



CRBOM Small Publications Series No. 39

Good practices for hydropower development

by

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July 2011

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Contents

Summary	i
Map of Viet Nam	ii
1 Introduction	1
2 Background	1
3 Impacts of hydropower development	2
3.1 Economic impacts	2
3.2 Social impacts	2
3.3 Environmental impacts	3
4 The way ahead	4
5 Observations and suggestions on good practices	4
5.1 Multipurpose operation	4
5.2 Clear allocation of responsibilities	5
5.3 Public information and involvement of local communities	5
5.4 Food security and sustainable livelihoods for resettled communities	7
5.5 Benefit-sharing	8
6 Conclusion	10
References and literature	10

Summary

The Central and Highlands Regions of Viet Nam are the second-highest potential source of hydroelectric power in the nation. During the last few years, many projects have gone into operation and contributed significantly to economic and social development. However, many such projects have resulted in population displacement and resettlement, flooding, deforestation and increases in downstream salinity, which have adversely impacted local economic growth and living standards. Based on research in the Vu Gia-Thu Bon Basin, Central Viet Nam, this paper makes observations and suggestions on good practices for socially and environmentally sustainable hydropower projects:

- Multipurpose operation;
- clear allocation of responsibilities;
- public information and involvement of local communities;
- food security and sustainable livelihoods for resettled communities; and
- benefit-sharing

Map of Viet Nam



1 Introduction

From 1995 to 2005, Viet Nam's capacity for electricity production almost tripled; but this is still insufficient to meet demand. Hydropower accounted for 42 percent of the country's generating capacity (2010). The unit cost of hydropower is much less than other types of power generation in Viet Nam, and today, many plants are under construction or planned for implementation. 1

While the benefits of hydropower can be national or indeed global, the adverse impacts are basinwide or local. Appropriate measures are needed to assure that affected communities benefit from the development and to maintain a healthy river basin.

Based on research in the Vu Gia-Thu Bon Basin, Central Viet Nam, this paper makes observations and suggestions on good practices for socially and environmentally sustainable hydropower projects.

2 Background

Over fifty percent of the Central and Highlands Regions of Viet Nam are covered by forests, which provide significant natural resources, including abundant sources of water power for generating electricity. Apart from some smaller river basins, the region has three large rivers. These are the Ba River, which is sourced and flows through highlands forests into the East Sea through Phu Yen province; the Sesan-Srepok Rivers that flow into the Mekong through Cambodia; and the Vu Gia-Thu Bon river system in Quang Nam province. Now, a great number of small and large hydroelectric projects are springing up on the tributaries of these river systems.

Hydropower not only brings benefits to investors but also solves the problem of meeting Viet Nam's energy demands, in a country where energy requirements are growing at over twice the rate of the GDP. Hydropower contributes to developing the infrastructure of the highland areas and solves many social problems and encourages permanent settlement by gradually reducing nomadic farming. It will also boost trading development and shorten the distance between the mountains and the coastal zone, and between rural and urban areas. As a result, the lives of the highland population will be gradually enhanced as they begin to enjoy increased access to modern living standards.

In hydropower cost-benefit analyses, however, feasibility reports only calculate the emergent component of expenses, such as construction, compensation and resettlement costs. Hidden costs are usually not calculated or referred to. Normally, these hidden costs concern the potential long-term negative impacts on the economy, on society and on the environment caused by hydropower projects, after they go into operation.

3 Impacts of hydropower development

3.1 Economic impacts

Firstly, depending on weather conditions, hydroelectric plants operate below full capacity in the summer months, or they are forced to redirect water for irrigation or to counteract saline intrusion. This results in losses for investors.

Secondly, projects can cause serious flooding downstream in the rainy season. For example, the overflow of the A Vuong plant in 2009 and the Song Ba Ha plant in 2010 caused great damage to the local people and their property, devastating villages and burying rice fields below the hydroelectric dams.

Thirdly, projects can cause drought and saline intrusion during the summer. Twenty years ago, seawater never flowed up the Vinh Dien River, but now, the salinity regularly increases in the dry season. As a result, the Dien Ban District Irrigation Company had to invest in a back-up reservoir to provide freshwater to rice fields after seawater had flowed up the Thu Bon River. As salinity levels steadily rose in the Cau Do River, the Da Nang Water Supply Company had to invest in another intake station upstream from An Trach dike, over 10 km from the existing Cau Do Water Supply Station.

These problems are related to deforestation, climate change and transportation development, with hydropower as a contributing factor.

3.2 Social impacts

Other major problems resulting from hydropower projects are population displacement and the challenges of maintaining a sustainable environment for the re-settled communities. In addition to other completed hydropower projects or projects currently under construction in the Central and Highlands Region of Viet Nam, eight particularly large hydropower projects, of over 50 MW each, located in the Vu Gia-Thu Bon basin, will submerge 10,000 hectares of land and 14,000 people will have to leave their homes. These numbers do not include households which will not move but must cede their land to incoming families.

Figure 1: Houses at Trà Bui commune before resettlement



According to the Government's decree No 197/2004/ND-CP, dated 03/12/2004, concerning compensation, support and resettlement under the state's land acquisition criteria, *'the new residence must be identical to or better than the old one'*. Most hydropower projects in the Vu Gia-Thu Bon Basin have only partially implemented this regulation. Most investors provide compensation and resettlement funding for the new

housing, transportation systems, electricity and water supplies; but they do not provide for the establishment of a sustainable livelihood for the resettled communities. So the affected families, communities and local authorities must then take full responsibility for this.

For example, the people who resettled in Alua Kla Village, in the Dang commune of the Tay Giang district, one of resettled villages of the A Vuong plant, had to leave the resettled area to find other places to live, nearer arable land. And the Tay Giang district People's Committee had to ask Quang Nam province for funds to resettle for a second time, nearer land suitable for cultivation. At Tra Bui village, near the Song Tranh 2 hydropower project, people started moving in 2009, but, until now, there are still 30 out of 674 households who have not yet been granted cultivatable land and continue to submit land claims to the Bac Tra My District People's Committee.

3.3 Environmental impacts

Hydropower can have the following environmental consequences:

- 1) Submergence of forest lands: Large hydropower projects normally flood forests but projects in the Central and Highlands regions are relatively insignificant;
- 2) emission of greenhouse gases: As flora disintegrate in the reservoir they emit greenhouse gases, which can be limited by cleaning the reservoir thoroughly before filling;
- 3) blocking the movement of aquatic species: Fish swim upstream or others downstream to the brackish estuary to lay eggs. Hydropower dams can block the path of breeding fish and the biodiversity of the rivers is lost;
- 4) increased deforestation: Many hydropower construction companies clearing land for reservoirs illegally exploited forest, for example the Khe Dien hydropower work in the Quang Nam province. In addition, because of the shortage of arable land, resettled households continue to deforest. The Song Tranh 2 hydropower project submerged nearly 2,000 hectares, most of which was land suitable for housing and cultivation. To compensate for land lost, another 2,000 hectares of protected forest was destroyed and transformed into production land, in addition to the illegal deforestation of areas used for generations for traditional food cultivation by ethnic minority communities.

Figure 2: Freshwater eel in the Song Tranh River



4 The way ahead

Although there have been some negative impacts on the economy, society and the environment it must be realized that, in the present structure of electricity production, hydropower currently accounts for 42 percent of the national generation capacity. The average cost of hydropower generation is half the cost of thermal generation. For example, turbine gas generation costs about 4 cents to 4.5 cents per KWH. This is why investors are attracted to this new sector. In addition, if the negative impacts, especially the environmental ones, can be limited, then hydropower is still considered as the most eco-friendly production source of electricity, after wind and solar.

So, in the coming years, Viet Nam will continue to exploit its hydropower potential. Previously, large international financial institutions, such as Asian Development Bank (ADB) and the World Bank, would not finance Vietnamese hydropower projects. The World Bank has now agreed however to grant a \$330 million loan to the 260 megawatt Trung Son hydropower plant in Thanh Hoa province, and ADB is financing a \$196 million loan to the 190 megawatt Song Bung 4 hydropower plant in Quang Nam province. Both banks require the investor (Electricity of Viet Nam) to commit to policies that will considerably reduce adverse environmental effects, and, at the same time, to agree to implement safeguard policies overseeing the transparency of information, resettlement programs and the livelihoods of the indigenous people.

Based on the analysis above and on research on current development plans for future hydropower projects in the Central and Highlands Regions of Viet Nam, in the author's opinion it is necessary to identify negative factors during the planning and approval processes and to implement economic and technical reporting during the construction process and also after the plant goes into operation, to document, measure and maximize the positive contributions of hydropower and to document, measure and minimize the negative aspects.

5 Observations and suggestions on good practices

5.1 Multipurpose operation

A hydropower reservoir has three basic functions, which are flood control, electricity generation and irrigation. However, reservoirs may be designed to meet one or more of these requirements and overlook the others. The Song Da reservoir's primary objective is to provide flood protection, then electricity generation and finally downstream irrigation of the Red River Delta. The Phu Ninh reservoir in Quang Nam province and the Ke Go reservoir in Ha Tinh province primarily aim to provide irrigation, with flood control and electricity generation as secondary objectives. Generally, reservoirs constructed in the Central and Highlands Regions have the primary goal of generating electricity; they were built without the extra capacity for flood emergencies, and only supply water to downstream communities at minimum flow during the dry season.

To remedy the recent flood damage wrought downstream of hydropower plants in the Vu Gia-Thu Bon Basin, on 13/10/2010 the Government issued Decision Number 1879/QD-TTg regulating the operations of six reservoirs located in the basin, namely A Vuong, Dak Mi 4, Song Tranh 2, Song Bung 2, Song Bung 4, and Dak Mi 1. The regulation focuses on: 1) work safety; 2) the control of downstream flooding; and 3)

efficient power generation. It also requires that reservoirs without standby control must reserve 10 percent of their capacity to reduce flooding. This is a way to correct deficiencies in previously approved reservoir designs, where standby requirements were overlooked.

The author therefore maintains that the government must always have proper regulations on design and operation in place to assure flooding standby capacity for both large and small projects, especially ones built on terraces.

5.2 Clear allocation of responsibilities

Responsibilities must be clearly allocated and observed, during planning, construction and after plants are fully operational.

The inception of a hydropower project always requires an environmental impact assessment (EIA) and a resettlement report. Large projects of 50 megawatts and over are approved by the Ministry of Natural Resources and the Environment; while smaller ones are appraised by the Department of Natural Resources and the Environment and ratified by provincial People's Committees. A hydropower project is often managed by many functional ministries. Issues related to land acquisition and grants are managed by Ministry of Natural Resources and the Environment. The ones relating to irrigation and aquatics are managed by Ministry of Agriculture and Rural Development, and those related to quality of work are managed by Ministry of Industry and Commerce and several other related ministries. However, when problems arise, responsibility and accountability is extremely difficult to assign, so that provincial agencies cannot be held responsible, and district-level People's Committees are left to provide acceptable solutions.

In ADB and World Bank projects, investors must comply with both Vietnamese government regulations and also commit to implement the three basic policies of the banks, such as: 1) environmental policies; 2) policies concerning indigenous people; and 3) policies for households forced to resettle. To implement these policies it is required to conform to basic principles: 1) Information disclosure and community participation; 2) community supervision of the implementation process; 3) minimization of negative impacts and risks; and 4) assurance of a sustainable local livelihood.

To monitor the investors during implementation of the policies and principles, these financial institutions have set up project management units at the site in order to coordinate closely with local authorities, the investors and the affected communities, to jointly supervise the implementation. In addition, to ensure exactness and objectivity in their assessment, the financial institutions also hire independent organizations to review implementation policies that the investor committed to under the terms of the loan.

ADB and the World Bank must ensure that their safeguard policy statements and those of the government are similar. The only difference is that, in addition to following the basic government requirements, these institutions always insist on a supervisory role for the affected community, using many channels of independent assessment. The supervision is continuous, from project inception until well after the project is fully operational. From these concepts and experiences they can now find better ways to finance the following projects.

5.3 Public information and involvement of local communities

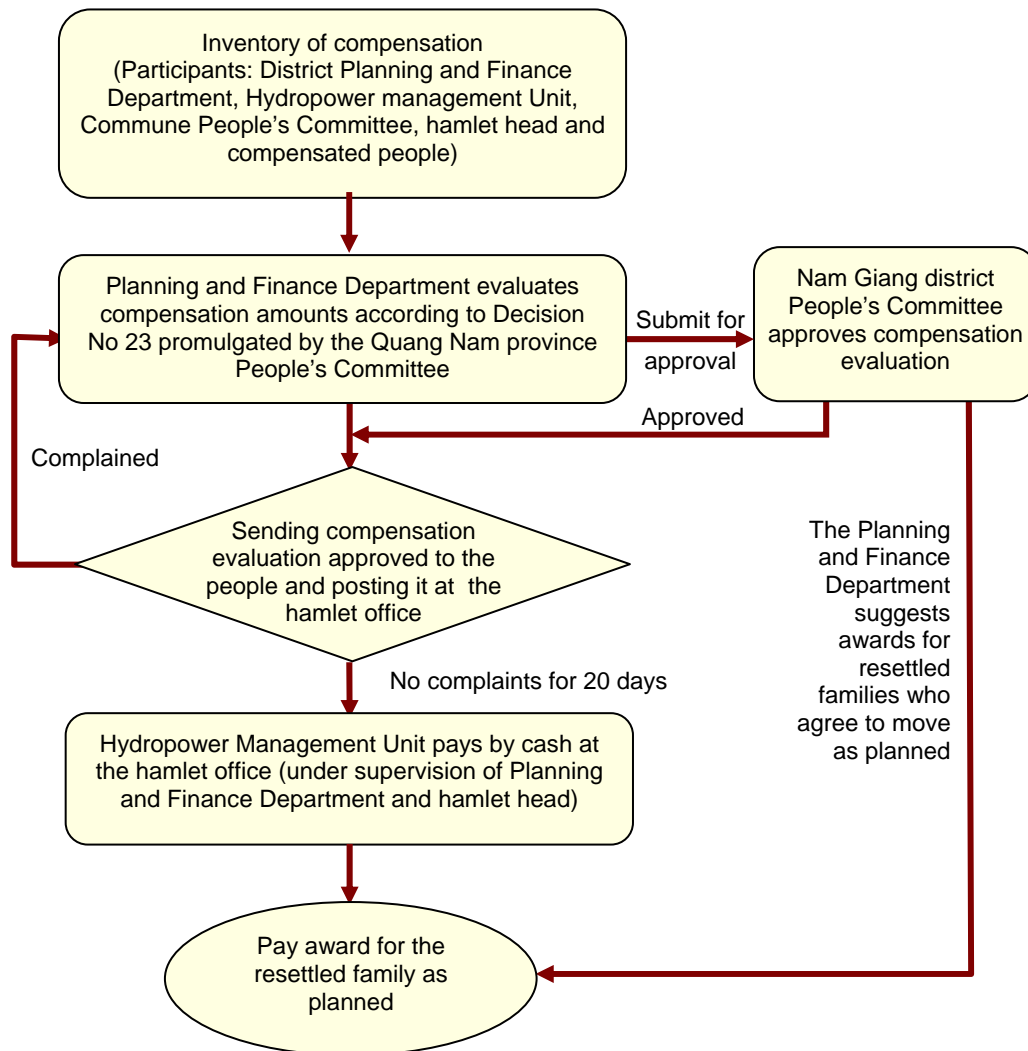
A public information policy must be implemented, and the supervisory role of local communities must be enhanced.

This is important to ADB and the World Bank when they finance the projects. These are the basic parts: 1) All affected people must have sufficient access to project details,

from the local authority, from the grass-roots, from the investors, from project managers and so on; 2) the affected people have the right to participate in decisions concerning compensation, choices of locations for resettlement, resettlement schedules and arrangements, housing design, water sources, the location of arable land and so on, to ensure that life in their new home is equal to or better than before; 3) people must know where to submit complaints if the public information policy is broken; and 4) each phase of the project can only proceed when all the concerns of local residents have been resolved.

The figure below shows the process of compensation at the Song Bung 4 hydropower project, financed by ADB. The affected local people always participate in inventoring lands, crops, houses and construction works. After that, the Nam Giang District Planning and Finance Department evaluates the compensation amounts, according to Decision No 23/2010/QD-UBND. Regulations include guidance on compensation and resettlement support in Quang Nam Province and are approved by the Nam Giang District People’s Committee. Details of compensation amounts are listed and sent to the affected people, and, at the same time, posted at the hamlet office. If, after twenty days, the affected people have no complaints, The investors will personally pay the affected people in cash under the supervision of the District Planning and Finance Department and the hamlet authority. The families that receive compensation and move as planned will be then be awarded another from three to five million VND.

Figure 3: Flowchart of compensation implementation at Song Bung 4



Not only compensation but also choices for resettlement and cultivation land location, housing pattern, residing freely or at the resettlement area, etc., are made with participation and influence of the people, according to the general norms of Quang Nam Province People's Committee. With access to information and active involvement, the people can ascertain the investor's compliance with the applicable policies.

5.4 Food security and sustainable livelihoods for resettled communities

The word '*livelihood*' is commonly defined in an economic perspective as the occupation, work or other means of earning income to provide the necessities of life. The livelihoods of the ethnic mountain communities mainly depend on critical resources such as the forest, arable land, manpower, knowledge and experience, with rudimentary methods and tools. During resettlement, communities risk to lose land, employment and income.²

Therefore, in order to guarantee sustainable livelihoods, production resources must be guaranteed during the resettlement process. By enhancing awareness in communities and with adequate state support, resettled communities may overcome their vulnerabilities and prosper.

Figure 4 shows the requirements for ensuring sustainable livelihoods in resettled communities:

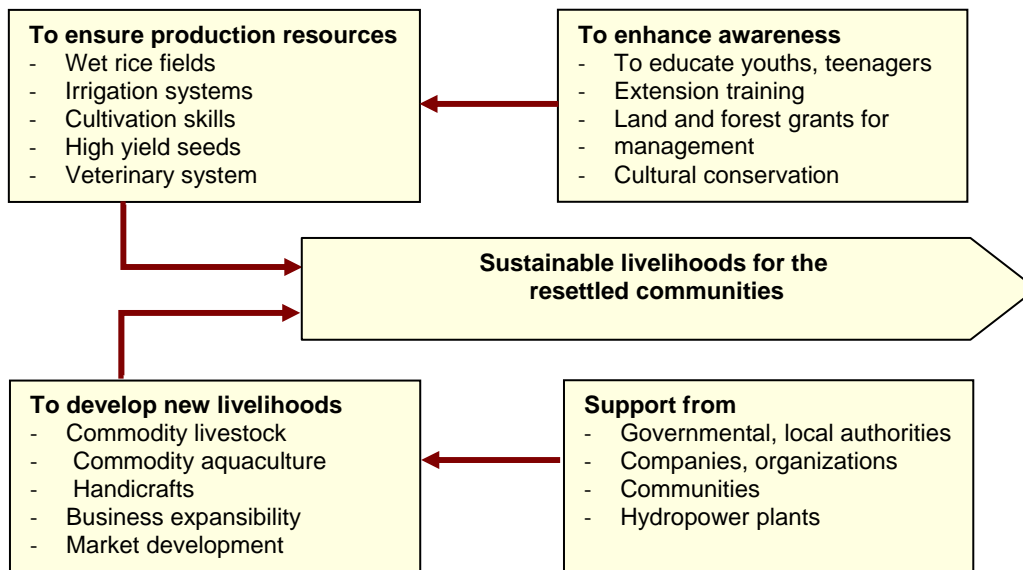
- 1) *To ensure resources:* Most importantly, sufficient areas of wet rice fields must be granted. Dry rice fields only have a productivity of 1.5 tons per hectare and only one crop per year, whereas wet rice fields have a productivity of 3.5 tons per hectare per crop, with two crops per year, if sufficiently irrigated. A wet rice field of 300 m² rice field is enough to supply food to a family of four; otherwise the same family needs up to 1.5 hectares of dry rice field. Up to now, hydropower investors in the Central and Highlands regions have not provided this amount of land to resettled communities.
- 2) *To develop new livelihoods:* To reduce deforestation, preserve and regenerate trees and still earn an income, new long-term solutions must be planned to sustain the communities. Hydropower projects must invest more in infrastructure, such as transportation, electricity supply networks, water supply systems and communications that facilitate the development of a new business environment for the resettled communities, so that surplus products they do not need for their own use can be traded.

Many hydropower schemes include construction of roads to remote areas. This is an opportunity to shorten the distance between the highlands and the coastal areas, bridging the gap between the two economies and ultimately increase incomes and quality of life by access to markets; health services; extension services; and education.

- 3) *To enhance the awareness and support of the state and local authorities:* To improve their conditions and capabilities, resettled communities must be able to use existing resources more efficiently, and, at the same time, remedy their vulnerabilities. With state and local support, the highlanders will be able to gradually develop new livelihoods independently, thereby increasing their income and prosperity.

² Please refer to Doan Tranh (Apr 11) for an elaboration regarding livelihoods for re-settled communities

Figure 4: Requirements for developing a sustainable livelihood for resettled communities



If food supplies and income increase at the same time, resettled communities will always benefit from sustained livelihoods.

The efforts must be long-term, to allow for consolidation far beyond the resettlement stage.

5.5 Benefit-sharing

By building a hydropower benefit-sharing mechanism, bigger multiple impacts will be created to increase the benefits of hydropower projects. This will depend on the investors and local communities in affected areas knowing how to wisely use existing resources and cooperating with each other. In addition, local authorities play an important role in creating effective institutions to control and ensure benefits to all related partners. The implementation of such a mechanism will bring many benefits:

- 1) The hydropower plants will have an abundant source of water;
- 2) local communities will gain income without deforestation; and
- 3) the state can achieve its goals for environmental protection.

Figure 5: The responsibilities of the benefit-sharing mechanism

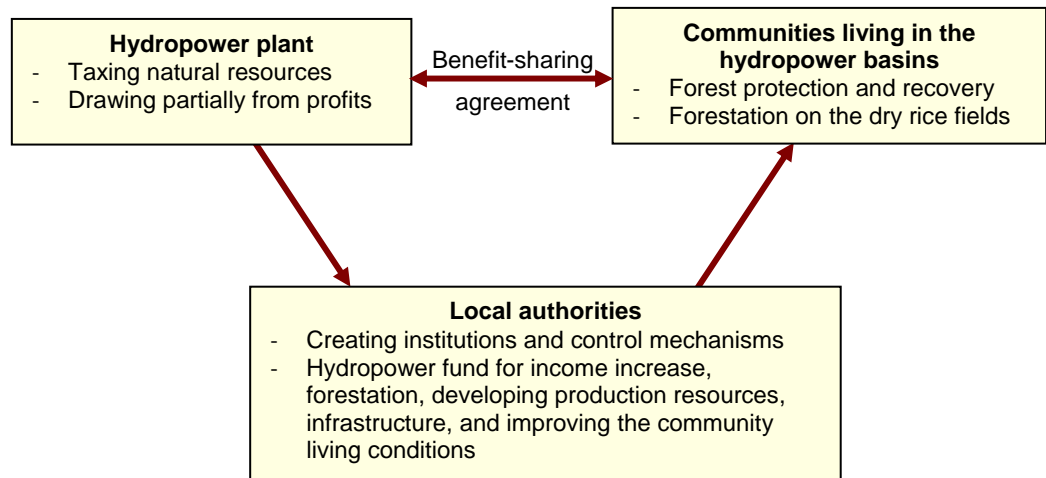


Figure 5 above shows relationships between the partners, and each partner's role and position. Success requires the participation of the local authorities.

This approach is feasible. It has been partially implemented in Quang Nam Province. The province now levies a natural resource tax on the A Vuong hydropower plant, amounting to about twelve billion VND per year. The province retained a sixty percent share and transferred the other forty percent to the three districts of Dong Giang, Tay Giang and Nam Giang (that source the water for the hydropower plant). These districts will implement development programs to support the affected communities currently living on the site. However, this amount of money is not enough to generate income to protect the forest, so it will be necessary to raise more money from other sources, if the hydropower plant does not contribute further from its net earnings. The hydropower plants will benefit if the forest is protected.

Previously, Quang Nam Province implemented forestation programs on the dry rice fields and local authorities planned to compensate resettled communities for lost food. In reality, unsuitable crops were planted and died in dry rice fields, so, ultimately, the mountain people in Quang Nam still rely mainly on cassava trees. It is regrettable that this program was abandoned and that the mountain people still grow their traditional trees on land cleared for rice cultivation.

Benefit-sharing is one element of a sustainable hydropower strategy for economic, social and environmental benefits in affected areas. Development of this proposed mechanism will surely bring lots of benefits both to investors and to the local people, and also assist the government in achieving its environmental protection objectives.

6 Conclusion

Hydropower projects can generate economic growth, ensure energy security, and contribute to economic and social development in the highland areas. Previously, many hydropower projects have had serious negative impacts on society and the environment, and damaged the economies, assets and human lives in flood-prone areas. This led to experts from organizations and communities to voice their concerns because they disagreed on the ways that hydropower projects had been carried out.

In particular, analysis of both the positive and the negative issues shows that in the past, hydropower investors consistently saved on costs to increase profits. Even today, the management processes, procedures, regulations and implementations of the various government agencies are still not clear and consistent. Also domestic financial institutions, for financial reasons, have so far only focused on the return on investment, without considering the related and adverse social implications.

If hydropower development continues to focus only on profit, it is certain that its economic and social benefits will be short-lived and that the economy will suffer great harm in the longer term. A hydroelectric plant can operate for over 100 years, and it must not only be concerned with the short term goal investment recovery, but deal with long-term issues. The solutions and modalities suggested in this document could help create unique and improved mechanisms and policies to provide a solid foundation for hydropower projects in the Central and Highlands Regions to permanently provide truly sustainable development for all.

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