical grassland.

Local households collect and depend on a regular supply of wild vegetables, bamboo shoots, mushrooms, *Auricularia auricula-judae (*Jew's Ear, an edible fungus), and herbal medicines such as "củ xa nhân", *Smilax* roots and *Ganoderma lucidum* (nấm Linh Chi) from Protection Forest. They also hunt wild animals such as wild boars, birds, wild chickens, squirrels, *Muntiacus muntjak (*barking deer) and mice for food, although wild boars and barking deer are now very few.

Keng Du Commune has 3,204.2ha Protection Forests and 148.9ha Production Forest. About 149ha Production Forest was allocated to households for tree plantation where *Styrax benzoides* and *Styrax benzoin,* some trees of *Acacia* spp. and *Melia azedarach* (Chinaberry) are planted. Similar to My Ly Commune households collect forest products.

Xiangkhoang Province in Laos, covers an area of 15,880km^2 and has a mountainous topography. The population of the province in the 2015 census was 244,684. This province has seven districts and My Ly HPP is located in Nonghed district. The reservoir area is a source of timber, forest products and used for agriculture and use is similar to that in Vietnam. It is noted that there are areas with matured trees in Laos mainly on steep and inaccessible sites including cliffs.

Aquaculture in the Project area is not developed, fisheries is limited to natural fish resources of Ca river and its tributaries. Fishes commonly caught in the Ca River are *Anguilliformes* (eel), *Bagridae* (cat fish), *Bagarius bagarius*, *Cyprinus carpio*, and *Trionychidae fitzinger*. They also catch small fish, snails, shrimp, *Caridina flavilineata*, *Brachyura* and tadpoles along the river and streams. They collect seaweeds and mosses during dry season for food.

Forest vegetation systems in the Project area. Forests close to the settlements and near the Project areas were heavily exploited and farmed without terraces using the swidden agriculture system. Typical for swidden agriculture, once soil fertility diminishes, the villagers abandon the farm and move to a new tract of land and the exploited forest was left to regenerate and restore naturally. Such areas gradually turn into grassland, scrubland and secondary forests.

Type of vegetation in reservoir and construction areas. Forest vegetation in the proposed reservoir area and construction areas is given in Table 5. Area of the proposed reservoir is 1,247ha of which 272ha is covered by Semi-deciduous Forest, 259ha Secondary Mixed Evergreen Rain Forest, 166ha Secondary Scrub, 161ha Subtropical Grassland, 98ha Mixed Broadleaf and Bamboo Forest, 32ha Shrub/bamboo /cultivated/ uncultivated land and 208ha river and streams. The Project will acquire 1,334ha of land and about 80% of this total area is forested or have some forest vegetation. About 75% of the 708ha proposed buffer zone area has secondary forest vegetation, 149ha is grassland and land under cultivation is less than 17ha (See Table 3).

Table 5. Vegetation types in Direct Impact Area and proposed buffer zone strip

No.	Vegetation types	Permanent area (ha)		Temporary (ha)[1]	Total (ha)	Buffer area (ha)
		Reservoir	Main works			
Total vegetated area		**988.3**	**31.25**	**47.3**	**1066.3**	693
I	Secondary mixed evergreen rain forest	259	11.6	11.6	**282.2**	*150*
II	Mixed broadleaf and bamboo forest	98.3	2.1	4.0	**104.1**	*45*
III	Semi-deciduous forest	272	3.8	6.9	**282.7**	*230*
IV	Secondary scrub	166	8.2	11.5	**185.5**	*102*
V	Secondary Subtropical grassland	161	5.2	6.1	**172.3**	*149*
VI	Shrub/bamboo /cultivated/ uncultivated	32	0.3	7.2	**39.5**	*17*

Main works include dam and associated structures, powerhouse and permanent project facilities

[1] Temporary area includes disposal sites 1-4, auxiliary area 1-3, and roads

Biodiversity status. There are 447 vascular plant species from 341 genus and 124 families recorded in the 20 sampling sites. Biodiversity in the Project area is low since most of the

vegetation has been disturbed. The secondary evergreen mixed rain forest has medium diversity while the secondary forest grown on uncultivated land, mixed broad leaf bamboo forest and predominant bamboo forests are of low biodiversity value. In general, number of tree species in the reservoir area is higher than in the proposed construction areas.

Regeneration, standing volume and total biomass. Regeneration in secondary forests is good, with more than 17 species of hardwood species regenerating in the proposed reservoir area. Regeneration in the proposed construction areas is lower than in the reservoir area. There is species similarity between these two Project areas with an exception of few species which were not recorded in the reservoir area. Table 6 summarizes the type of forests and its estimated organic biomass at the proposed reservoir and auxiliary areas.

Table 6. Estimated organic biomass above ground in the reservoir area

Type of forest	Reservoir		Buffer zone		Headwork / powerhouse	
	Area (ha)	Biomass (mt)	Area (ha)	Biomass (mt)	Area (ha)	Biomass (mt)
Secondary mixed evergreen rain forest and Semi-deciduous forest	531	29,140	380	20,500	15.4	880
Mixed broadleaf & bamboo forest	98	2,949	45	1,350	2.1	63
Secondary scrub/ grassland /shrub/cultivated /uncultivated	359	2,796	268	2,173	13.7	120
Total	**988**	**34,885**	**693**	**24,023**	**31.2**	**1,063**

Species of conservation importance. There are two species of concern namely the Gu Sui Bu (*Drynaria fortunei),* an epiphytic herb species native to East Asia and *Pterocarpus indicus*, a hardwood found in South East Asia, recorded within the Project area. The former is listed as endangered species in the Red Data Book of Vietnam, 2007[2] while the latter is recorded as regionally extinct in the IUCN. *Drynaria fortunei* is known as traditional Chinese medicine for bone healing while *Ptercarpus indicus* is a good source of timber. Both are heavily exploited for their uses.

Wildlife species. Mammals in the Project area include 19 rodent species *(Rodentia)*, 12 bat species *(Chiroptera)*, six carnivore species, three *primate* apes, two insectivores and two ungulates *(Artiodactyla)*. These animals are mainly distributed in area where forest is in good condition, usually above 500masl. Small mammals, rodents and bats are abundant in the proposed dam site and auxiliary areas.

The reservoir area comprises mainly of secondary forest, bamboo forest, scrub land and grass land. Since wildlife are dependent on their habitats, wildlife population in the Project area did not exibit a diverse population as compared to where forest is in good condition. There are no large size animals/species or rare species reported in the reservoir area instead, animals of small size such as the civet (*Viverridae)*, weasel (*Mustelidae)*, tree squirrel (*Sciuridae)*, rats (*Muridae)*, bamboo rats (*Rhizomyidae)* were reported to occur. There are also bird species which include wild chicken (*Gallus gallus)*, woodpecker (*Piciformes)*, rollers (*Coraciidae)*, kingfisher (*Alcedinidae)*, boucal, some species of cock, drongo and *Muscicapidae.* Reptiles and amphibians reported to be present include the

[2] Red Data Book of Vietnam (2007)

agama (*Agamidae)*, ground dragon *(Physignathus cocincinus)*, gecko *(Gekko gecko)*, varan *(Varanidae)*, snake (*Coelognathus radiates)*, cobra (*Elapidae)*, and some species of frog. Species of conservation interest are given in Table 7.

Table 7. List of species of conservation interest

No	Scientific name	Common name	Vietnamese name	Vulnerability status[3]		
				Vietnam Red Data Book (a)	IUCN (b)	Decree 32/2006 (c)
1	**Mammals**					
	Nycticebus bengalensis	The Bengal Slow Loris	Cu li lớn	VU	VU	IB
	Macaca mulatta	Rhesus monkey	Khỉ vàng	LR		IIB
	Macaca fascicularis	Leopard cat	Khỉ đuôi dài	LR		IIB
2	**Reptiles**					
	Gecko gecko	Gecko	Tắc kè	VU		
	Physignatus coccincinus	Chinese water dragon	Rồng đất	VU		
	Varanus nebulosus	Clouded monitor	Kỳ đà vân	EN		IIB
	Varanus sanvator	Water monitor	Kỳ đà hoa	EN		IIB
	Ptyas korros	Indochinese ratsnake	Rắn ráo thường	EN		IIB
	Ptyas mucosus	Oriental ratsnake	Rắn ráo trâu	EN		IB
	Bungarus fasciatus	Banded krait	Rắn cạp nong	EN		IIB
	Naja naja	Indian or Asian cobra	Rắn hổ mang	EN		IIB
3	**Birds**					
	Falco severus	Oriental hobby (a falcon)	Cắt bụng hung			IIB
	Psittacula alexandri	Red-breasted parakeet	Vẹt ngực đỏ			IIB
	Copsychus malabaricus	White-rumped shama	Chích chòe lửa			IIB

Use of forest plants, animals and forest ecosystem services. Out of the total 447 vascular plant species recorded in the Project area, 149 of them are medicinal plant species, fuelwood and timber species, edible plant species, ornamental plant species, rattan and bamboos species and others. There are 65 medicinal plant species of high value naturally growing in the Project area while 56 species are used for timber and fuel wood.

[3] (a) VNRB.2007. Vietnam Red Data Book; (VU = vulnerable; LR = Lower risk; EN = Endangered)
(b) IUCN.2016. The IUCN Red List of Threatened species; VU = Vulnerable
(c) Decree 32/2006/ND-CP. Management of Endangered, Precious and Rare Species of Wild Plants and Animals; IB = Prohibiting collection and use for commercial purposes; IIB = Restricting exploitation and use for commercial purposes.

The villagers have always used and are highly dependent on the forest as source of their fuel-wood, timber, fodder and forage, medicines, religious rituals and food.

The wildlife species in the mixed forest types are consumed and these include the yellow monkey (*Macaca mulatta)*, wild pig (*Sus scrofa)*, muntjac (*Muntiacus muntjak)*, wild cat and big bamboo rat (*Bandicota indica)*. It is also habitat for bird species from the families of drongo, crow, fly eating bird, honey eating bird, Chinese laughing-thrush, cock and turtle bird. Reptile and amphibian species that are found here include *Physignathus cocincinus*, *Varanus nebulosus*, cobra (*Naja naja)*, *Trimeresurus albalabris*, species of family tortoise *Emydidae*, and Gecko (*Gecko gecko)*. Secondary forest types also have good habitat for small mammals from the orders of rodents and bats; bird species, reptiles and amphibians like *Physignathus cocincinus*, *Ptyas mucosus*, *Bungarus fasciatus*, *Bungarus candidus and Naja naja*.

Habitats along Ca River, streams, swidden farming area and the village area. Areas along Ca River and the adjacent streams, swidden farming areas, settlement areas and along road alignment provide habitat for mammals which are also eaten regularly as a free source of protein: such as the black tail rat (*Crocidura attennata)*, mosquito eating bat (*Java Pipistrellus javanicus)*, mice (*Rattus flavipectus)*, rat (*R. norvegicus) and* bird species such as milky stork (*Egretta garzetta)*, fly stork (*Bubulcus ibis)*, Milky necked stork (*Amaurornis phoenicurus)*, big kingfisher (*Megaceryle lugubris)*, small kingfisher (*Ceryle rudis)*, wolly necked stork (*Halcyon chloris)* and *Alcedo atthis.* Some reptiles, the gecko water snake, amphibians such as family Ranidae, family Rhacophoridae (tree frogs)), Microhylidae (small frogs) and some insects (butterfly) were recorded in this habitats.

Fish species and diversity. There were a total of 77 fish species from 17 families and six orders recorded in the Ca River and the streams joining it. Fish living in streams are normally small fish species, preferring rapid water and high oxygen content. Typical stream fish species are those such as *Schistura*, *Rhinogobius* (gobies) and *Oreochromis niloticus* (tilapia).

Eight species have high economic value and most of them except *Onychostoma lepturus* are less common in the river (Table 8). None of these high valued fish species are found in streams.

Table 8. Fish species of high economic value in Ca River

SN	Fish species	Ca River	Stream
1	*Anguilla marmorata*	+	-
2	*Spinibarbus denticulatus*	+	-
3	*Cyprinus rubrofuscua*	+	-
4	*Onychostoma lepturus*	++	-
5	*Hemibagrus guttatus*	+	-
6	*Cranoglanis henrici*	+	-
7	*Bagarius rutilus*	+	-
8	*Channa striata*	+	-

Bagarius rutilus

Bangana lemassoni

Fish species recorded at Ca River and its tributaries

Migratory fish species. *Anguilla mamorata* is a long distance migratory fish species, migrating downstream to sea for feeding. This species is considered to be of high economic value, vulnerable and is now less frequently seen in the river. The Ban Ve HPP dam and Nam Non HPP dam downstream of this proposed Project has already obstructed its movement to the sea. Its habitat has been fragmented and a small population is now adapting to this new environment and is likely to disappear over time.

Vulnerable species. Of the 77 fish identified, two species are listed as Vulnerable (VU) according to the Vietnam Red Data Book while IUCN classifies five (2007; Table 9)[4].

Table 9. List of vulnerable fish species

SN	Scientific name	Common name	Vietnamese name	Vulnerability status[5]	
				IUCN	VNRB
1	*Bagarius rutilus*	Cat fish	Cá Chiên	VU	VU
2	*Acrossocheilus annamensis*	Carp	Cá trốc	VU	
3	*Bangana lemassoni*	carp	Cá Rầm xanh	VU	
4	*Hemibagrus guttatus*	catfish	Cá Lăng	VU	
5	*Anguilla marmorata*	Marbeled or giant mottled eel	Cá lệch, cá Chình hoa	VU	VU

[4] Kottelat, M., 2001. Freshwater fishes of northern Vietnam. A preliminary check-list of the fishes known or expected to occur in northern Vietnam with comments on systematics and nomenclature. Environment and Social Development Unit, East Asia and Pacific Region. The World Bank. 123 p.

[5] IUCN. 2016. The IUCN Red List of Threatened Species; VU = Vulnerable
VNRB. 2007. Vietnam Red Data Book; VU=Vulnerable; LR = Lower Risk

Fisheries. Fishing is not a main occupation of the people in the Project area. However, most of the households do fishing regularly for their household consumption. Men, women and children go for fishing. Men use boat and cast net, while women and children use baskets for fishing. Families take a day off to go to streams for fishing with basic fishnets and baskets. Sometime they stop the flow on streams, dewater and do fishing. Some villagers also use poisonous leaves in a stream section. Also, although it has been prohibited, the use of electrofishing is still being practiced. Even with the various fishing methods, fish catch is reported to be low, at about 1-3 kg average per day, while on a good day catch could increase to 5-10 kg/day. The species caught are: *Onychostoma lepturus, Bagarius rutilus, Hemibagrus guttatus, Cyprinus rubrofuscua, Oreochromis mosambicus, Danio laoensi* and *Garra orientalis.* Some people also catch crab, shrimp and mussels for household consumption. Fish farming is not a prevalent practice in the Project area although there are small ponds noted. These are only for small production and not for large commercial purposes.

Fishing a common activity in the Ca River

SOCIAL ENVIRONMENT AND LIVELIHOODS

Inundation area. The My Ly HPP reservoir at FSL will have an elevation of 300m and an inundation area of 1247ha. The area is upland forested area with steep slopes, the river is in most parts rocky with high current. Several isolated villages are located along the river close to the river bank and are in the proposed reservoir inundation area.

Three villages in Vietnam and five villages in Laos are expected to be inundated by the My Ly HPP reservoir. In Keng Du Commune, the village of Keng Du and in My Ly Commune downstream Keng Du, Cha Nga and Xop Duong villages by the river will be inundated.

In Kouan District in Laos, settlements of five villages will be inundated by the reservoir: Phiangxang, Sopsan, Sopkang, Kengkor and Phiangthat and in Nonghed District, also in Laos, land areas of the villages of Keochia, Phianghong, and Sopten will be inundated.

The affected villages and administrative areas can be seen in Figure 1.

Project construction areas. By the dam site, in My Ly Commune, Xang Tren Village is located 1km below the planned dam site and will be in the midst of the planned Project construction areas, and therefore is included in the list of villages to be relocated.

Downstream stretch. It is estimated that downstream the planned dam, about 28.4km of the river will be potentially affected by low flow during the dry season. Nine villages are located along this stretch of the river.

Socio-economic and cultural features of the affected villages

Population ethnicity and poverty. Almost all the people in the Project areas in both countries originate from different ethnic groups/minorities[6]. In the Vietnamese area they are

[6] In Vietnam, the Government recognises a total of 54 ethnic groups, of which the Kinh (Vietnamese) is the majority population with 87% of the national population, and all the other groups are defined as ethnic minorities. In Laos the national population is divided into three broad categories of 49 ethnic groups, and the term ethnic minority is not used.

Thai and Kho mu ethnic minority people and in Laos, Kho mu and Thai[7] with their own identity, language and cultural features. Most villages are inhabited with one ethnic group and people have family ties with each other. The ethnic groups in Vietnam and Laos are related to each other, some people have moved across the national border and settled down on the other side, and villagers have regular social and economic interaction with each other over the border river.

All the households in the affected villages are extremely poor, under or just above the poverty line as defined by the GoV[8] and the GoL[9].

Infrastructure and services. The affected villages are located remotely and can be reached either by boat in the Ca River or along soil roads that are hardly vehicle accessible year round. Local people mainly travel either by wooden boats, on foot or by motorcycles. In all the riverside villages, nearly every household owns a boat, and Ca River is the main transportation route for both people and goods. The Lao villages are located at a road distance of up to 80km from the District center, so when they e.g. need health services, they rather travel by boat to My Ly Commune center than to the Kouan District town.

The villages to be affected by My Ly HPP in both countries are outside the national electricity network, and most all households have a micro-hydropower (pico) generator in the Ca River or in a tributary stream next to the village, providing enough electricity for a few hours of lighting and TV. In the Lao villages, households use both micro hydro generators and solar panels for electricity generation.

In the Vietnamese villages household water is lead from tributaries and mountain streams to water tanks in the villages. These water tanks have been constructed through government or donor programs. Additionally, villagers use the Ca River and its tributaries for washing and bathing, as well as for watering animals. In the Lao villages water is likewise lead from a stream through a tube to a water post with tap centrally located in the village.

Health and sanitation. Hygienic conditions in the remote villages are in general very poor. Most villages lack toilets, and the existing ones are very rudimentary. Pigs, poultry and dogs roam freely around in the villages. Villages lack any rubbish disposal system, and litter may lie anywhere in and outside the village including the riverside. The general standard of knowledge about health, hygiene and nutrition is very poor and based on tradition.

No health services are available in the villages, and the distance to commune or district health center is too long and costly for people to travel. Health problems are treated with medicinal plants, herbs and fungi collected in the forest. Most common health ailments include headache, diarrhea, fever, respiratory infections, itchy eyes, and gynecological problems. Most always, babies are delivered in the villages, and women seldom attend any birth-controls/health check ups during pregnancy. Most children are vaccinated in the

[7] Another spelling “Tai”, and also reported as Lao Loum, which is the larger ethnic group. In Laos, people are ethnically divided into three main groups: (1) The Lao Loum, who are also called the Lao Thai or the Lowland Lao, who make up approx. 75% of the population in the country; (2) Lao Theung, the midlands people, consisting of 58 sub-groups, among them the Kho mu; and (3) Lao Soung, the highland people consisting of the Hmong and Yao as the main sub-groups and making about 10% of the national population (sources: http://minorityrights.org/minorities; https://www.luangprabang-laos.com/The-people-tribes-and-ethnical).

[8] The official poverty line 2016–2020 issued through the GoV Decision No. 59/2015/QD-TTg *Promulgating multidimensional poverty levels applicable during 2016-2020* is for urban areas 900,000VND/capita/month and for rural areas 700,000VND/capita/month. 1USD≈22,700VND (22 Sept 2017).

[9] The official poverty line 2010–2015 issued through the Decree No.285/PO *Poverty and development standard 2010-2015* is for country level 192,000LAK/capita/month, for urban areas 240,000 LAK/capita/month and for rural areas 180,000LAK/capita/month. 1USD≈8,300LAK (22 Sept 2017).

villages through monthly mobile vaccination services provided by the commune health center, and few cases of infant or maternal deaths are reported.

Food and nutrition. Upland rice is the main cultivation crop and the staple food of all the affected people. Forest and river provide the resource base for other daily food. Women collect wild growing vegetables, roots, bamboo shoots and mushrooms in the forest several times every day for household food. Men are hunting rats, birds and bamboo rats for food on a daily basis. Another main protein source base is the river: Men are fishing with nets from boats and shore, women are fishing with baskets, and even children are collecting snails and shrimps in the shallow waters. Poultry with chicken and ducks is kept not only for selling but also for family food, but pigs are eaten more seldom at special occasions, during annual celebrations and family festivities such as weddings. Food is prepared on open fire, and both men and women collect firewood in the forests.

Education. According to the Vietnamese government standard, there is a kindergarten and a primary school in every village, in Laos there are primary schools in villages. Secondary boarding school is located in the commune center in Vietnam, and in Laos each village group has a secondary boarding school. Many ethnic minority children drop out of school after primary school or during the secondary school, and very few, if any, continue to high school that is located in the district center.

In the villages the ethnic minority people use their own ethnic language in everyday communication. Women regularly have lower education level than men, because girls drop out of school early during the secondary school in order to help their families with household work. Many elder ethnic minority women are not able to communicate fluently in the national language, and up to 50% of the elder women are illiterate.

Livelihoods. All the inhabitants in the Project areas are farmers living on low-productive rain-fed upland rotational swidden agriculture, combined with forest resources utilization, fishery and livestock breeding. Many households do not have sufficient food year round, in some villages 50% of the households lack rice during the period from March to August prior to the annual harvest. Apart from upland rice, all farmers cultivate maize and cassava for animal fodder. Vegetables and fruit trees are grown on riverbanks, but in many areas the land along the Ca River is too steep and rocky to allow cultivation activities.

Ky Son is a rural district and an overwhelming majority of the inhabitants in its 21 communes are farmers living on upland agriculture and forestry. Cultivable land resources are limited and main part of agriculture takes place in the upland areas. Table 10 below provides an overview of land use in the two communes to be affected by the My Ly HPP.

Table 10. Land use in the My Ly and Keng Du communes, Vietnam

SN	Land use	Commune	
		My Ly	Keng Du
1	**Agriculture land**		
	Wetland rice	31.8	41.0
	Annual crops	45.0	99.2
	Perennial crops	26.0	58.2
	Other farming area	25.0	19.0
		127.8	**217.4**
2	**Forest land**		
	Protection Forest	15,210	3,204.2
	Production Forest	2,520	148.9

SN	Land use	Commune	
		17,730	**3,353.1**
	Total land area	**27, 109.9**	**8,014.9**
	Households	1,247	888
	Population	5,595	4,329

Source: PECC1, 2017. Livelihoods Survey Report – My Ly HPP ESIA (April 2017);
Land use Plan of Villages 2015, Keng Du Commune, My Ly Commune;
Commune Annual Report 2016, Keng Du Commune, My Ly Commune.

Implementation of the Project will influence seven villages situated on the right bank of the Ca River (in Vietnam side) and five villages on the left bank (in Lao PDR). The seven villages namely Cha Nga, Xop Duong, Xang Tren, Keng Du, Huoi Phuon 1, Hat Ta Ven and Huoi Xui in My Ly and Keng Du communes have 739 households. Altogether they cultivate 940ha of upland farm and 23ha wetland paddy crop annually. Under the rotational farming system, they have access to about 1,180ha additional upland for crop cultivation. They grow 704ha upland rice, 311ha maize, 99ha cassava and 20ha other crops including peanuts (Table14). The estimated livestock population reared in these seven villages is 1,935 cattle, 535 buffaloes, 2,088 pigs, and 8,664 poultry birds including ducks.

Table 11. Estimated area under crop cultivation in Project IA villages in Vietnam

Village /Commune	Households	Population	Swidden land (ha)					
			Rice	Maize	Cassava	Others	Total	Wet rice
My Ly Commune, Ky Son District, Vietnam								
Cha Nga	97	435	109	45	10	2	166	x
Xop Duong	61	224	93	9	6	2	110	x
Xang Tren	174	688	223	35	26	3	287	6
Total	**332**	**1,347**	**424**	**89**	**42**	**8**	**563**	**6**
Keng Du Commune, Ky Son District, Vietnam								
Keng Du	46	183	31	46	12	3	92	2
Huoi Phuon 1*	93	388	71	35	13	3	122	x
Hat Ta Ven*	130	636	81	104	26	4	215	15
Huoi Xui*	138	564	97	37	6	2	142	x
Total	**407**	**1,771**	**280**	**222**	**57**	**12**	**571**	**17**
Vietnam total	**739**	**3,148**	**704**	**311**	**99**	**20**	**940**	**23**

Source: PECCI, 2017. Livelihoods Survey Report and – Village Baseline Report, My Ly HPP ESIA (April 2017).
Note: Average farmed area by a household for each crop is multiplied with the total number of households to get a better estimate of land under cultivation. X -not present
*Note: Only some cultivated land of Huoi Phuon 1, Hat Ta Ven and Huoi Xui will be affected

There are 3,076ha of forests in the Laos Project influenced villages (Table 12). In some villages, people have encroached on Production Forest for upland cultivation. Upland cultivation covers 207ha, averaging 1.6ha per household. It is to be noted that there is encroachment of the different forest types, particular production forest areas, for agriculture, which are not reported or available officially.

Table 12. Land use in Project IA villages in Laos

Agriculture and forest land	Area (ha)					
	Kengkor	Phiangsang	Phiangthat	Sopkang	Sopsan	Total
Agriculture	50.0	10	54	48	45	**207.0**
Forest	563.9	182.0	1439.7	557.3	332.9	**3,075.8**
Production forest	174.5	110.2	40.6	272.0	182.5	**779.8**
Conservation forest	313.9	71.8	386.7	92.2	150.4	**1,015.0**
Protection forest	75.5	-	1,012.4	193.1	-	**1,281.0**
Households	29	9	44	48	16	**146.0**
Population	150	36	276	320	89	**871.0**

Source: PECC1, Livelihoods Survey Report – My Ly HPP ESIA, April 2017; Village Baseline Report - My Ly HPP ESIA, April 2017; Land use plan of villages in 2015.

Upland farming (swidden land) area is estimated to be about 413ha in the Project influenced villages. Upland rice is the major crop grown in about 368ha (89% of the total land) followed by maize 38ha (9%). All households plant cassava but the area is small just over 7ha. Peanut is grown only in Kengkor Village. Table 13 summarizes the productivity of farm products in the different Project villages in Lao PDR. In terms of production, cassava has the highest yield among the crops.

Livestock breeding is the most important livelihood after farming for people in the remote villages. All households have chicken and geese for family food, pigs are grown mostly to be sold but also to be eaten at special occasions as festivity food in the village. Animal diseases and deaths are not uncommon, especially among pigs and chicken that are roaming freely in the villages, and epidemics and cold weather kill even cattle. Animal deaths are reported to be more common in the villages in Vietnam, where veterinary services appear to be less available than in Laos, where villagers' knowledge in animal breeding appears to be somewhat better than in the Vietnamese villages. Most families have a few cows and some households even have buffaloes, which both are kept entirely for selling to generate cash. Together with goats kept by some farmers they are grazing in riverbank grasslands and forests near the upland fields. Animals can roam freely because there are no wildlife predators in the nature. Veterinary services are not well developed in Vietnam but are better available in Laos.

Table 13. Productivity of farm crops (mt/ha) in Project IA villages in Laos

Villages	Swidden land			
	Rice (mt/ha)	Maize (mt/ha)	Cassava (mt/ha)	Peanut (mt/ha)
Phiangsang	1.1-2.0	4.0-4.5	15-17	-
Phiangthat	1.5	2.5-3.5	18-20	-
Sopkang	1.5-2.2	3.0	16.0-18	-
Kengkor	1.5-2.0	3.5-4.0	18.0	0.15
Sopsan	1.5-2.0	3.5-4.0	18 - 20	-

Source: PECC1, Livelihoods Reports and Village Baseline Reports, My Ly HPP ESIA (April 2017)

Forest resources are the crucial base for the daily food and provide approximately 50% or more of the livelihoods of the people in the riverside villages. Non-timber forest products (NTFPs) are important for household food, medicine supply and economy. Women collect bamboo shoots and wild-growing vegetables and mushrooms every day for family food. Some NTFPs like mushrooms, bamboo shoots and medicinal herbal plants are sold to traders. Men collect firewood and do logging of timber that is both used for construction of houses and other structures in the village, and sold to traders. Hunting of birds, rats, bamboo rats, squirrels and snakes is done regularly for household food, mainly with crossbows and traps, and wild boars are hunted during the harvest season near the upland fields.

Ca River is important as a source of livelihoods and as a transportation route for upland products, timber, firewood and other goods. Almost all households in the villages along the Ca River to be affected by the HPP have boats and are fishing for household food on a daily basis. In addition they sell fish when the catch is large enough; fish is dried and salted and also made into fish sauce to be sold later. Men fish with nets both from boats and from the shore, women and children use baskets, and also collect shrimps, snails and moss in the shallow river. Fish is an important protein source for the inhabitants along the Ca River. Riverbanks are in some places also used for home gardening, and these areas serve as pasture for animals as well. However, large parts of the river and riverbanks are rocky and many areas are steep, where riverbank cultivation is not possible.

Due to the remote location and poor transportation infrastructure **trade and business is very limited**. There are no commune markets, only a district market in the district town. In most villages, there are one or two petty (sundry) shops selling daily consumer goods like rice, salt, fish sauce, drinks, sweets and gasoline. Mobile Vietnamese traders visit villages in both countries for buying and selling goods.

There are very few available non-agricultural labour opportunities. Both permanent and seasonal labour migration of mostly young men and women but even entire families is very common both in Vietnam and in Laos.

Cultural heritage. People in the villages along the Ca River belong to the ethnic groups of Thai and Kho mu, which share the same kind of worldview and cultural features through living for generations in the same geographical environment. Forest and river provide their needed resources and form the context for their material and spiritual culture. The local worldview contains gods/spirits related to different elements and places in nature. In addition every family respects its household gods/spirits and ancestors' spirits.

The physical elements of the spiritual culture include spirit forests which are usually located at some distance (about 1km or more) from the village. People are not allowed to utilize forest resources in the spirit forest, however, cattle graze there. Death ceremonies are related to the river, and village graveyard is often located near the river. Each village has a village worship place that is importantly located under the biggest tree in or outside the village. In some villages there is a small wooden spirit house in place, while in some villages only a small wooden platform is used for offerings. Annual ceremonies take place there twice a year: the month of the year depending on the ethnic group residing in the village. Ceremonies are typically connected to the cultivation cycle in the upland fields.

Gender roles and issues. In the Project-area villages, women work in upland fields, in forest and by the river, side by side with men in the livelihoods activities. Women in the ethnic minority villages have in general, lower education level than men. Elder women are often illiterate and cannot fluently use and understand the national language. The Kho mu girls drop out of school early, in order to help their families with household work and livelihoods activities. It is common for these girls to get married when 14-15 years. Women are less mobile than men, and they rarely travel outside their village and livelihoods activity areas. Men are decision makers in the village, and women are not customed to speak-up or express their opinions in meetings. Due to the low educational level and limited

knowledge of ethnic minority women, it is difficult for them to learn new skills for improving their livelihoods and living conditions.

Major reasons for prevailing poverty. There are very few available livelihoods opportunities apart from upland cultivation combined with livestock breeding, fishing and forest resources utilization. The available production land is located in high areas with deep slopes, and in the Vietnamese territory, where the available land is not sufficient for the farming population, pressure on land is therefore high.Erosion and poor soil quality also contribute to very low field yields. Cultivation methods are manual, seeds are local, farmers lack fertilizers and there are no soil improvement methods, which lead to low productivity with hardly enough food for household annual consumption. Every year, many households in the Project-area villages lack rice during the months before the annual harvest.

Cultivation is rain fed and there are no irrigation systems. Agricultural and livestock services are very deficient in Vietnam. In Laos, veterinary services appear to be better available and consequently animal mortality lower than in Vietnam. Support and advice from the commune/district is lacking, seeds are not provided at an optimal time, seeds provided are often that of high-fertilizer demanding varieties, and farmers lack sufficient skills to take care of the animals that they receive through government development programs.

Villages are remote, far away from the district center both in Laos and in Vietnam, and poor road infrastructure affects people's mobility and market access. Market infrastructure is undeveloped with the only available markets in the district towns. Most villagers rarely visit the district center, and women do not even go to the commune center or village group center more than 1-2 times per year. Mobile traders buy agriculture and forest products from farmers in the villages for low prices and sell them household goods for high prices.

All the affected people are ethnic minorities who use their own language in everyday communication. Many elder people are illiterate and the general educational level is low, especially in the Vietnamese villages. Many people are not fluent in the national language and lack ability to take opportunities for health, hygiene, livelihoods or other living standards improvements. Still many children in Vietnam drop out of secondary school in order to contribute to the economy of their poor families. Children grow up with deficient education which further hampers their capacity to avail new opportunities to escape poverty.

PROJECT IMPACTS

Land and Households

Land loss. A total of 1334ha of land will be used by the Project (direct impact area, Table 3). This will include mainly agricultural, different forest assemblages and grassland. The wildlife and plant resources will be lost permanently, while some areas in the auxiliary areas, although used only during construction phase, the change will be permanent.

Villages to be inundated. The reservoir is expected to inundate three villages in Vietnam and five villages in Laos that have to be relocated. The table below summarises the number of households and people count and their ethnicity in each of the villages that will be affected. All the households in the affected villages are extremely poor, under or just above the poverty line as defined by the GoV and the GoL.

Table 14. Villages in the expected reservoir inundation area and construction area of My Ly HPP to be relocated

My Ly HPP Villages to be relocated				
Village	**HH**	**Population**	**HH poverty %**	**Ethnicity**
Keng Du Commune - Vietnam				

My Ly HPP Villages to be relocated				
Village	**HH**	**Population**	**HH poverty %**	**Ethnicity**
Keng Du	46	183	78	Thai
My Ly Commune - Vietnam				
Cha Nga	97	435	60	Thai
Xop Duong	61	224	90	Thai
Xang Tren*	174	688	84	Thai
Subtotal My Ly Commune	332	1,347		
Total Vietnam	**378**	**1,530**		
Kouan District - Laos				
Phiangxang	9	36	100	Kho mu
Sopsan	16	89	88	Thai (Lao Loum)
Sopkang	48	320	63	Thai (Lao Loum)
Kengkor	29	150	100	Kho mu, Thai
Phiangthat	44	276	93	Kho mu
Total Laos	**146**	**871**		
Total My Ly HPP	**524**	**2,401**		

* Xang Tren Village is located in the middle of the Project construction areas and will be highly impacted by the construction, its related activities and workers' camp. The village should be relocated and is therefore included in the list of villages to be relocated.

Village land to be inundated. Added to the villages that will be inundated, land in the area of four villages in Keng Du Commune is located within the proposed reservoir area. In the Laos territory, the reservoir will affect land areas that belong to Keochia and Phianghong villages in Nonghed District in Xiankhoang Province. Additionally the very tail end of the reservoir according to the current design will affect a small area of Sopten Village. The riverbank here is very steep and no villages are located along the river stretch of the My Ly HPP reservoir (Table 15).

Table 15. Four villages in Keng Du Commune in Vietnam with land areas to be inundated

My Ly HPP Villages in Vietnam with land losses					
Village	**HH**	**Population**	**HH poverty %**	**Ethnicity**	**Impact**
Keng Du Commune - Vietnam					
Huoi Phuon 1	93	388	60	Kho mu	Land affected is used for animal grazing.
Huoi Phuon 2	138				Land potentially affected, status to be confirmed.
Hat Ta Ven	130	636	75	Kho mu	Land affected includes cultivation land with maize, sugarcane, eggplant and fruit trees.

My Ly HPP Villages in Vietnam with land losses					
Village	**HH**	**Population**	**HH poverty %**	**Ethnicity**	**Impact**
Huoi Xui	138	564	87	Kho mu	Land affected. Some HHs worried over living too close to the reservoir edge (about 100m above the water level).
Nonghed District –Laos					
Keochia					Land affected by the propsed reservoir. The riverbank is very steep and there are no settlements along the river.
Phianghong					
Sopten					The very tail end of the reservoir. There are no settlements along the river.

Phiangthat Village in Laos subject to relocation

Construction area impacts. Xang Tren Village in My Ly Commune with 688 Thai ethnic minority people in 174 households is located 1km downstream the river from the planned dam site and in the midst of the project construction areas. This village will be highly impacted of the planned workers' camp with estimated 3,400 workers next to it, and of all the construction transportations in the road along the village border as well as of dust, noise, pollution and material disposal from the dam construction in the vicinity of the village. Xang Tren Village should be relocated.

Downstream water regime. It is estimated that downstream the planned dam about 28.4km of the river will be potentially affected by low flow during the dry season. There are nine villages along this stretch of the river, however, all the villages downstream Yen Hoa village that is located 2.8km downstream the planned My Ly dam site, are affected by the Ban Ve HPP more than 80 km downstream. The identified downstream villages can be seen in Table below.

Table 16. Villages in the potential downstream impact area

Village	HHs	Population	Hh poverty %	Ethnicity	Location
Yen Hoa	99	442	70	Thai, 3 HHs Kho mu	2.8km downstream of the dam site.
Xieng Tam	48	287	67	Thai, 5 HHs Kinh	Commune center, 5.1km downstream of the dam site,

Village	HHs	Population	Hh poverty %	Ethnicity	Location
					within the tail end of Ban Ve HPP reservoir.
Xop Tu	175	774	65	Thai, Kho mu, Kinh, Hmong	8.7km downstream of the dam site, within the impact area of Ban Ve HPP reservoir.
Hoa Ly	158	702	74	Thai, 3 HHs Kho mu	14.7km downstream of the dam site, within the Ban Ve HPP reservoir.
	Status of villages further downstream in the Ban Ve reservoir area				
Pieng Mung	Village located by a tributary and separated from the Ca River by hills				
Xen My	Ban Ve resettlement village. No road access.				
Ban Tom	Ban Ve resettlement village. No road access.				
Cha Luan	Ban Ve resettlement village. No road access.				
Sop Pe	Ban Ve resettlement village. No road access. About 28.4km downstream of My Ly dam site.				

Physical losses due to reservoir inundation and dam construction

Loss of private property. Affected households will lose their private houses and attached assets.

The structures include:
(i) family home;
(ii) barns for preserving agricultural products;
(iii) fences around the house.;
(iv) There is no grid electricity in the affected villages, and in the villages in Vietnam each household provides its own electricity through a mini-hydro generator in the river and in Laos each household has a micro-hydro generator or solar panels; and
(v) private boats that are used for fishing and river transportation.

Loss of land. The land to be inundated consist of:
(i) residential land that each household has a land certificate on;
(ii) land used for production: (a) upland cultivation land; (b) home garden; (c) riverbank cultivation land;
(iii) forest that is utilized for: (a) timber logging for house construction and for selling; (b) hunting animals for household food and for selling; (c) collecting NTFPs at a daily basis for household food, such as wild growing vegetables, bamboo shoots, mushrooms; (d) collecting firewood; and
(iv) animal grazing land.

Loss of public infrastructure. The reservoir will inundate public infrastructure in villages and adjoining areas, including:
(i) village access road;
(ii) inter-village roads;
(iii) water supply system with water tanks and water pipes leading water from streams to villages;
(iv) village cultural house;
(v) school (and kindergarten in Vietnam)

Loss of cultural heritage. All the villages have areas that are of cultural and spiritual importance. The reservoir will inundate:
(i) village spirit forest located at some distance from the village in a Protection forest area;
(ii) graveyard located outside village; and
(iii) village worship place under a big tree with a small wooden spirit house or altar for offerings.

Non-physical losses due to reservoir inundation and dam construction

Loss of access to livelihoods resources. The Project will inundate land, forest and water areas that are used for household livelihoods. The reservoir and dam construction will also cut accessibility to areas with livelihoods resources such as cultivation and forestry areas across the reservoir lake. Moreover, the HPP will disturb aquatic resources (amount of fish, shrimps, snails and other crustaceans) and wildlife that are important for households food security in the Direct and Indirect Impact Area.

Loss of access to transportation. For most villages along the Ca River, the river is the main transportation way to services in My Ly Commune center. People from the villages both in Vietnam and in Laos travel along the Ca River to My Ly Commune health center when they need health services, and for buying and selling goods in the commune center. Villagers also travel by both to other villages to socialize with relatives and to attend festivities such as weddings. The dam will cut off boat transportation between upstream and downstream areas of the dam, affecting people's access to healthcare and government services as well as to trade.

Vietnamese mobile traders selling household items to the local people in the Project area and buying from them agricultural and forest products, animals, hunted wildlife and timber are using waterways to access the villages and areas along the river both in Vietnam and in Laos. The dam will cut off transportation between upstream and downstream areas of the dam and, consequently, trade connection to the affected villages, which is important for the Project affected people's access to consumer goods and for their cash income generation activities.

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Major constraints in agriculture

Farming system. The Project IA has a mountainous terrain and the people living there are ethnic minority, people who rely on subsistence farming for their livelihoods. The area for wetland paddy and for perennial crops is limited. Farmers grow rain-fed crops on swidden land on slopes located mostly in Production Forests. They harvest one crop per year and leave the land to fallow between three to six years. On sloping land without terraces, animals or machines cannot be used for ploughing land and therefore farming operations are done manually. Farmers use local seed materials except maize, and farming technology has not improved over the years. Many farmers do not grow vegetable because they prefer to collect wild-growing vegetables for home consumption in the forests. Crops are grown as monoculture, but peanuts, ginger and other crops grown in small areas are also intercropped with cassava and maize. Agriculture extension service is deficient.

Soil fertility. There is no intervention observed in improving swidden cultivation in the Project IA. This agriculture practice is not sustainable. The period of keeping land fallow after cultivation to rejuvenate soil fertility is very short (not sufficient for the soil to recover) due to demand for farming the land again. Fertilizers are not used, except occasionally in maize cultivation, and there is no system of compost making although a few farmers in Hat Ta Ven use cow dung in vegetable plots. Legumes are not grown as main crop or as an inter-crop which could gradually build up soil fertility. In upland agriculture, annual cropping without reasonable improvement measures rapidly degrades soil. Farmers indicated poor crop yields due to low soil fertility.

Climate change. Crop yields are highly varying, and farmers reported reduced yields due to unfavorable weather conditions and long periods of droughts. Yield of the hybrid maize is only 40-50% of its potential. Failures of harvest were reported by the villagers. Climate change effects will be more profound for crops growing on swidden land because these crops grow under natural conditions and wholly depend on rainfall and temperature regimes, which are gradually changing.

Livestock feeds and fodder. All the livestock reared are of undescribed local breeds adapted to free-ranging system and low level of nutrition and management. Farmers reported shortage of fodder for ruminants during winter months, and in some villages an acute shortage was observed. A few farmers in Hat Ta Ven Village grow local maize as a fodder crop. Some farmers rearing hybrid pigs buy commercial livestock feeds. Nutrition level has to be improved for livestock development and better yields.

Animal health service. Livestock health status is in general poor and high mortality in pigs and poultry was reported. Animal health service is not easily available and if available, it is costly and of poor standard. Farmers are not trained and lack knowledge in disease treatment. In some villages, farmers are aware of prevention methods such as vaccination, but the lack of veterinary services makes it very difficult for them to improve their livestock farming.

Livelihoods – linkages and dependence

Currently, livelihoods of the local communities in Laos and Vietnam in the Project IA depend upon forest, water and land resources, the later in the form of swidden (shifting cultivation) agriculture (Figure 3**).** Forest dependence is high, forests providing protein resources, edible and medicinal plants, vegetables, materials for household energy, construction and other uses, and animal protein through small mammals, birds, rodents, lizards and amphibians. Water resources provide free protein through fishes and aquatic insects. Apart from daily food, both these resources are helpful in generating some occasional cash through sale of small mammals and rodents. Livestock is another source of animal protein (mainly poultry) and of cash income through sale of live animals. However, animal health services are poorly available and animals are often lost in disease outbreaks. Swidden agriculture is less productive but provides carbohydrates in the form of rice as a staple food, while maize and cassava are grown for livestock fodder. Rice production is, however, not

sufficient for yearly consumption needs for the poor families, and food security is a serious aspect influencing PAP lives and wellbeing. This livelihoods scenario among the ethnic minorities/groups will continue resulting in deterioration of forest and other land in use until changes are brought to the practices used and sustainable processes are put in place. The My Ly HHP Project affecting the above resources will have detrimental effects on livelihoods of the people living in the Project DIA. In the context of livelihoods, forest resources are significantly more important than fisheries, livestock and crop farming, as these provide a reliable and available source of food and other products.

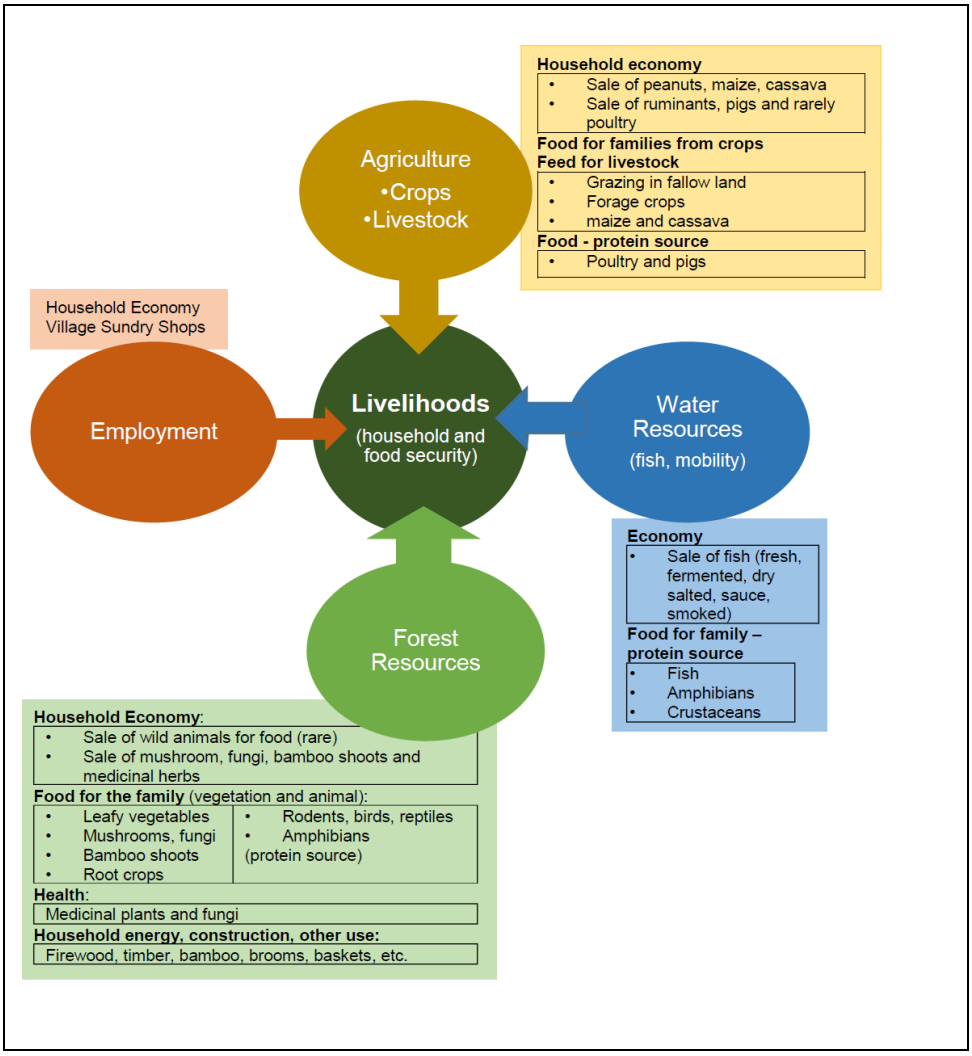


Figure 3. Livelihoods of Project affected households are primarily dependent on forest resources followed by upland agriculture and the water resources of the river.

BIODIVERSITY

The terrestrial ecosystem, mainly forests and grasslands, and aquatic ecosystems and their quality in the form of water resources in rivers, as a function of river's catchment, provide a good habitat for wildlife and aquatic life including fish. Biodiversity of forest vegetation and wildlife are inter-related, and serve to provide products for humans, enriched soil (after a few years or regeneration) for agriculture and work to reduce siltation through providing a more stable land cover than, for example, grasslands do. In the My Ly HPP area, biodiversity of forest vegetation is low. A growing secondary forest vegetation after exploitation or developing through a progressive forest succession on uncultivated fallow land has a comparatively low cover but it is growing. This is reflected in the riverine location

of habitats where biodiversity of wildlife is limited to smaller size mammals, e.g., rodents and bats, and reptiles and amphibians. A past long period of exploitation of mature forests has depleted larger wildlife and timber resources. Short - to long-distance migratory fish species and resident species make-up the existing fish biodiversity, however a dam (Ban Ve HPP) operating downstream from the proposed My Ly HPP has already impacted upward movement of migratory species, particularly for spawning. Nonetheless, the presence of 77 fish species and several other aquatic species in Ca River indicate that the biodiversity has not deteriorated significantly.

Both the terrestrial and aquatic ecosystems in the Project AI provide tangible food products and some cash flow for the ethnic minority communities. The communities in the Project AI depend more on forest resources including wildlife and aquatic resources, fish and other, for their livelihoods than on crop farming which is restricted to mainly upland rice. The food resources from the forests are vital, for daily needs and during lean periods when food is insufficient.

In general, a hydropower project disturbs the ecosystem, and as in the case of My Ly HPP it will affect significantly product availabililty from forests and rivers to the local people. The mitigation suggested is meant to minimize impacts due to the land-take of the Project through proposing forest conservation, biodiversity restoration, fish monitoring and agriculture enhancement measures linked to community involvement.

CUMULATIVE IMPACTS

Cumulative impacts are those that result from the incremental impact of the Project when added to existing, planned and reasonably predictable future projects and developments. The cumulative impacts of the propsed Project have been assessed based on the principles outlined in the IFC Guidance Notes (2012). It aims to better understand the impacts of the existing HPP and planned HPPs within the Ca River cascade system, together with the proposed development.

While there is currently limited quantitative data available to make a fully informed cumulative impact assessment, the assessment nevertheless looked at different vital ecosystem and social attributes aspects such as biodiversity, critical habitats, sensitive receptors, livelihood and ecosystem services.

The My Ly HPP is planned on the Ca River where there are both hydropower projects planned and in operation. During the preparation of this ESIA, there are three planned projects upstream, namely Nam Non 2, Lower Nam Non 1 and Lower Nam Non, all are located in Laos territory. The two latter Projects have feasibility studies completed.

Downstream, there are two hydropower projects which are already in operation, namely the Ban Ve HPP (320 MW) and the Nam Non HPP (15 MW), both are in the Vietnam territory.

The upstream projects have the potential to affect the river/water use downstream including the operational requirements of this Project. The current plan also indicates that the backwater of My Ly HPP may overlap with the location of the planned Lower Nam Non HPP in Laos, although this is not an unusual condition in Vietnam. In the absence of sufficient information on the upstream HPPs at this stage, this needs to be studied further and consultation/negotiation between the HPP owners is necessary.

Downstream, the Ban Ve HPP's reservoir's tail end at FSL is only 2.8km from the My Ly's dam site, while it extends up to 31.20km during MOL and therefore will affect the villages using the river as the reservoir recedes from its FSL to MOL, a distance of about 28.4 km from the My Ly proposed dam site. At present, the receding level of the reservoir leaves the river with the natural flow in the river, however, with the My Ly HPP the flow is anticipated to be further reduced. This may affect current river related activities, particularly during the dry season. The reduction of water will be based on the discharge decided for My Ly HPP.

Fish species however are not likely to be significantly affected as long as the reservoir shall be maintained at its MOL level all the time. The river bank natural vegetation has already been affected by the Ban Ve HPP reservoir regime, since its operation in 2010 and therefore no significant impact is foreseen.

Navigation to the downstream villages without access roads however maybe affected from the potential reduction of water flow and therefore monitoring of the potential impacts is necessary to further assess seasonal effects.

ECOSYSTEM SERVICES

Ecosystem Services (environmental services) are the benefits that people derive from the ecosystems and includes four types: provisioning, regulating, cultural and supporting services. In the case of My LY HPP the most relevant types are those provisioning services commonly referred to as natural resources, e.g., water, food and fuel contributing to the human well-being, being central to livelihoods in the DIA and IIA. In order of decreasing relative contribution to livelihoods and importance, the ecosystems services including provisioning, cultural, recreation are from:

- Forest and forest-bamboo (food sources mainly rodents, snakes, birds; medicinal plants; firewood, wood for construction);
- Land (agriculture for rice production, cash crop (peanuts) and feed (maize and cassava) for livestock, some grazing of livestock; vegetation cover that provides for soil and slope stability in Project direct and indirect impact areas); and
- Water (fish, crustaceans; transport; cultural importance linked to rituals related to burials and spirits; bathing).

The dependence on the forest and forest-bamboo ecosystems is high and its contribution is directly contributing to provision of food sources, especially protein in the form of rodents and snakes. Many HH make daily collections for food sources from forest ecosystems. The areas that will be inundated will result in a loss of core nutrition and protein source. The water resources of the river are important sources of fish for many villages located in the planned inundation area (direct impact area, reservoir). This ecosystem service will change in composition and will need to be managed if the reservoir is to be used as a source of fish. The river which is currently free flowing and the downstream dam is more than 80km away is an important rapid way of travel across the river and along the river. Burial ritual related sacrifice (chickens) is performed with the river serving as a pathway for spirits.

There are intimate livelihoods links with forests, the Ca River and upland lands which all provide ecosystem services to the local communities. Ecosystem services and their dependence is high and the loss is significant. The conservation and sound management of forests ecosystems and sustainable use of agricultural and grazing land is required in the relocation areas, so that the ecosystems services are available. The river provisioning services may be lost, except for fishing in the form of aquaculture or reservoir fishing.

COMMUNICATION

Previous consultations. The Proponent and hired national consultants in Vietnam and Laos have had several meetings with the local authorities at commune and village levels about the proposed Project during 2012-2016. People in the villages to be affected by the Project have also been informed about the possibility of the HPP in a few instances. These consultations were not arranged in a manner to allow informed consultation and participation of the project affected people and cannot be considered as part of the Informed Communication and Participation (ICP) process.

ICP process initiated. The Free, Prior, and Informed Consent (FPIC) process was initiated in June 2017, when a Vietnamese communication team hired by the Proponent according to advice from and designed by the International Consultant undertook informed consultations in all the villages to be affected by the HPP. Villagers were provided information about the planned project, its impacts and proposed mitigation measures using communication methods that were understandable for them. Their questions, opinions, views and concerns on the project impacts and proposed mitigation measures were discussed and recorded in a village consent document in each village to be relocated. In those villages that will lose riverside land but not be relocated, the consultant had similar consultations with the Village leader.

The FPIC consultations showed *broad community support* for the Project and agreements were obtained through the consultations. Main concerns of communities are presented below.

Main concerns from the affected people. People in all the villages to be relocated agreed in principle to the relocation, but some of them expressed concerns and had alternative suggestions for the proposed relocation site. Relocation site and the available land and water resources were the most important criteria for the affected villagers to agree to the relocation. Other concerns and suggestions that commonly came up in the consultations included:

- Compensation payment should be made in maximum of two larger payments and not in several smaller ones, and the payment should be made in full before relocation;
- Affected households should receive compensation payment directly from the Proponent, not through commune or village government authorities;
- Request that people will screen the proposed relocation site together with the project planning team in order to verify the location, land and water availability, etc.;
- Request that people are involved in the design and relocation of the village, location of graves and spirit forest;
- House placement direction is important and depends on each ethnic clan;
- Forest protection and management and the income it brings to local people is important, and should not be disrupted by the relocation;
- Land use certificates have to be issued on the new location to all households; and
- There has to be a monitoring and compliant (grievance) system, and villagers should be involved in monitoring.

These and other expressed concerns are to be addressed by the Proponent in follow-up-community consultations.

MITIGATION AND ENHANCEMENT MEASURES

Specific and general measures have been proposed to mitigate impacts. Below are flow charts of the key plans for managing social, environmental and resettlement impacts. Elaboration of the key plans spanning all programs are provided in the ESIA and Environment and Social Management Plan (ESMP), the Resettlement and Ethnic Minority Livelihoods Restoration Plan (REMLRP) and the Public Commmunication and Disclosure Plan (PCDP). A resettlement policy and entitlements framework is proposed in the REMLRP.

Physical and biological impacts of hydropower projects can be significant and permanent and if proper mitigation is not conducted at the appropriate time, consequences can be dire. Similarly, the loss of land and properties and the displacement of population from their settlement areas are probably among the major social and cultural impacts of the My Ly HPP. As part of the project optimization process, a number of measures have been taken to minimize the social and ecological footprint of the Project. The main Programs are:

- Physical Environment Program
- Biological Environment Program
- Social Program

In addition, requirements for the construction contractor are eluded to for initial guidance to the Proponent. See figure below for an overview of the Programs.

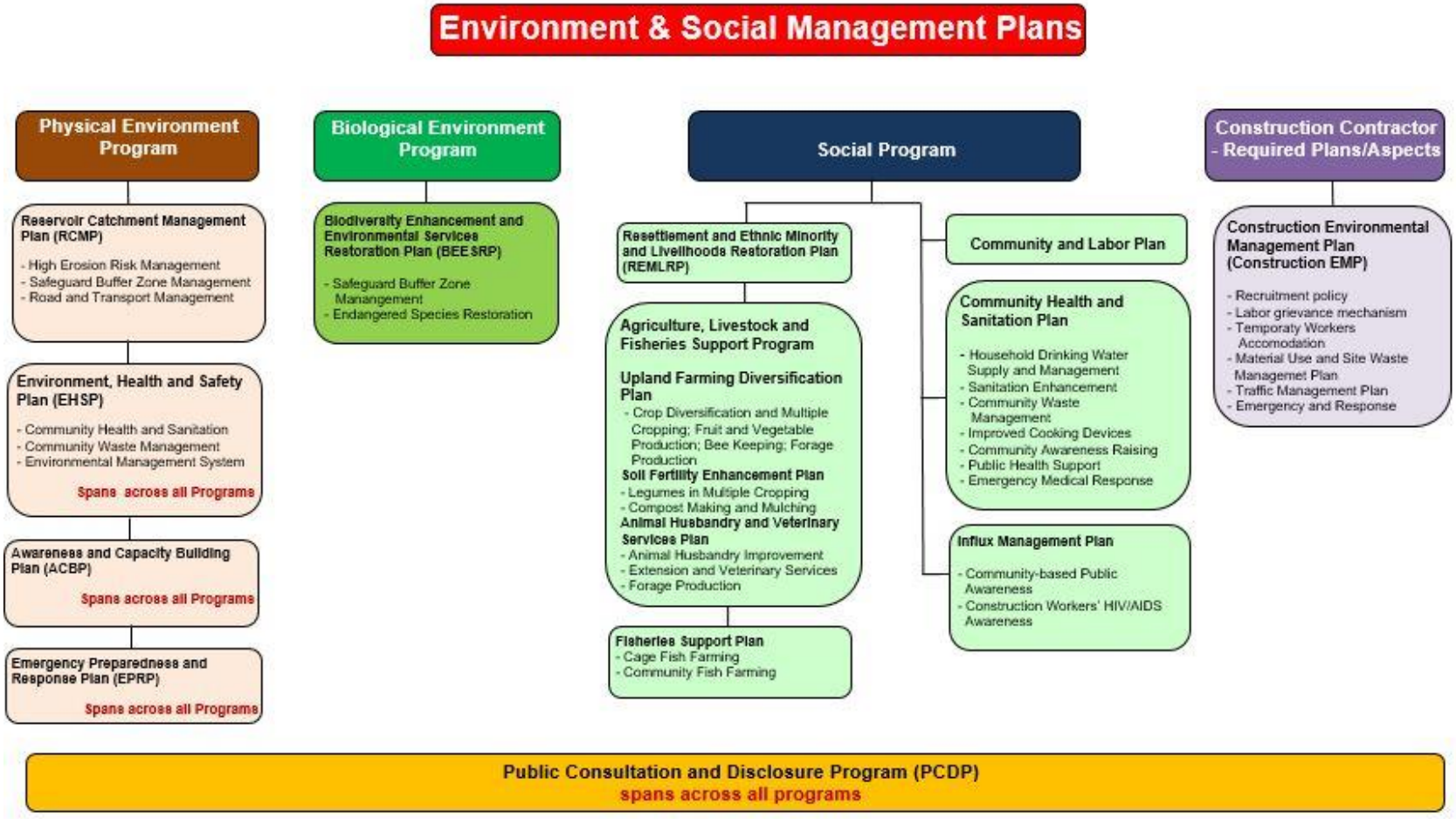
Grievance Redress Mechanism. The proponent has to establish in the project planning phase a Grievance Redress Mechanism (GRM) consistent with the MIGA PSs. The GRM will provide the PAP clear and practical mechanism to express their complaints and concerns about the project's social and environmental performance. The GRM will allow the Proponent to receive and address any issues on land acquisition, compensation and relocation from the relocated people and host communities. The GRM will also allow the Proponent to address complaints from people in the Indirect Impact and Tertiary Impact Areas who may be affected due to the project activities and activities related to the presence of the Project. The GRM will allow issues to be raised in a timely fashion, and include a mechanism designed to resolve disputes in an impartial manner.

The GRM should be based on the local community organization and be culturally appropriate and understandable for the affected people. It is an integral part of the PCDP. Prior to relocation, the GRM should be adapted to the local community organization structure.

SOCIAL AND ENVIRONMENTAL PLANNING AND MANAGEMENT, MONITORING AND AUDITING

The application of mitigation measures, monitoring, and environmental audit of the proposed Project have been recommended to ensure the validity of impact prediction, effectiveness of mitigation measures and sustainable social, economic and cultural development of the local and adjacent community. The measures proposed are expected to be formulated in detail during the pre-construction (design phase) of My Ly HPP. A Social and Environmental Management Division has been proposed to manage and implement the proposed ESMP and the REMLRP under the Proponent's management. The ESMP and REMLRP will be linked to the social mitigation and enhancement measures undertaken under the same division. Similarly, a PCDP and GRM have been proposed for the Proponent's management. An organization structure and program has been proposed for the ESMP and other safeguard documents. Note that the mitigation measures may change after the public consultations are held during the pre-construction phase.

The proposed PCDP sets the principles and procedures as required according to MIGA PS 1 and PS 7 for an ICP process during the project planning, implementation and operation monitoring to ensure the FPIC of the project affected ethnic minority/groups communities in Vietnam and in Laos.


Environment & Social Management Plans
Physical Environment Program
Reservoir Catchment Management Plan (RCMP)
- High Erosion Risk Management
- Safeguard Buffer Zone Management
- Road and Transport Management
Environment, Health and Safety Plan (EHSP)
- Community Health and Sanitation
- Community Waste Management
- Environmental Management System
Spans across all Programs
Awareness and Capacity Building Plan (ACBP)
Spans across all Programs
Emergency Preparedness and Response Plan (EPRP)
Spans across all Programs
Biological Environment Program
Biodiversity Enhancement and Environmental Services Restoration Plan (BEESRP)
- Safeguard Buffer Zone Management
- Endangered Species Restoration
Social Program
Resettlement and Ethnic Minority and Livelihoods Restoration Plan (REMLRP)
Agriculture, Livestock and Fisheries Support Program
Upland Farming Diversification Plan
- Crop Diversification and Multiple Cropping; Fruit and Vegetable Production; Bee Keeping; Forage Production
Soil Fertility Enhancement Plan
- Legumes in Multiple Cropping
- Compost Making and Mulching
Animal Husbandry and Veterinary Services Plan
- Animal Husbandry Improvement
- Extension and Veterinary Services
- Forage Production
Fisheries Support Plan
- Cage Fish Farming
- Community Fish Farming
Community and Labor Plan
Community Health and Sanitation Plan
- Household Drinking Water Supply and Management
- Sanitation Enhancement
- Community Waste Management
- Improved Cooking Devices
- Community Awareness Raising
- Public Health Support
- Emergency Medical Response
Influx Management Plan
- Community-based Public Awareness
- Construction Workers' HIV/AIDS Awareness
Construction Contractor - Required Plans/Aspects
Construction Environmental Management Plan (Construction EMP)
- Recruitment policy
- Labor grievance mechanism
- Temporaty Workers Accomodation
- Material Use and Site Waste Managemet Plan
- Traffic Management Plan
- Emergency and Response
Public Consultation and Disclosure Program (PCDP)
spans across all programs

CONCLUSION

The My Ly HPP is planned along a stretch of the Ca River at the border of Vietnam and Laos. The technical feasibility of the Project has been performed for an installed capacity of 180 MW.

The main anticipated negative impacts of the Project include:

(i) the loss of land and assets of Project Affected People due to land permanently acquired and used by the Project both in Laos and Vietnam;

(ii) resettlement and social change;

(iii) changes related to the loss of production and protection forests, agricultural land and associated wildlife habitat;

(iv) changes related to the change of the river into a reservoir affecting connectivity/transport and fisheries;

(v) loss of forest-river related ecosystem services affecting livelihoods which are dependent on these systems.

The main anticipated positive impacts of the Project include:

(i) Increase in mobility and accessibility to the affected villages and Project area in general due to improved roads and provisions of new roads to the villages. This may trigger positive impacts on livelihoods, in making markets accessible, easier access to health care and other services;

(ii) Restoration of forest-grassland areas so that the vegetated areas improve in quality, such that sediments are reduced, availability of forest products are assured overtime and wildlife habitat is increased. This will ensure that ecosystem services are enhanced, maintained and is sustainable;

(iii) Improvement in agricultural methods and products whereby food insufficiency does not occur;

(iv) Improved energy availability and use, better cooking methods and electricity; and

(v) Increase in well being is expected, provided proposed measures are implemented.

Mitigation and enhancement measures on potential social-cultural, forest, agricultural, biological and physical impacts are proposed to minimize the effects and therefore enhance community well being and forest-agriculture central to livelihoods. Measures include, among others, plans for livelihood restoration, immediate catchment management, ecosystem services enhancement, health and safety measures. The measures proposed in the ESMP will help minimize the ecological footprint of the Project. Safeguard documents include the REMLRP and ESMP guided by the PCDP. An adaptive management process should be adopted to adjust plans according to findings from monitoring, consultations, and audits. A Social and Environment Division (SEMD) of My Ly HPP will administer the ESMP through the establishment of a Social and Environmental Management Unit (SEMU).