JVS-NWP

STUDY ON FACILITATING POOR PEOPLE INTO OWNERSHIP OF COMMERCIAL HYDROPOWER SCHEMES

Report

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Poverty Alleviation Through Sustainable Energy Development

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ABBREVIATIONS

AEPC	Alternative Energy Promotion Centre
BPC	Butwal Power Company
CG	Community groups
CHD	Commercial Hydropower Developer
DoED	Department of Electricity Development
EIA	Environment Impact Assessment
E&M	Electrical & Mechanical
GoN	Government of Nepal
HH	Household
IEE	Initial Environmental Examination
INGO	International NGO
IRR	Internal Rate of Return
km	kilo metre
kW	kilowatts
LCP	Local Capacities for Peace (Do No Harm)
LHC	Local Hydropower Company
LIO	Local Investors Organisation
LLI	Local Labour Investors
LMI	Local Money Investors
m	metre
m^3/s	cubic metre per second
MHP	Micro Hydropower
MW	Mega Watts
MoFSC	Ministry of Forest and Soil Conservation
MoWR	Ministry of Water Resources
NEA	Nepal Electricity Authority
NPV	Net Present Value
NRs	Nepalese Rupees
NGO	Non-Government Organisation
PPA	Power Purchase Agreement
PEEDA	People, Energy & Environment Development Association
PPHP	Pro-Poor Hydropower
UMN	United Mission to Nepal

EXECUTIVE SUMMARY

Pro-Poor Hydropower (PPHP) is a concept by which the Poor of Nepal are facilitated into the **profitable ownership of their water resources**. This is achieved through development of commercially profitable hydropower projects with the local poor gaining **significant** ownership of the projects.

Significant ownership is defined as ownership of shares that earn dividend that represents a sizable earning when compared to the household's other earning streams.

If successful, this model may be repeated in various locations throughout Nepal and will have a massive impact on poverty.

Achieving this 'significant' ownership can be realized either through the local poor owning a majority of a small project ('pure' approach) or through the local poor owning a small part of a big project ('dilute' approach) - or a sliding scale in between.

The **direct project goal of pro-poor hydropower is income generation** through facilitating the rural poor of Nepal into the profitable ownership of their local water resources.

Income generation is a development approach that empowers the local poor and gives them the choice of how to spend this long term and sustainable income. They can then afford to buy the medical care, education, electricity or infrastructure which they so desire.

The PPHP development approach runs contrary to the many development projects in Nepal, which end up subsidising the delivery of services so that the poor can afford them. The problem comes when the funding stops and the subsidy is withdrawn and the situation returns back to the previous state before the intervention. Collapse in delivery of essential services is politically de-stabilising since expectations have now been raised that cannot continue to be fulfilled.

Undertaking the pilot project in its dilute approach should help other hydropower developers to replicate the project in a more direct way. Many large hydropower developers (some foreign some local) have noted that they would like to find a modality to facilitate the local people into some kind of ownership of the hydropower project. They have identified that in the current context of Nepal, having continued local support for their hydropower project is vital if the project is to succeed. They agree that the PPHP modality is potentially the best way of achieving this, but they are unwilling to use the modality without it first being tested and proven on a similar (albeit smaller) project.

1 HYDROPOWER AND POVERTY IN NEPAL

1.1 Poverty in Nepal – the Current Situation

Nepal remains one of the poorest countries in the world, with a Gross National Income Per Capita of US$320 (2006)[1]. This places Nepal as the poorest country in South Asia and in the poorest 15 countries of the world. Nepal's population of 28 million is growing at about 2% per year, and the ratio of population to arable land is one of the highest in the world.

Certain development indicators show an improvement in the living standards of Nepali people over the last two decades. Life expectancy has risen from 51 years in 1985 to 63 years in 2006 [2]. The national estimate of Maternal Mortality Rate (maternal deaths per 100,000 live births) halved from 538 in 1996 to 281 in 2006. The Infant Mortality Rate (deaths per 1000 under 5 yrs old) dropped from 79 in 1996 to 48 in 2006. The coverage of potable water rose from 71 percent in 2002 to 77 percent in 2006.

Whilst the World Bank reports that 'over the last decade Nepal has made considerable progress toward reducing poverty, with the headcount poverty rate falling dramatically—from 42 percent to 31 percent—between FY95/96 and FY03/04' [3] - when these figures are examined more closely, it can be seen that in reality Nepal has only managed to return to FY83/84 poverty levels (see Figure 1 below).

Compared to its neighbouring countries, Nepal's economic growth has been very slow. Nepal achieved a 2.8% growth in 2006, whilst China achieved 10.7% and India 9.2%. Hopefully in 2007/08 Nepal will grow economically in the region of 3 to 4%, but this forecast is still lower than its target of 5%. This slow growth can be attributed to the on-going political instability and resultant poor economic business environment.

Although, the Maoist insurgency, which started in 1996, was brought to a peaceful conclusion in April 2006 when a comprehensive peace agreement was signed with the government – political stability has not yet returned to Nepal. Constituent Assembly (CA) elections were peacefully held on April 10, 2008, after two postponements during 2007 and it is hoped that the new CA will bring a new political order and associated stability. However, ongoing disturbances, frequent blockades and strikes which virtually stop movement of goods and people in most parts of the country, high inflation, labour unrest, shortage of power and long lines queuing for petroleum products are all a common part of everyday life in Nepal.

[1] Nepal Country Overview 2008, World Bank, Permanent URL for this page: http://go.worldbank.org/T44TN78GD0

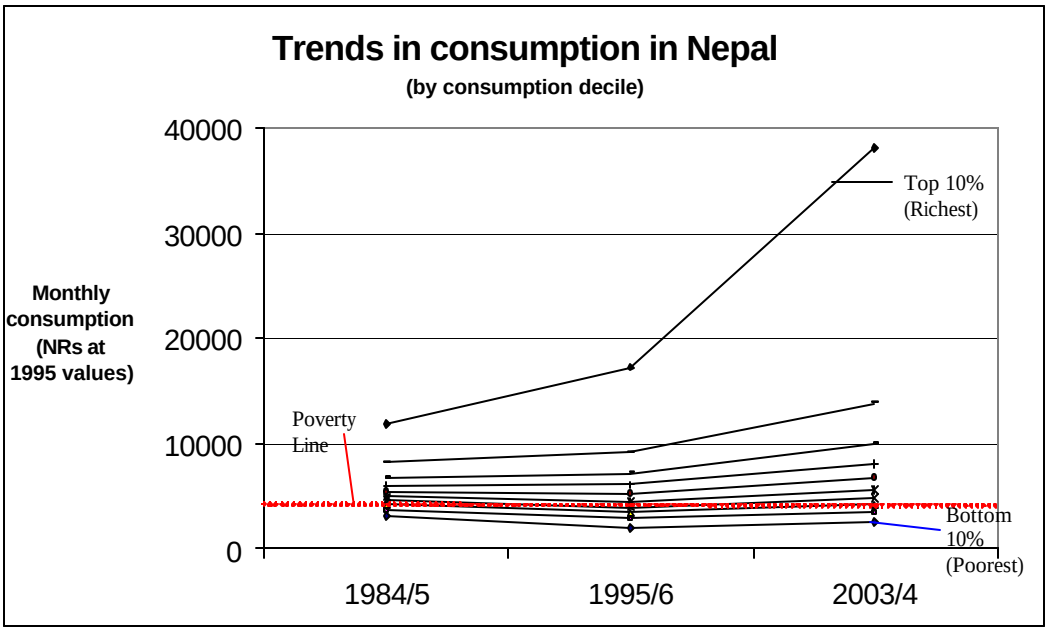
[2] World Bank Data by Topic, Permanent URL to access this data: http://go.worldbank.org/T44TN78GD0

[3] Nepal Country Overview 2008, World Bank, Permanent URL for this page: http://go.worldbank.org/T44TN78GD0

1.2 Economic growth benefiting the rich not the poor

Figure 1 below shows the consumption and therefore the wealth of different strata of Nepali society. The top line shows the richest 10% of Nepali society and how their wealth has increased almost 3 fold over the 9 years from 1984 to 2003. The subsequent lines below show the corresponding consumption figures for each subsequent 10% (or decile) of society. The graph indicates that, whereas the overall trend for Nepal might show economic growth, for the poorer 50% of Nepal's society economic wealth levels have not increased and for the poorest 10% have actually got slightly worse. Recent rises in the costs of fuel and food is likely to further exacerbate this situation, with the poor being more vulnerable to inflation in these areas.

Figure 1 Trends in Consumption in Nepal by Population Decile (with dotted red line showing poverty line)[4]



The above graph illustrates how much of the economic growth in Nepal has benefited the rich of society and not the poor. This is despite significant amounts of foreign donor finance, which is given to Nepal with the goal of reducing poverty. The Government of Nepal (GoN) recent Three Year Interim Plan[5] has poverty alleviation at the top of its agenda with a total 3 year budget of NRs 511 billion (US$ 7.9 billion) of which 27.5% is expected to be financed through foreign sources (compared to 20.6% foreign funding for 2002/3 to 2006/7). In this situation, obvious questions arise as to the effectiveness of the government and its donors in achieving a reduction in poverty.

[4] 1984/5 and 1995/6 data from:"Nepal: Poverty at the turn of the 21st Century", by Giovanna Prennushi, World Bank 1999 and 2003/4 data from "Nepal Living Standards Survey" Second Survey, Central Bureaux of Statistics, December 2004

[5] Three Years Interim Plan 2007/08 to 2009/10, National Planning Commission, GoN. http://www.npc.gov.np/plan

1.3 Approaches to Poverty Alleviation

1.3.1 Trickle-down verses Trickle-up

The trickle-down approach to poverty alleviation assumes that if the overall economy of a country grows, so there should be a resultant benefit to the whole of society. It might start with richer people becoming wealthier, but will result in a gradual trickle down of wealth from the rich to the poor.

An example of this would be in donors providing finance for large commercial hydropower and transmission lines. The resultant improvement in power supply to the cities and towns improves economic wealth and creates new wealth by allowing business people to set up factories etc. Whilst these business people might significantly increase their wealth, so do the poorer people who find jobs in their factories.

This model has shown itself to work well in many developing country situations – such as the 'tiger' economies of South East Asia.

However, Figure 1 shows how this model has had limited success in Nepal where rural regionally isolated people find little benefit from such infrastructure projects, such as commercial hydropower.

In contrast, trickle-up development assistance seeks to target assistance on the poorest people. As economic conditions improve for the poor, so can they generate more wealth and this wealth trickles up the pyramid increasing the wealth of the country overall.

1.3.2 Subsidising essential services verses income generation

Much of the foreign donor assistance to Nepal comes in the form of budget support to government ministries for subsidising essential services. This might be for improvements in health care services, education or any other of the government services.

However, there is a sustainability problem with this kind of approach. Should, donor funding cease, then there is likely to be a corresponding reduction in the services being provided. Collapse in delivery of essential services is politically de-stabilising since expectations have now been raised that cannot continue to be fulfilled.

Conversely, income generation is a development approach that helps the poor to increase their income through improvements in their current income streams or through helping them develop new income streams. This approach empowers the local poor and gives them the choice of how to spend this long term and sustainable income. They can then afford to buy the medical care, education, electricity or infrastructure which they so desire.

Hence, income generation as a development philosophy is more sustainable and empowering to the poor than subsidising government services.

1.4 Industries Available for Poverty Alleviation

If poverty alleviation is to be promoted through income generation, it is worth examining the various industries that have potential for this in Nepal. These are discussed below:

1.4.1 Tourism

Since Nepal is gifted in having many of the world's highest mountains, beautiful landscapes, national parks, ancient culture, historical sites, pleasant climate and a friendly people, all make it an attractive tourist destination. Many of these tourists will spend time in rural areas thus benefiting the rural poor of Nepal. As such, the tourism industry has great potential as a way of helping the poor of Nepal to generate income. However, this income is mainly confined to the tourist areas in Nepal – which can be surprisingly localised. One village on a trekking route can have significant potential, whilst another village a short distance away does not. As such the tourism industry should be developed for income generation for the poor and tourist areas expanded where possible. However, areas unsuited to tourism need other industries to help in income generation.

In the last decade the main reason the tourism industry has been held back is because of the political instability and resultant lack of security that has been prevalent. This particularly impacts investors seeking to invest in more remote areas who are more vulnerable to insurgent groups.

1.4.2 Agriculture

Since Nepal is mainly a rural economy, agriculture is one of the largest sectors of the economy (81% of Nepal's households have agriculture as a major occupation[6]). Rural poor are often employed in the sector or are subsistence farmers. Improving incomes generated in the agriculture sector has significant potential for poverty alleviation. However, since Nepal has one of the world's highest ratios of population to arable land and Nepal's population is ever growing, expanding the agricultural sector has its limitations. Also evident is the vast difference between the economies of agriculture in the fertile Terai region compared to the high mountain areas of Nepal, where eking out a living on the high mountains is much more fragile.

1.4.3 Irrigation

Irrigation is associated with agricultural sector, but is included separately since implementing irrigation projects have been shown to double if not triple incomes[7]. Hence, in the right location, an irrigation project can have a substantial impact in reducing poverty by creating income generation. However, like agriculture, suitability for irrigation projects is generally limited to the more fertile lower arable areas of Nepal. Also irrigation projects struggle to be economically viable, since it is difficult to extract payments for irrigation water from farmers who consider water to be a free commodity.

[6] Population Census 2001: National Report. Central Bureau of Statistics, GoN, Kathmandu

[7] 'Contribution of irrigation to sustaining rural livelihoods: Nepal case study' HR Wallingford report for DFID, March 2002, KAR Project R7879

1.4.4 Factories

In certain locations in Nepal, factories manufacturing labour intensive goods (such as carpets, clothing etc) have been profitable since they use the cheep labour rates available in Nepal. These locations tend to be along the Terai or in the major cities of Nepal. Because of their nature, these factories create large numbers of jobs – particularly for the urban poor. However, such factories depend upon good economic conditions, a ready labour force and good transport links. Thus, few factories can be found in the more mountainous and remote areas of Nepal where many of the really poor live. Also, factories can easily move to new locations if the economic conditions look more favourable somewhere else.

1.4.5 Remittances

In 2006, of Nepal's US$ 9 billion Gross Domestic Product, almost US$ 1.5 billion came from workers remittances and compensation of employees received[8]. These World Bank figures illustrate how remittances from Nepalis working overseas form such a significant part of the economy. Money sent back often is crucial to poor families who would otherwise struggle to survive. This money can reach the most remote family and make a difference to those who have very few income generating options (as described above).

However, this labour is essentially creating economic wealth for other countries, not Nepal.

1.4.6 Hydropower

Harnessing the power of Nepal's steep rivers flowing from the snow capped Himalayas offers a massive opportunity for wealth creation. Energy prices across the world have been rising at a rate greater than inflation as the world demand for oil outstrips the limited and finite supplies. With the realities of climate change, alternatives to fossil fuels are being sought in order to reduce CO_2 emissions. With Nepal holding an estimated 83,000 MW of renewable hydropower resources, of which 43,000 MW are thought to be economically feasible, the prospect of economic growth centred around hydropower development is an opportunity waiting to be taken. Nepal's own demand for electrical power is still not being met and India has a huge forecast deficit in electrical power generation.

An example of this kind of wealth generation can be found in Bhutan, a country geographically similar to Nepal where Bhutan and India have collaborated to develop Bhutan's hydropower resources with the power mainly being sold to India. The construction of the 1,020 MW Tala hydropower project has been driving Bhutan's strong 8.8% growth in GDP (2005)[9]. This growth is set to rise even higher through construction of the 1,095MW Punatsangchhu Project stage-I and the planned

[8] World Bank Data by Topic, Permanent URL to access this data: http://go.worldbank.org/T44TN78GD0

[9] Asian Development Bank, Economic prospects and Outlook, Bhutan. http://www.abd.org/documents/books/ADO/2006/bhu.asp

construction of Punatsangchhu-II and Mangdechhu[10]. The Asian Development Bank reports that hydropower accounts for 12% of Bhutan's GDP and 45% of Bhutan's revenues. This has led Bhutan's per capita gross national income rising 2.5 times in a decade from US$ 570 in 1996 to US$ 1430 in 2006.

It should be noted however that during construction of these large hydropower project, there is huge demand for labour – with the corresponding wealth creation for the poor. However, once construction is completed, job opportunities are limited – especially for the unskilled poor. Hence, although hydropower projects are providing income for the country, the challenge is to allow the poor of the country to access this wealth.

[10] Bhutan Times report May 22, 2008
http://www.bhutantimes.bt/index.php?option=com_content&task=view&id=594&Itemid=1

2 EXPERIENCE OF HOW THE HYDROPOWER INDUSTRY HAS IMPACTED THE POOR IN NEPAL

2.1 UMN Projects

In the 1970s the United Mission to Nepal recognised Nepal's potential for wealth generation based on its hydropower potential. The 1MW Tinau project was developed to provide power to the industries being set up in Butwal on the Terai. There followed three decades of work in this sector largely financed by the Norwegian Government through NORAD. The following outlines some of the activities:

- Establishing and capacity building of institutions (commercial, teaching, research and social) to provide necessary services for the establishment of Hydropower Projects [11]
- Promotion (through these institutions) of various commercial hydropower projects [12]
- Provision of expert personnel to transfer the necessary technology to Nepali staff
- Training of technicians and engineers at appropriate levels[13]
- Research and development of technologies
- Assistance to the micro-hydro sector in capacity building communities to implement Micro Hydropower Projects (MHPs)
- Influencing policy to liberalise the industry to allow for more private investment.
- Grant assistance to the Government of Nepal (GoN) and capacity building of its ministries.

The basic philosophy of this past intervention in the hydropower sector is that Nepal has a huge, but largely unexploited, hydropower resource that if it were to be developed could bring substantial benefits to Nepal. These benefits would have many facets, but would include:

- Provide electrical power to meet the growing demand of Nepal's population and also servicing its growing economy;

[11] Examples of which are: **Butwal Power Company** (BPC) (independent power producer, distributor and developer); **Himal Hydro and General Construction Ltd** (contracting company); **Nepal Hydro Electric (P) Ltd** (manufacturer and developer of mechanical and electrical plant associated with hydropower and other industries); **Hydro Consult (P) Ltd** (engineering and environmental consultancy); **People Energy Environment Development Association** (NGO promoting renewable energy use for the purpose of poverty alleviation); **Jhimruk Industrial Development Company** (a not for profit company working to alleviate the impact of Jhimruk hydropower by physical and social development projects); **Hydro Lab (P) Ltd** (physical modeling laboratory for headwork design and research); **Kathmandu University** (electrical and mechanical graduate and post-graduate engineering degree courses)

[12] **Andhi Khola Hydropower Project** (5.1 MW) and **Jhimruk Hydropower Project** (12 MW) implemented through BPC and **Khimti I Hydropower Project** (60 MW) implemented through Himal Power Ltd.

[13] Training has been at appropriate levels, from practical tradesman courses at Butwal Training Institute through to a scholarship programme to Norwegian Universities,

- Generation of income for the local owners of the hydropower projects and where exports of Nepal's electrical energy takes place to India – to generate income for Nepal;
- Provide employment through the a) construction process, b) operation and maintenance of the plants, c) stimulate enterprise in the surrounding community, d) create a service industry to supply the needs of hydropower producers;
- Provide infrastructure to the communities living nearby hydropower projects in terms of roads, water supply, schools and other community development projects;
- Replace the burden of Nepal having to import fossil fuels for its energy requirements.

The beauty of the above approach is that it should be a self-financing, growing sector that impacts the rural areas of Nepal with an environmentally low impact industry. In many ways, UMN and its partners have been very successful in the above activities – so much so that many in Nepal still credit the NORAD sponsored UMN projects with kick-starting much of the hydropower industry.

However, UMN has not been so assured as to the worth of its past approach – particularly in its goal of decreasing the poverty levels of Nepal. It had previously been assumed that in making Nepal as a whole richer – so the benefits would trickle down to the poorest of Nepal, also increasing their wealth. This theory, which has been shown to have some basis in many other parts of the world, was thought to also apply to Nepal. However, research in Nepal has shown a contrary experience. While Nepal has become richer as a whole, the richer proportion of the population has become even richer, whilst the poor proportion has actually become poorer[14]. The proximate reasons for this are that Nepal's economic growth has been mainly in the industrial and service sectors, while the poor are stuck mainly in the low-yield agriculture, where growth has been poor.

2.2 Micro-Hydropower Projects and Rural Electrification

Micro-hydro projects are different from their commercial cousins in that their primary aim is to provide lighting to rural households at minimal cost. The consumers benefit from a service provision that improves quality of life, but this rarely generates income and more often is just an additional cost. There can be some saving in reduced kerosene bills but this rarely compensates the amounts needed to be paid for the electricity provision. Thus the household has to find the money to afford this new service – which in many cases is beyond the incomes of the very poorest of society. This is the case even when a proportion of the capital costs are subsidised by the Alternative Energy Promotion Centre (AEPC), local government and/or charitable organisations.

[14] 'Root Causes of Poverty – Concept Paper' by Dr Martin Allaby, Sept 2003, United Mission to Nepal

Where micro-hydropower does generate income, is through the agricultural processing end-use industries that use the power generated during the day. For the poor, this saving in labour in agricultural processing only generates income when that labour can be used for other income generation.

Rural electrification has a similar characteristic to micro-hydropower with the main difference being that grid supply from the mains allows consumers to use as much power as they wish – as long as they are prepared to pay for it. Again the challenge for the poor in remote rural areas is to create wealth through utilising this power supply rather than consumption just being an expense that they ultimately cannot afford.

2.3 Royalties and how they are used

Under current legislation, commercial hydropower developers supplying power from hydropower plants generating greater than 1MW of power are required to pay royalties to the government.

The hydropower development policy 2049 of the Ministry of Water resources states that 'the producer of such electricity shall pay the government a sum of Rs. 100.00 per KW per annum and 2% of the average sale per unit (KW hour) as royalty up to the period of 15 years starting from the date of commercial production. After the completion production, the producer shall pay the government a sum of Rs.1,000.00 per KW per annum and ten percent of the average sale price per unit (KW hour) as royalty.'

Though very little royalties are paid for the first 15 years, but the royalty amounts increase to a significant amount after 15 years of operation. This royalty goes to central government, but there is a provision to distribute a proportion of the royalty to the district administrations affected by the project. In theory, this extra income to the District can be used for development projects to benefit those impacted by the project. In practice this is unlikely to happen with few document cases showing how money from royalties has benefited communities impacted by commercial hydropower projects on their river. Experience in Nepal has been that mitigation development projects for affected communities have tended to have been funded by donors, with small contributions coming from the commercial hydropower developer company[15].

There is a case for arguing that the royalty mechanism should be modified to ensure that a greater proportion of this income goes to benefit the communities actually living beside the hydropower project generating the income.

[15] The Jhimruk Industrial Development Company (JIDCO) uses left over donor funds from NORAD for the community development and mitigation work it is involved in for the Jhimruk Hydropower Project. Himal Power Limtied is using its own and NORAD funds on the KIND project to increase the supply of power to rural communities.

2.4 The challenge of using hydropower for poverty alleviation – why Pro-poor Hydropower is necessary

To the national economy, hydropower projects are an economic wealth generating engine. Not only do they provide electricity to the domestic and industrial economies, but they generate wealth for their owners and the banks that lend to them. However, this wealth does not go back to the poor communities that live beside these projects – rather to the wealthy businessmen of Kathmandu and the foreign investors.

Figure 2-1 Consumption pattern in Nepal (2003/04)[16]

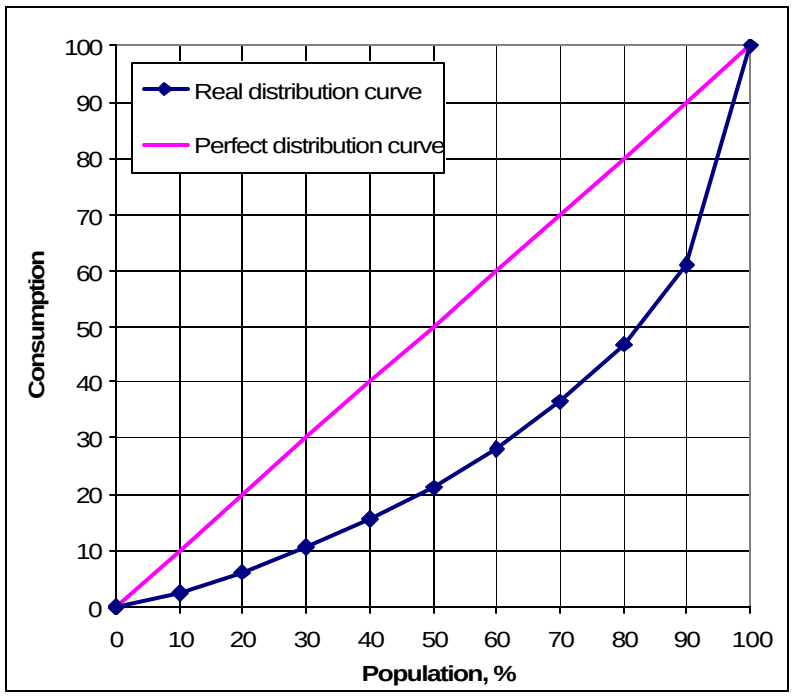


Figure 2-1 shows how in 2003/4 the richest 20% of Nepal's society consumed about 53% of the total consumption, while the poorest 20% shared only 6.2%. This vast difference between rich and poor is evident in Nepal's high 0.41 Geni Coefficient[17], which measure the inequality gap between rich and poor.

Experiences in Nepal show that the trickle-down theory of economic development has little applicability. The Kathmandu businessmen of Nepal who own shares in hydropower projects are more likely to spend their new found wealth on sending their children abroad for top-class education, building houses in the cities or importing foreign vehicles - rather than in investing in the remote areas of the country or the communities neighbouring the hydropower project they own.

Hence, apart from the short period during construction, the real wealth from hydropower is realised in the long term ownership of the hydropower project itself.

[16] Nepal Living Standards Survey, Central Bureau of Statistics, 2004

[17] 2005: Economic Survey – Fiscal Year 2004/5. Ministry of Finance, GoN.

Spin-off benefits to the local poor living beside the hydropower project are very little compared to the benefits of ownership itself.

No wonder that this situation has led to communities living beside hydropower projects being disenfranchised with the benefits they receive. In some cases this has led disputes which have resulted in hydropower projects being shut down.

Hydropower developers have also realised that if they are to develop new hydropower projects, they need to provide significant benefits to the local communities surrounding the project in order to convince them to 'allow' the project to proceed.

Thus the logic for pro-poor hydropower has been developed with its main features being:

- It is a income generating tool to help poverty alleviation in poor communities surrounding a hydropower project
- Income generation is through the local poor acquiring share ownership of the project along with other investors
- The hydropower project needs to be commercial and therefore profitable in order for it produces dividends
- The project is not a social project, looking to provide rural electrification or other benefits to the local community – rather the local poor receive their benefits through ownership.
- The local poor earn their ownership in the hydropower project by providing their labour during construction. A proportion of their wage it sacrificed in order to buy shares in the project. This salary sacrifice or sweat equity is multiplied by a grant and soft-loan to the poor in order for the poor's equity stake to be sufficient to provide a reasonable long term income.

The remainder of this report describes this Pro-poor Hydropower (PPHP) concept and how it can be used to alleviate poverty in Nepal.

3 THE PRO-POOR HYDROPOWER CONCEPT

3.1 Definition of Pro-poor Hydropower

Pro-Poor Hydropower (PPHP) was initiated by PEEDA and the United Mission to Nepal (UMN) who have developed a concept by which the rural poor of Nepal are facilitated into the profitable ownership of their water resources. This is achieved through development of ***commercially profitable*** and ***socio-ecologically acceptable*** hydropower projects with the local poor gaining ***significant*** ownership of the projects.

It is recognised that there are different scales of the local poor's ownership in a commercial project, and hence significant ownership is defined as ownership of shares that earn dividend that represents a sizable earning when compared to the households other earning streams.

3.1.1 The Project's Development Goal

The overarching development goal is that: all households in the target group have sufficient and sustainable cash resources from the local hydropower and other revenue streams to meet their basic needs which are sufficient food, clothing, shelter, education and health resulting in a feeling of security and substantially contributing to poverty alleviation.

The direct **project goal** of pro-poor hydropower is **income generation** through facilitating the rural poor of Nepal into the profitable ownership of their local water resources.

Income generation is a development approach that empowers the local poor and gives them the choice of how to spend this long term and sustainable income. They can then afford to buy the medical care, education, electricity or infrastructure which they so desire.

3.1.2 Two Types of PPHP – the 'pure' or the 'dilute' approach

It is recognised that the PPHP concept can be implemented in two different approaches. In the first instance the PPHP concept was developed in its 'pure' form, where essentially the whole commercial hydropower project was geared around the PPHP concept with the aim that the local poor would own the majority (or more than 51%) of the hydropower project. The 'dilute' approach was developed later, after commercial hydropower developer companies approached PEEDA with a request to help them facilitate the local community into ownership of a small proportion of shares in a bigger hydropower project. A 'dilute' approach project is therefore defined as one in which the local poor are facilitated into the ownership of 50% or less of the project.

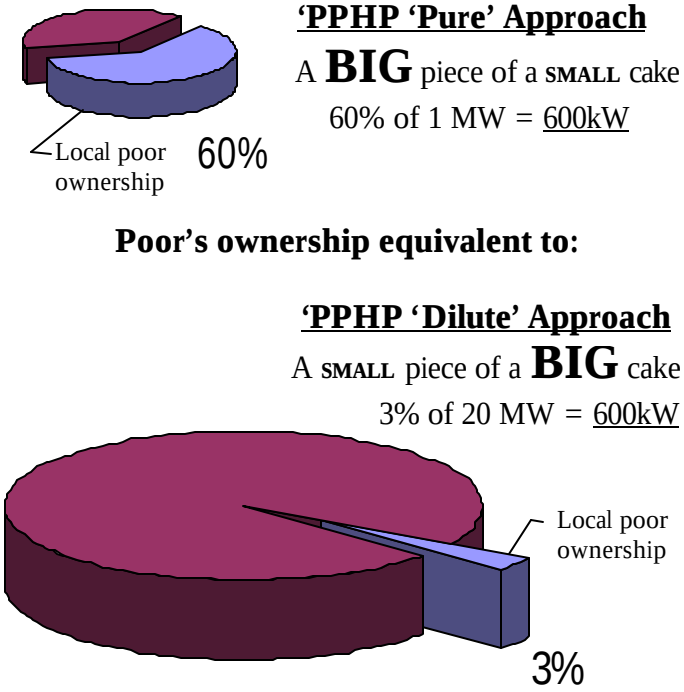


Figure 3-1 'Pure' verses 'Dilute' PPHP Approach

It is recognised that there is sliding scale between these two opposite ends of the spectrum and as such there is much overlap in the descriptions of the two approaches. This is illustrated in Figure 3-1 below which shows how the 'pure' and 'dilute' PPHP approaches can result in the same amount of hydropower ownership through different proportions of different sized project.

Currently PEEDA is looking to trial the 'dilute' approach in a pilot project with Nyadi Hydropower Limited. Since commercial hydropower developers are most interested in the 'dilute' approach, this approach will be described here and then later compared to the 'pure' approach.

3.2 Description of the pro-poor hydropower concept for the 'dilute' approach

The Pro-Poor Hydropower concept involves the construction and operation of commercial scale hydropower projects. The local poor will be facilitated into owning equity in these plants. This equity will be in the form of capital equity (shares) and debt equity (debentures). Refer to section 5.3.5 for an explanation of the rationale for the use of debentures. The Local Poor will receive a regular stream of income from their equity stakes for the period of the operating license for the hydropower plant (normally 20 years or more). This income will be sufficient to pay off their investment plus provide substantial cash surplus.

The Local Poor are those who qualify as poor according to the rules and criteria set by the PPHP consortium in broader consultation with the local community. Generally, a good test of the Local Poor classification is whether these people are actually willing to

labour on the project themselves. The Local Poor are the primary target group of the Pro-Poor Hydropower concept. The envisaged conceptual mechanism through which the Local Poor earn shares in the Pro-Poor Hydropower is that:

- The Local Poor work on the project as labourers and earn a wage. Some of that wage is sacrificed to buy shares in the project. This is known as 'sweat equity' or 'contributed labour' and is usually the only asset the poor have to invest in the project. It should be recognised that part of the wage is still paid in order for the labourer to live and provide for their family in the short term. On its own, the value of this sweat equity is likely to be very small – not enough to provide any real long term income for the family.
- For each share in the project that a member of the target group earns through salary sacrifice, they will receive a matching share paid for through grant finance.
- Each share in the project that a member of the target group owns through contributed labour and grant finance is 'stapled' to a debenture of equal value[18]. This debenture investment is financed by a Micro Finance Institution/Bank that will provide soft-loan finance for this additional investment.

[18] A debenture is an unsecured debt backed only by the integrity of the borrower, not by collateral. In this case, the debentures will be debts owed by the project to the shareholders. The debentures will be fixed to the shares, and will not be separable from them. Debentures and shares that are fixed together in this way are referred to as 'stapled' securities.

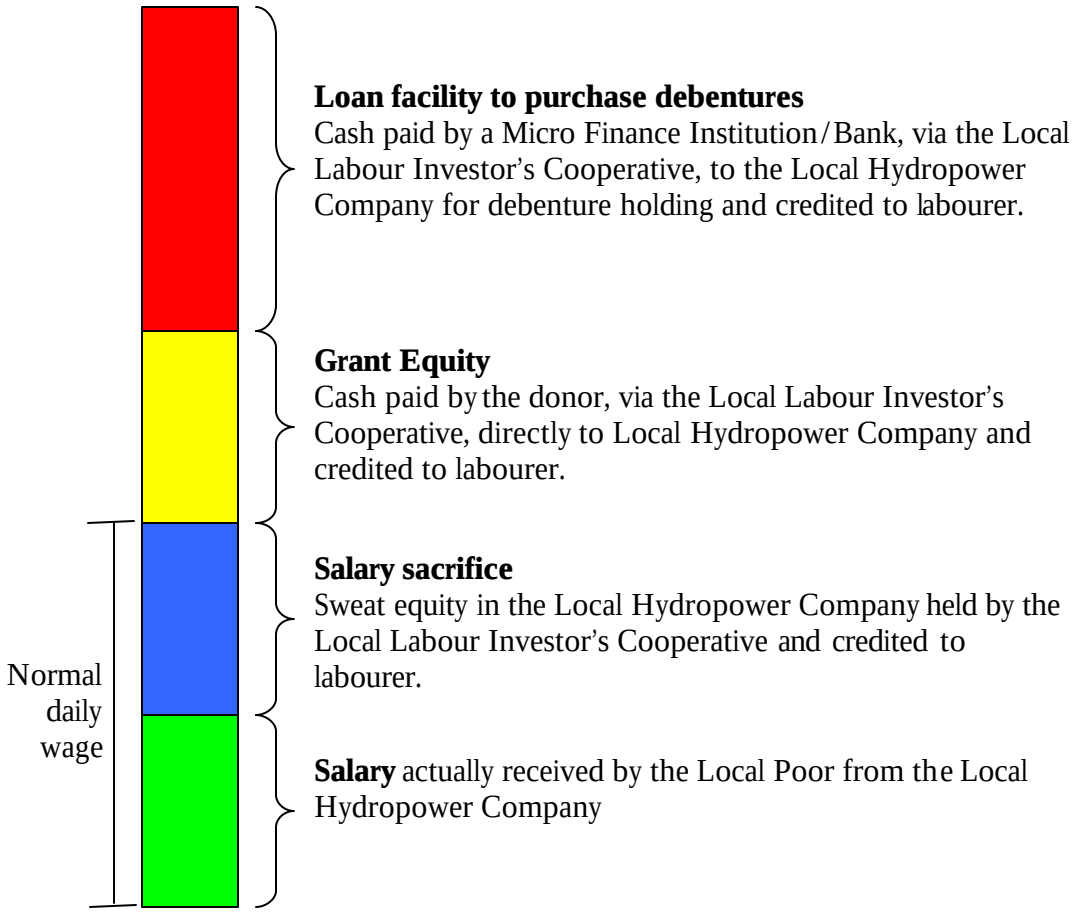


Figure 2-2 Mechanism for leveraging the Local Poor's equity that has been earned through daily labour

The envisaged mechanism for facilitating the share ownership of the Local Poor in the Pro-Poor Hydropower project through their daily labour is illustrated in Figure 3-2. This whole process would need to be carefully managed in consultation with the broader local community.

4 PPHP STAKEHOLDERS

For the PPHP concept to be implemented, it is envisaged that it will need a number of organisations/stakeholders to work together to implement the project. Various stakeholders are identified in the organisational structure diagram in Figure A-2 in Annex A, and are further described below.

4.1 The Local Poor

The local poor are the main target beneficiaries of the project, who qualify according to the criteria set by the PPHP consortium in broader consultation with the local community. The full criteria for who can be classed as 'local poor' needs to be developed on a case by case basis and in partnership with the local community in order to ensure the benefits to them. However, one good criterion to measure who is poor is whether the person is willing to provide physical labour for building the project. Since more wealthy people are likely to be unwilling to provide their own labour - the local poor will more naturally end up as the people who labour on the project and through the PPHP mechanism will end up being the beneficiaries. The local poor are also known as Local labour Investors (LLIs) since this label does not carry any stigma.

4.2 The Local Non-Poor

The local Non-Poor are those in the community who do not qualify as poor according to the rules established by the PPHP consortium. This group is not the target group of the Pro-Poor Hydropower Concept, but they will be invited to participate in making investments in the project. One benefit of this is that the local non-poor will also have an investment in the project and will thus have a vested interest in the project succeeding. This group is known as Local Cash Investors (LCIs)

4.3 Local Community Groups (CGs) Local Labour Investors Cooperative (LLIC)

In the course of mobilising the community for the project, various community based organisations will be established, known as Community Groups (CGs). These will be based around the people of a locality and include all the people from that area who are investing. It is thought each will consist of between 15 to 30 households. These groups will only be created if there is no existing group which could undertake this function.

4.4 Local Labour Investors Cooperative (LLIC)

It is envisaged that a Local Labour Investors Cooperative (LLIC) will be setup to unite the Community Groups and represent them to the Local Hydropower Company. Plans are that this organisation will be a cooperative, since this structure carries a number of advantages. It is this organisation that will hold the shares on behalf of the Local Poor and make the dividend payments along with the necessary soft loan repayment.

4.5 National Coordinating Agency

The Pro-Poor Hydropower Programme involves many organisations working together. This effort needs to be coordinated. In the interests of longer-term sustainability, a Nepali NGO with some external support will carry out this coordination. Since PEEDA meets these criteria and was involved in initially developing the concept, thus far PEEDA has been envisaged as the National Coordinating Agency (NCA).

One of the roles of the National Coordinating Agency is to manage the donor finances for the project and the associated contracts for these donor funds. PEEDA has good technical and legal advisors who can supervise this role.

4.6 Local Partner Organization

The Local Partner Organization will play a major role in managing the entire process of the Poor investing in the hydropower project, including support to them in the utilisation of the dividends. The Local Partner Organization is most likely to be an NGO comprising of local individuals who share a concern for the Poor in their community.

The Local Partner Organization will raise awareness amongst the local Poor and Non-Poor regarding the Pro-Poor Hydropower concept, and motivate people to participate. The Poor are especially reluctant to invest in a new idea that offers returns some time in the uncertain future. A major challenge is to raise awareness among the Poor about various aspects of the Pro-Poor Hydropower concept. Community development activities will often raise awareness about the situation within which the Poor find themselves. In the Pro-Poor Hydropower programme, awareness will also need to be raised about:

- The concept of owning equity (shares & debentures) in a profitable business, and how these profits are distributed back to the owners
- The viability of the hydro-power business compared to other potential business opportunities
- The details of the Pro-Poor Hydropower concept, and specifically how the various parties are offering to assist the Poor to become investors

This awareness raising is the first stage of the process. The second stage is to actually motivate the Poor to participate. The Poor have precious little to risk, and the consequences of losing their investment is normally disastrous. They will therefore normally choose to avoid risk. Every effort will need to be made to reduce the burden of risk that the Poor shoulder. Even so, the Poor will find it difficult to overcome their natural aversion to opting for a new course of action, and will need motivation to do so.

4.7 Commercial Hydropower Developer

The Commercial Hydropower Developer needs to be an organisation willing and desiring to be joint shareholders with the Poor. While it is clear that the Commercial Hydropower Developer must have a serious profit motive, it must also have an equally

strong motive to serve the Poor. If profit were the only motive of the Commercial Hydropower Developer, then the challenges of developing a project jointly with the Poor would probably outweigh the benefits. The shareholders of the Commercial Hydropower Developer must therefore have a clear social concern, and indeed, this concern would need to be reflected in the Mission and Vision statements of the company.

In order for the Pro-Poor Hydropower concept to succeed, it must be profitable. If the hydropower project is not profitable, then those who have invested in the project (including the Poor) will not benefit. The Commercial Hydropower Developer must be seriously committed to investing for good financial return.

Nepal has a growing collection of poorly designed and implemented hydropower projects. The primary reason for this is that owners of these projects have insufficient awareness or interest in the importance of good engineering design and construction. In order to further protect the investment of the Poor, the Commercial Hydropower Developer must have a real awareness and commitment to quality engineering design and construction.

4.8 Local Hydropower Company

The Local Hydropower Company (LHC) will design, construct and operate the proposed hydropower project. Most Commercial Hydropower Developer companies will set-up such a company to exploit a particular hydropower project. It is this company that has its ownership divided between the local poor, non-poor and other investors.

The principle CHD that owns the majority of this company will generally supply the necessary expertise and staff resources needed to implement the project.

4.9 Supporting INGO

It is recognised that the National Coordinating Agency, Local Partner Organisation and other organisations in the PPHP consortium may not have sufficient capacity to implement this type of project. Hence a supporting INGO is envisaged to provide this role – particularly for the pilot project.

4.10 Banks

Banks or financing institutions are required to provide the loan finance for such a project. It is usual in Nepal for these loans to be to the Local Hydropower Company, with as much as 70% of the project value being provided by loans. These institutions must be willing to have the local poor invest in the project in this kind of modality.

4.11 Micro Financing Institutions (MFI)

One of the weaknesses of the PPHP concept is that the poor will only receive income from their share ownership once the hydropower project starts to produce profits and associated dividends. This may take many years – particularly for large projects that take many years to construct and then many years to payoff the LHC's loan. For the

poor, this is an unacceptable situation. One way around this is for the poor themselves to become lenders to the project. Loans repayments can start straight away and thus provide income in the early years. The money for these loans can come at a soft loan rate from Micro Financing Institutions (MFIs) (which could be a bank, cooperative or finance company) who are required to supply a certain amount of micro credit funding to the poor of Nepal. Various MFIs have been approached by PEEDA to ascertain if they would be willing to supply the matching soft-loan to the poor's equity investment in a PPHP project. Current response has been positive, since they see the PPHP pilot project as a secure investment in which a third party (the LLIC) will manage the poor to receive and then repay the loan. This increases their confidence whilst reducing their administrative charges. The income that the Local Poor will receive is the margin or difference between the soft loan interest rate and the interest rate that they are lending to the local hydropower company at.

5 ADDITIONAL ASPECTS OF PPHP

5.1 Tests as to whether PPHP tackles the root causes of poverty

UMN has identified two simple tests for any proposed intervention[19] aimed at addressing root causes of poverty:

1. Do the Poor (i.e. those below the poverty line) benefit at least as much as the non-poor?
2. Will the beneficial effect continue after the intervention has ceased?

5.1.1 Do the Poor benefit?

In order for Pro-Poor Hydropower to meet the first test, the Local Poor must benefit from the intervention at least as much as the Non-Poor. In the case of the 'pure' approach to PPHP, the majority of the company is owned by the Local Poor and hence this criterion is met easily.

In the 'dilute' approach case, whilst the Local Poor are only facilitated into ownership of a small proportion of a large hydropower project, the intervention by the donor only contributes to the Local Poor's ownership and other mitigation and community mobilisation work. Hence the owners of the rest of the shares do not directly benefit from the intervention. They do have an in-direct benefit in that they know their investment is less likely to be disrupted by local disputes – since the local people will have no interest in seeing the hydropower project disturbed because this would impact their own earnings from the dividend payouts.

5.1.2 Will the beneficial effect continue?

Privately developed hydropower in Nepal is generally developed on a Build-Own-Operate-Transfer (BOOT) basis. That is, the private developer undertakes to build the project, own it for an agreed duration (normally 20 to 30 years), operate it during that period on terms defined by a Power Purchase Agreement (PPA) and then transfer ownership (and management) of it to GoN at the end of the operation period[20].

The intervention by the Pro-Poor Hydropower Programme would be in the period leading up to, and through the period of financing and construction, which should be concluded within a few years after construction is complete. Dividends will be paid regularly throughout the 20 + year operation period. Therefore the benefits will continue well past the intervention.

[19] The intervention is the intervention by the external party aiming to address root causes of poverty. In this case, the intervention is the Pro-Poor Hydropower Programme generally, and the work of the Local Community Group in particular.

[20] As is the case in most of the rest of the world, water resources in Nepal are regarded as a community asset that, unlike land, cannot be privately owned. Therefore utilisation of these water resources is on the basis of a license granted by the community (normally the government) for a limited period of time.

5.2 Pro-Poor Hydropower in Relation to Empowerment

Pro-Poor hydropower in relation to empowerment is an economic intervention in the local poor community with the overall developmental objective of facilitating a sustainable economic advantage to the local community through optimum utilization of the available local water resources. This is envisaged to equip the local poor with a number of capabilities (see below).

5.2.1 Economic opportunity

The PPHP modality gives the Local Poor a way of investing in the hydropower project being built on their river. These local investors receive a regular stream of income from the debenture interest and dividends paid by the hydropower company. The money received can be used to invest in other economic activities and income opportunities.

5.2.2 Empowerment

The money received as income from the debentures and dividends on shares paid by the local Hydropower Company can be used to address the socio-economic vulnerabilities of the Local Poor – particularly giving them voice, dignity, and the power to choose to invest in other parts of their lives.

5.2.3 Security

The money received can be used to address the economic vulnerabilities and particularly food security faced by the Poor.

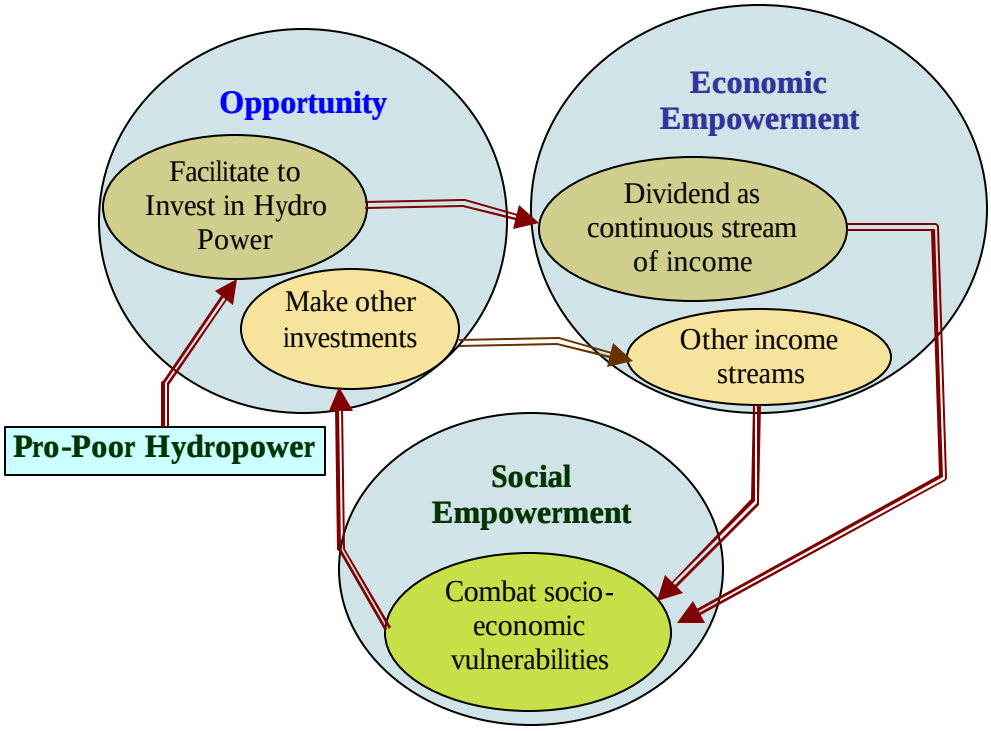


Figure 5-1: Pro-Poor Hydropower in Relation to Poverty

5.3 Practical Aspects of Pro-Poor Hydropower and the Poor

5.3.1 Protection from creditors

Many of the Poor are deeply indebted to local moneylenders. Mechanisms will have to be put in place to ensure that the Poor are freed from this debt without losing either their project equity or the dividends flowing from them.

One way this can be achieved is for the LLIC to hold the grant share ownership in 'trust' for the poor. Agreements would be signed to allow the Local Poor to only sell their grant shares after a certain period of time (say after the main loan repayment period is over and the shares are realising their full dividend). If a Local Poor person tried to sell their shares before this time, they would only be able to sell their own 'seat equity' share with the 'grant share' defaulting to the LLIC's ownership.

5.3.2 Advocacy

By its very nature, Pro-Poor Hydropower advocates for the Poor. The Poor are the target beneficiaries of the PPHP intervention, and through the mechanisms referred to above, their cause and welfare are advanced.

5.3.3 Peace and Reconciliation

Generally, the local community is made up of a broad cross-section of people often from different strata of society. In the context of the present political / security

situation in Nepal, the community is likely to have been in conflict with each other and initial levels of trust may be low.

Through working together to achieve the mutual goal of benefiting the Poor in their community, reconciliation between these individuals, and the interests that they represent is promoted. The 'Do No Harm' analytical framework is recommended to guide programming decisions to ensure this.

5.3.3.1 Do No Harm

The 'Do No Harm' analytical framework has been developed as a tool for mapping the interactions of aid and conflict. It can be used to plan, monitor and evaluate both humanitarian and development assistance programmes to ensure that they 'do no harm' in terms of feeding any conflict. This technique can also be used in a positive way maximise the peace-making aspects of a project.

The Pro-Poor Hydropower concept generally has been analysed against the 'Do No Harm' framework. This analysis has shown that the programme generally contributes towards 'Connectors / Local Capacities for Peace' and not to 'Dividers / Tensions'. It is recommended that a more detailed do-no-harm analysis be undertaken as part of any PPHP project to analyse the specific situation.

5.3.4 Other Community Development

Whilst the project is targeted on facilitating the local poor into ownership of a commercial hydropower project, it is recognised that much of the community mobilisation work related to the project (in terms of community group formation etc) can also be used for other sorts of development work. REDP has proven how community groups created for hydropower development can also be used for other types of community development. This project will also seek to maximise the 'spin-off' benefits of the community mobilisation work undertaken.

5.3.5 Early and Regular Payouts – the logic for debentures

In order to build the confidence of the Poor in their investment, it will be important for them to see the promised income as soon as possible. Once income starts to flow, then they will be more motivated to invest.

In Nepal, like most of the rest of the world, a company may not pay dividends until it is turning a profit. For hydropower projects, this may be some years (usually 5 to 8 years) after initial operation commences. Since the construction period can also be lengthy (in the case of a large 20MW project it may be 3 to 4 years), dividends may only be forthcoming in the tenth year after the first investment. Clearly, it would be unacceptable for a typical poor labourer to have to wait as much as 10 years before they saw any return on their investment.

The debenture mechanism is a way to allow a payment to the poor during this initial period when dividends are not been paid.

Micro Financing Institutions (MFI) and banks, under government rules, have a duty to supply a certain proportion of their lending to the poor on a soft loan basis[21]. Most banks and MFIs struggle to provide this lending to the poor in an economic way that then recovers the loan and collects the interest due. Because of this many banks or MFIs prefer to pay the fines for not providing these loans or if they provide them, they would quickly write off the loan without expectation that it could be recovered.

Banks and MFIs report that they would be very positive toward supplying a loan to the poor when part of the PPHP mechanism[22]. The loan would be made in the name of individuals but through a cooperative that represents them. This cooperative would then loan the money to the Commercial Hydropower Developer as a debenture with an interest rate similar to the commercial bank lending rate (currently 10 to 12%). The size of the debenture would match the size of the 'sweat equity' investment for each individual and is known as 'stapled security'. It is known as this since the equity and debenture investments are tied together legally and form a mutually dependent investment.

As the project starts generating income, the debenture debt would gradually be paid off. At the same time the MFI loan would be paid off in respect of each individual by the cooperative. The margin between the two interest rates represents the profit the local poor make on their debenture. They receive this as cash income in the period before the main dividend payments come through.

Therefore, it is proposed that much of the equity stake of the local community be in the form of debentures that will earn interest payments immediately.

[21] Financing possibilities of soft loan finance of Local Investors by finance company, Notes of a meeting with Shree Himalayan Multi Purpose Co-operative Society, 26th March 2007. A soft loan interest rate of 6% was reported to be available

[22] This is because the banks do not have to deal personally with each individual investor (since the cooperative does this). Collecting re-payments is also more assured since the investment is part of a large well managed hydropower project.

6 COMPARISON OF PPHP IMPLEMENTATION MODALITIES

6.1 'Pure' Approach – Poor Gaining Majority Ownership

The key aspects of the 'pure' approach is that the **local poor community are in control** of the project from start to finish, with a local NGO facilitating them into this ownership and helping them develop the necessary capacity to run and manage the project. Because the project is centred on the PPHP concept, decisions regarding project scheduling etc will be determined to suit the PPHP modality. The ownership structure of this modality is further illustrated in Figure A-1 in Annex A. It can be seen from this figure that the local poor own the majority of the Local Hydropower Company. As such the definition of a 'pure' approach PPHP project is that the local poor own 51% or more of the shares.

6.2 'Dilute' Approach – Poor Gaining Significant Ownership

In contrast to the 'pure' approach, the 'dilute' approach is generally where the local poor ownership is a relatively small proportion of a larger hydropower project. In this situation a **large commercial hydropower developer is driving the project**, but is willing for the local community to have a small percentage of ownership in the project. Generally the motivation to do this is from the realisation that the local communities need to have an economic stake in the project to have an incentive to minimise disruption to the project. There are many examples where hydropower projects have been shut down in Nepal because a disenfranchised local community is seeking more local benefits from profitable hydropower projects using their local river.

Since the PPHP component of the project is generally small, the commercial hydropower developer will generally run the project purely on commercial lines and will not be willing to delay the project for the sake of maximising the local community's involvement.

The ownership structure for this modality is further illustrated in Figure A-2 in Annex A. As is the case of most commercial hydropower companies, the loan part is taken out by the Local Hydropower Company – not by each individual investor. This also means that the soft-loan provided to the poor for debenture investment also may come into the project through the financing consortium or directly to the company.

It should be noted that the amount of kilo-watts owned by the local poor in the two illustrations can be the same; just the size of the hydropower company is much larger. This is illustrated in Figure 3-1 above where the size of the 'slice of cake' ends up being the same in both scenarios.

6.3 Comparing the 'Pure Approach' and 'Dilute Approach'

There might be slightly different components of PPHP with 'Pure' and 'Dilute Approach' during implementation of PPHP, which can be listed as follows:

S. N.	Activity	Traditional Approach	PPHP 'Pure Approach'	PPHP 'Dilute Approach'
1.	Feasibility Study	Commercial Developers do it	Will probably have to be facilitated by a lead PPHP agency.	As in traditional approach
2	Regulatory approval	Commercial Developers do it	Will probably have to be facilitated by a lead PPHP agency.	As in traditional approach
3	Detailed Design	Commercial Developers do it	Will probably have to be facilitated by a lead PPHP agency.	As in traditional approach
4	Community Mobilisation	Not mandatory	PPHP lead agency does it	PPHP lead agency does it
5	Power Purchase Agreement	Commercial Developers do it	Will probably have to be facilitated by a lead PPHP agency.	As in traditional approach
6	Local labour mobilisation	Depends on the contractor's interests	Local labour as a share investment from local poor	Local labour as a share investment from local poor
9.	Contract for project construction	Tender among contractors. Choose lowest/best.	Conditions for local poor's labour investment have to be clearly described in contract documents. May be negotiated directly with contractor instead of tender.	Conditions for local poor's labour investment have to be clearly described in contract documents
10.	Return on investment	Only Commercial Developers receive it	The local poor get the significant portion of it	The local poor get a tiny portion of it.

6.4 Community Mobilisation

There might be different models of community mobilisation depending on the supporting agency. However, it is very important to consider the gender balance, social inclusion, skill development, environmental preservation, techno logy development, capital formation and organisational development aspects into the PPHP community mobilization. PEEDA has prepared a guide book for mobilizing the local community of the Pro-poor Hydropower Project (PPHP) site to motivate the local community for their involvement in construction and operation of PPHP. A Nepali language guide is also available. In that respect this guide aims at leveraging primarily the PPHP related community mobilization works. Therefore, it has been the essential endeavour of PEEDA to incorporate all the aspects including the primary steps of PPHP community mobilization process, which may or may not be relevant to community mobilization works in other sectors of development project.

The PPHP community mobilization has identified eight major steps each of which consists of two or three activities. These steps can be divided into four main phases for the purpose of monitoring and easier understanding. These phases pertain to the group of similar or very closely related activities. The steps and phases of these activities also signify the serial accomplishment of the activities implying that any succeeding steps and activities can not be initiated without accomplishing the preceding one. Before initiating the PPHP community mobilization process a socio-

economic survey of the local community is undertaken preliminarily. This preliminary survey is conducted during the site selection study itself. The overall phases and steps of PPHP community mobilization process are outlined below.

1. **Community mobilization preparatory works**
   - Introduction
   - Sensitization and information collection
2. **Formation of community groups**
   - Formation of Community group
   - Maturisation of Community Group
3. **Formation of investment groups**
   - Formation of Investment groups
   - Maturisation of Investment groups
4. **Formation of committee for development works and involvement in LHPDC**

The detail activities of PPHP community mobilization process are outlined schematically in the figure 6-1 and 6-2 below.

Figure 6-1: Community Mobilisation Process

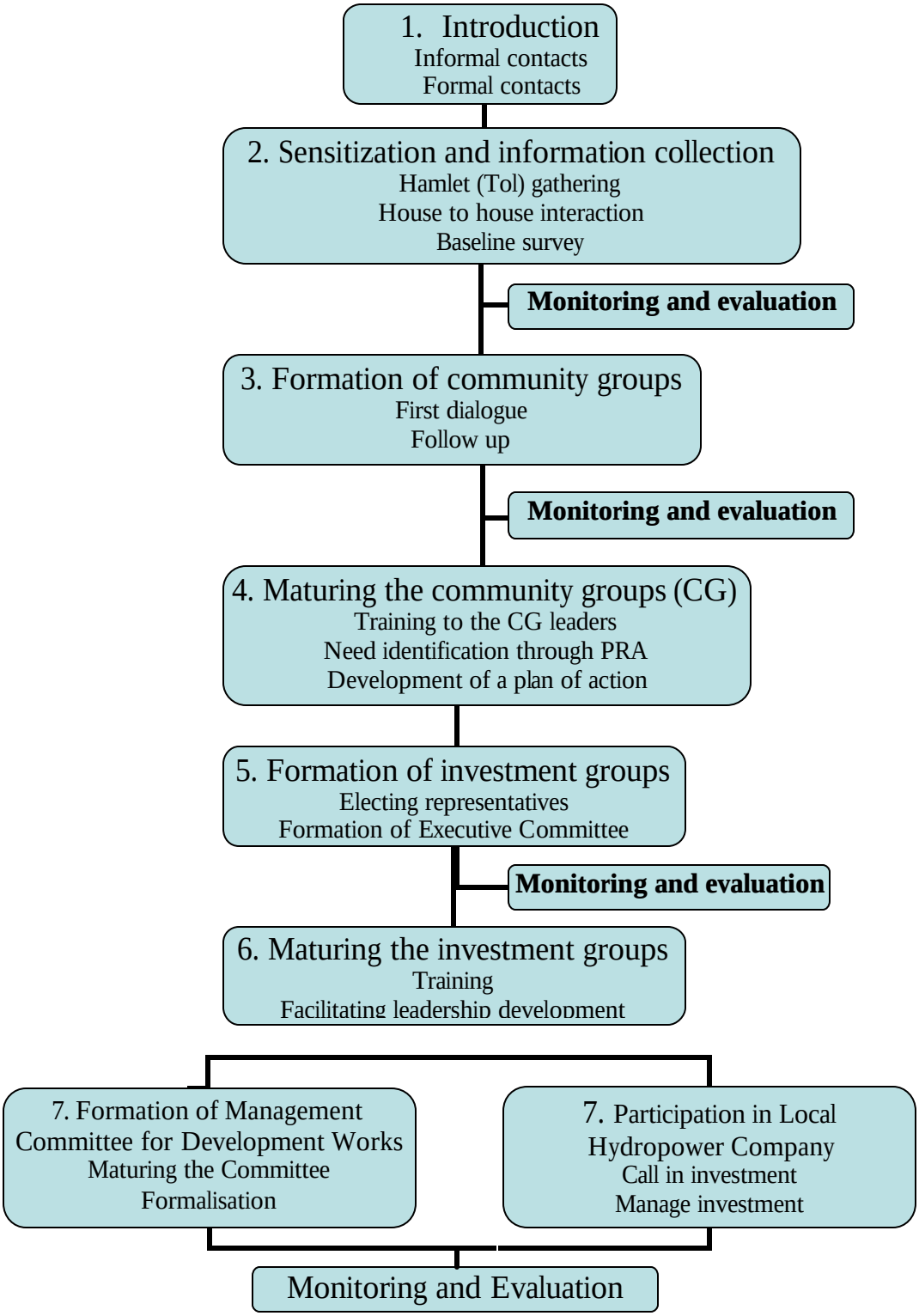
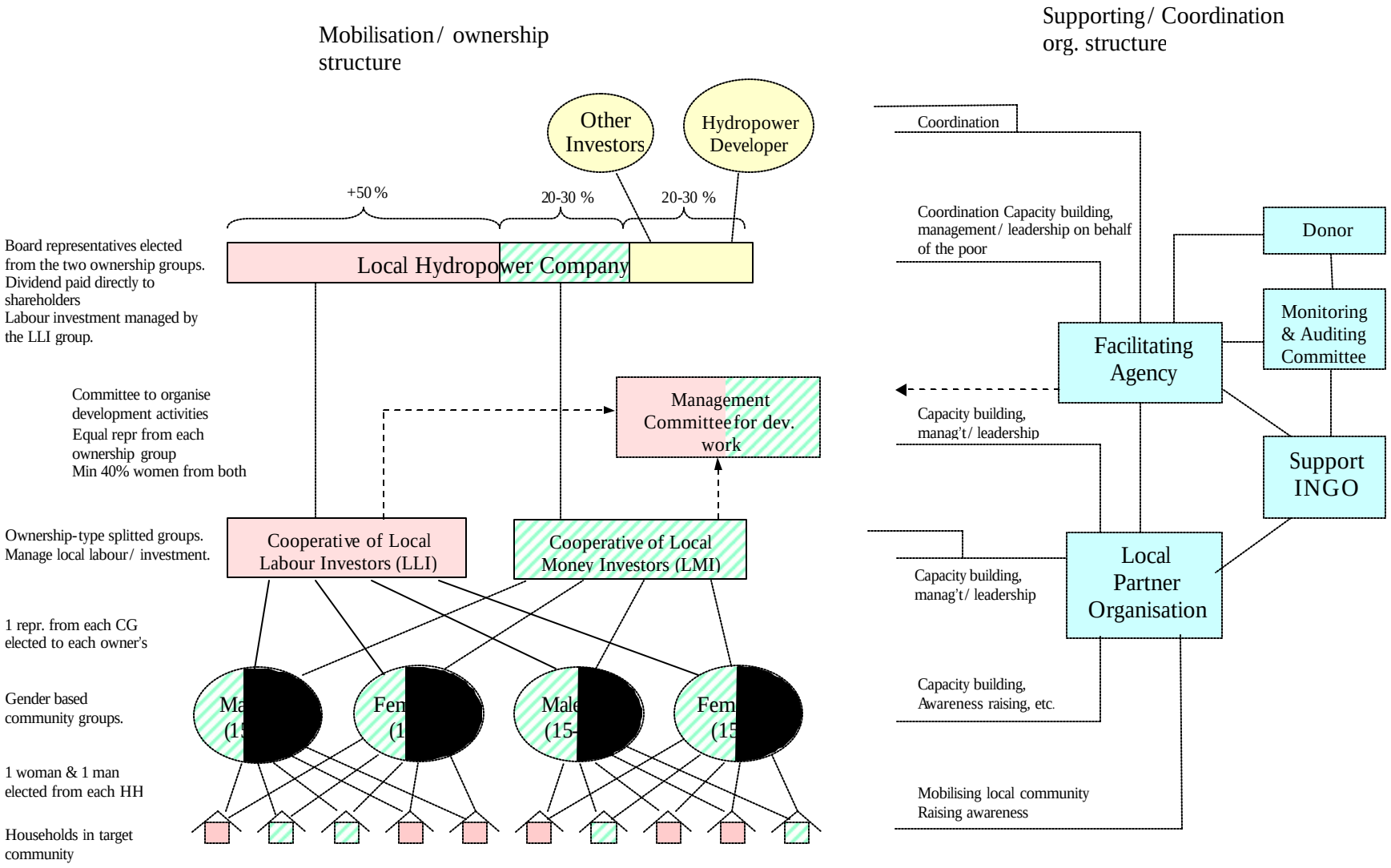


Figure 6-2: Schematic Diagram of PPHP Community Mobilisation



7 EXAMPLE OF A PPHP MODALITY IN A 'DILUTE' APPROACH – HYPOTHETICAL 10MW CASE STUDY

7.1 Assumptions for the Hypothetical 10MW Project

Many projects in Nepal are in the 10MW size and represent a typical size of project. Projects of this size are big enough to enjoy the economies of scale, whilst being small enough to be financed and constructed using Nepal's own resources (which are cheaper than using international finance and contractors etc).

7.1.1 Project Costs

The below table provides an estimate of typical project costs for a 10MW project. Also estimated is the labour component for such a project. It is assumed that the project is designed as a tunnel project with correspondingly less labour requirement to a canal type headrace waterway. Projects in Nepal tend to have labour components in the range of 10 to 20% of the total construction cost. As can be seen the labour component stands at 9.3% of total construction cost – which is on the low side when compared to other hydropower projects in Nepal.

Table 7-1 Assumed Costs of a Hypothetical 10MW Project (1US$=70NRs)

Particulars	Cost US$	NRs	Local labour cost, US $	Assumed % labour of component
Preliminary Civil works (a)	2,172,211	152,054,737	390,998	18
Local Transmission Line (b)	145,933	10,215,333	7,297	5
Main Civil Works (c)	8,227,342	575,913,947	987,281	12
Electromechanical (d)	4,549,722	318,480,556	136,492	3
Penstock and Hydromechanical (e)	926,750	64,872,500	46,338	5
132 kV transmission line (f)	1,697,850	118,849,500	84,893	5
Total Contracts (a+b+c+d+e+f)	**17,719,808**	**1,240,386,573**	**1,653,297**	**9.3**
Engineering Fees 8%	1,417,585	99,230,926		
Total Contracts and Engineering Cost	**19,137,393**	**1,339,617,499**		
Total VAT and complying US$ equivalent	**18,084,836**	**1,265,938,537**		
VAT 13%	2,351,029	164,572,010		
TDS on engineering fees	70,879	4,961,546		
Total import taxes (custom duty, local tax and go-down charge)	28,527	1,996,873		
Total Tax and VAT	**2,450,435**	**171,530,429**		
Total contracts and engineering cost inc VAT and TDS	**21,587,828**	**1,511,147,928**		
Land Acquistion Cost	56,500	3,955,000		
Environmental Mitigation Cost (2% of the total contracts)	354,396	24,807,731		
Total Project Cost ,Before financing	**21,998,724**	**1,539,910,660**		
Total Financing Capitilisation Cost	**2,975,107**	**208,257,518**		
Total Project Cost after Financing	**24,973,831**	**1,748,168,177**		

7.1.2 Project Assumptions

Table 7-2 outlines the principle assumptions for the project:

Table 7-2 Hypothetical 10MW Hydropower Project - Assumptions

1	**Project general details:**					
	Site	Hypothetical 10MW project				
	Gross scheme head (m)		176	m		
	Design flow (m^3/s)		7.2	m^3/s		
	Max Installed Capacity (MW)		10.00	MW		
	Annual energy production (KWh)		63,650,000	kWh		
	Project value (US$ and NRs)		24,973,831	US$	1,748,168,177	NRs
	Value of equity in the total project cost (%, in US$ and NRs)	40%	9,989,532	US$	699,267,271	NRs
	Value of loan in the total project cost (%, in US$ and NRs)	60%	14,984,299	US$	1,048,900,906	NRs
	Value of poor equity assigned for the poor in the total equity (%, in US$ & NRs)	15%	1,498,430	US$	104,890,091	NRs
	Value of local Labour available in the total Project(NRs)	9%	1,653,297	US$	115,730,810	NRs
	Loan including financing		17,481,682	US$	1,136,309,315	NRs
2	**Project life:**					
	Operating life (years from start of generation)		25	Yrs	Up to 50 years maximum	
	Construction start year		2009			
	Operation start year		2012			
	Project construction duration (years)		3	Yrs		
3	**General economic parameters:**					
	Inflation		7.0%			
	Rate of exchange: no of NRs to one US$		70	NRs to 1US$		
	Required discount rate		10%			
	Payback period (Years)		10	years		
4	**Interest rate of financial institutions**					
	International financial institutions		10%			
	Dom estic financial institutions		10%			
5	**Electricity sales parameters:**					
	Initial selling rate (weighted average of dry and wet season rates) (NRs/kWh)		4.65			
	Tariff escalation rate years 0 to 4		3.50%			
	Tariff escalation rate years 5 to 9		5.00%			
	Tariff escalation rate years 10 onwards		5.00%			
6	**Taxation parameters:**					
	Base corporate tax rate		21.5%		Potential tax rebates:Tax Act	
	Located in remote district?	FALSE			0.0%	30% income tax rebate
	Located in undeveloped district?	FALSE			0.0%	25% income tax rebate
	Located in under-developed district?	TRUE			20.0%	20% income tax rebate
	>80% of raw materials (water!) are local?	TRUE			10.0%	10% income tax rebate
	Net corporate tax rate:		15.1%			
7	**Royalties**					
	Royalties in years 1-15 (%of sales) NRs/kW		2.0%			
	Royalties after 16 years (NRs/kW)		10.0%			
	Per kW capacity for 1-15 years		100	NRs		
	Per kW capacity after 16 years		1000	NRs		
	Average depreciation rate		13.0%			
8	**Operational costs**					
	O&M costs/year as % of construction cost		3%		(normal range = 2-4%)	
9	**Sales - op. start year**					
	Sales (NRs) - including increase in NEA buying rate to start year		339,635,251	NRs		

The above assumptions were used to create the following Table 7-3 of the profit and loss account for the project with its associated financial figures.

Table 7-3 Profit and Loss Statement for Selected Years for a Hypothetical 10MW Hydropower Project

	Hypothetical 10MW HEP	Year	Construction period				Operational Period					
	Profit & Loss Statement	**Reference Note**	**0**	**1**	**2**	**3**	**1**	**5**	**10**	**15**	**20**	**25**
1	**Capital Cost** - 3% for the first year,35% for the second,31% for the third and 31% for the fourth year		**52,445,045**	**611,858,862**	**541,932,135**	**541,932,135**						
2	**GROSS INCOME (a)**											
	Sales Revenue (NRs)	339,635,251					**339,635,251**	**412,828,771**	**526,885,748**	**672,454,566**	**858,241,365**	**1,095,357,630**
3	**Less EXPENDITURE (b)**						**318,235,040**	**285,731,067**	**278,087,439**	**125,589,305**	**244,328,003**	**330,361,244**
	Royalties						**7,792,705**	**9,256,575**	**11,537,715**	**14,449,091**	**95,824,136**	**119,535,763**
	Royalties in years 1-15 (%of sales)	2% of sales					6,792,705	8,256,575	10,537,715	13,449,091		
	Royalties after 16 years	10% of sales					-	-	-	-	85,824,136	109,535,763
	Per kW capacity 1-15 years	Nrs 100 per installed kw					1,000,000	1,000,000	1,000,000	1,000,000		
	Per kW capacity after 16 years	NRs1000 per installed kw					-	-	-	-	10,000,000	10,000,000
	Operation and Maintenance cost						**32,649,955**	**44,419,903**	**65,267,411**	**95,899,240**	**140,907,446**	**207,039,266**
	O&M costs/year as % of construction cost	taken as 3% of Project cost					32,649,955	44,419,903	65,267,411	95,899,240	140,907,446	207,039,266
	Depreciation						**107,088,588**	**61,350,796**	**30,578,520**	**15,240,974**	**7,596,420**	**3,786,215**
	Interest						**104,890,091**	**74,345,952**	**15,518,527**	**-**		
	Principal payment						**65,813,702**	**96,357,840**	**155,185,266**			
4	**INCOME (c) = (a -b)**						**21400211**	**127097704**	**248,798,310**	**546,865,261**	**613,913,362**	**764,996,386**
	Corporate tax	assume tax holiday first 15 yrs									**92,393,961**	**115,131,956**
5	**NET INCOME after Corporate Tax**						**21400211**	**127097704**	**248,798,310**	**546,865,261**	**521,519,401**	**649,864,430**
6	**Operating cash flow**	Net income + Depreciation					128,488,799	188,448,500	279,376,830	562,106,235	529,115,821	653,650,645
7	**Total Project Cash Flow**	Operating Cash Flow-Capital Cost	(52,445,045)	(611,858,862)	(541,932,135)	(541,932,135)	128,488,799	188,448,500	279,376,830	562,106,235	529,115,821	653,650,645
8	**Cumulative Project Cash Flow**		(52,445,045)	(664,303,907)	(1,206,236,042)	(1,748,168,177)	(1,619,679,378)	(959,066,221)	248,266,065	2,825,542,650	5,313,141,572	8,323,119,983
9	**Discounted Project Cash Flow**	Discount Factor at 10%	(47677314)	(505668481)	(407161634)	(370146940)	79,781,435	79,920,560	73,568,651	91,908,861	53,718,800	41,205,750
10	**NPV (NRs)**	500,488,488										
11	**IRR**	12.87%										

7.1.3 Debenture Income

Calculations have been made to assess the income from the debentures held by the Local Poor. These debentures are assumed to be paid over a period of 10 years, which is also the pay-back period for the loan on the project. Also the soft-loan taken out by the cooperative in the name of the local poor is assumed to be paid back over the same period. The margin between the rate of loan of the debenture in the hydropower company (assumed as 10% in this case) and the rate of the soft loan (assumed to be 5% in this case) provides the Local Poor's income.

Table 7-4 Debt Servicing of the Total Loan, The Debenture Loan and the Soft Loan for Selected Years

12	**Debt Service Schedule - for total loan**	Year			
		0	1	5	10
	Annuity payment (Rs)		170703792	170703792	170703792
	Principal payment(Rs)		65813702	96357840	155185266
	Interest payment at 10% (Rs)		104890091	74345952	15518527
	Principal remaining (Rs)	1,048,900,906	983087205	647101677	0
13	**Debt Service Schedule for community debenture**	Year			
		0	1	5	10
	Annuity payment (Rs)		16477971	16477971	16477971
	Principal payment(Rs)		6352971	9301385	14979974
	Interest payment at 10% (Rs)		10125000	7176586	1497997
	Principal remaining (Rs)	101,250,000	94897029	62464475	0
14	**Debt Service Schedule for soft loan repayment**	Year			
		0	1	5	10
	Annuity payment (Rs)		13112338	13112338	13112338
	Principal payment(Rs)		8049838	9784629	12487941
	Interest payment at 5% (Rs)		5062500	3327710	624397
	Principal remaining (Rs)	101,250,000	93200162	56769562	0
	Margin between Debenture Loan Repayments and Soft Loan repayments (debenture payment to local poor)		3,365,633	3,365,633	3,365,633

7.1.4 Local Poor's Contribution through PPHP

The Pro-poor Hydropower parameters used for the project are summarised in Table 7-5 below. It is assumed that the grant component matches the sweat equity owned by the local poor. The debenture loan amount matches the sum of these (i.e. 100% of sweat equity plus grant equity).

It is also assumed that 500 households are in the vicinity of the project with 90% wishing to take part in the PPHP project as Local Poor. This means that there would be 450 beneficiary households.

As can be seen, if each household contributes 250 days labour per year for 3 years and sacrifices 50% of their 300NRs wage, then the Local Poor would own approximately NRs 225,000 of shares from the sweat and grant equity.

Table 7-5 PPHP Financial Parameters Assumed for Hypothetical case

	PPHP FINANCIAL PARAMETERS	Amount	Total	Construction Year 1	Construction Year 2	Construction Year 3
	Number of households in the community participating in the PPHP project	500				
	Proportion of households that will be labour contributors	90%	450			
	Average daily value of labour (NRs)	300				
	Days of labour worked per household		750	250	250	250
	Value of labour worked (Rs)		101,250,000	33,750,000	33,750,000	33,750,000
	Proportion of project labour costs that are contributed as equity	50.0%	50,625,000	16,875,000	16,875,000	16,875,000
	Grant as proportion of contributed labour	100%	50,625,000	16,875,000	16,875,000	16,875,000
	Value of equity of total labour household (Rs)		101,250,000	33,750,000	33,750,000	33,750,000
	Value of equity per labour household (NRs)		**225,000**	75,000	75,000	75,000
	Value of grant per household		112,500	37,500	37,500	37,500
	Total cost of the labour components		115,730,810			
	Total cost of the labour components as per HH involvement		101,250,000			
	% of project labour component used for share purchasing		**87%**			
	% of the total equity actually used by the local poor		**14.48%**			
	Value of Debenture held by local community					
	Percentage of equity ownership available community debenture ownership	100%				
	Assumed soft loan rate	5%				
	Value of community debentures	101,250,000				
	Value of debentures per participating HH	**225,000**				
	Percentage of total loan (including capitalisation) held by community	9.65%				

7.1.5 Returns on Local Poor's Investment

The above investment by the Local Poor in the Local Hydropower Company producing the returns illustrated in Table 7-3 will produce the returns shown in Table 7-6. As can be seen, the average discounted return per local poor's household is in the region of 60,000NRs per year. This represents a return of approximately 16% on their total investment (grant plus sweat equity).

It is considered that it would be considered a significant income when compared to the household's other income streams.

Table 7-6 Expected Returns from Hydropower Project and Cooperative in Respect of the Local Poor's Investment

17 **PPHP Financial Outputs from Local Hydropower Company**

	Year:	1	5	10	15	20	25
Actual Income from project for poor to coop		18,604,461	27,286,291	40,452,207	81,389,847	76,613,019	94,644,967
Equally divided by number of participating HHs (actual annual income for poor equity)		41,343	60,636	89,894	180,866	170,251	210,322
% return on poor's equity investment per year		13.81	13.83	12.73	15.90	9.30	7.13
% Average return over 15 years	14.93						
% Average return over 25 years	12.67						
Debentures income per HH to coop		3,365,633	3,365,633	3,365,633			
Debentures income per HH		7,479	7,479	7,479			
Actual annual income per HH		48,822.43	68,115.39	97,372.98	180,866.33	170,251.15	210,322.15
% Annual return on true inflated value of investment		16.30	15.54	13.79	15.90	9.30	7.13
% Average return over 15 years	16.05						

18 **PPHP Financial Outputs from Cooperative**

	Year	1	5	10	15	20	25
Dividend for Cooperative		**21,970,094**	**30,651,925**	**43,817,840**	**81,389,847**	**76,613,019**	**94,644,967**
Less Coop expenses (assume 5%)		**1,098,505**	**1,532,596**	**2,190,892**	**4,069,492**	**3,830,651**	**4,732,248**
Less Coop Reserve Fund		5,217,897	549,358	679,293	834,873	763,723	920,432
Cumulative Reserve Fund (NRs)		5,217,897	7,279,832	10,406,737	19,330,089	18,195,592	22,478,180
Net Income of Coop		**15,653,692**	**28,569,970**	**40,947,655**	**76,485,481**	**72,018,646**	**88,992,287**
Net Income per household		**34,786**	**63,489**	**90,995**	**169,968**	**160,041**	**197,761**
Discounted Net Income per household		**21,599**	**39,422**	**56,501**	**105,537**	**99,373**	**122,794**
Average Net Income per Household in present day terms over 15 years	59,036						

Also of consideration is the amount the Local Poor earn in the first few years of operation when the loans are being re-paid and hence dividends are relatively low. In the first year, the cooperative is legally required to set 25% of any potential dividend as a reserve amount. Once the reserve is in place, higher dividends can be paid from year 2 onwards.

7.2 PPHP – Dilute Approach – Without Matching Grant or Debentures

Calculations have been made assuming that the Local Poor did not receive a matching grant share or debenture share through a soft loan. In this case average annual discounted revenues would be down from NRs 60,000 per annum to NRs 28,000. This is a sizable reduction in revenues for the Local Poor and it would be debatable if this amount would be considered significant when compared the Local Poor's other income streams.

8 EXAMPLE OF A PPHP MODALITY IN A 'PURE' APPROACH – BYAMDANG KHOLA CASE STUDY

8.1 About Byamdang Khola

Byamdang Khola, in Rasuwa District, has been identified as a potential pro-poor hydropower site for the 'pure' approach type project, considering the economic indicators and social aspects. For these reasons the key features and the indicators for Byamdang Khola have been used as the illustrative example of PPHP in this project document.

Byamdang Khola flows through Gatlang VDC of Rasuwa district. It is situated at an altitude between 1840 to 2140 m AMSL The river has a mean flow of 2.1 m^3/s and a gross head of 390 metres. For the purpose of preliminary study on the feasibility of the project, a design flow of 0.435 m^3/s and a net head of 279m are taken.

8.2 Key Figures Governing Commercial Viability

The key economic figures taken in as an indication of the commercial viability of a PPHP project is the capital cost of electricity generation per kW installed capacity (US$ per kW), the Net Present Value (NPV) of income and the Internal Rate of Return (IRR). These economic indicators are impacted by critical variables, that are uncertain in the nepali context, which are:

- Inflation,
- Annual operation & maintenance costs (as % of construction cost),
- Escalation of selling rate to NEA (for the first 5 years and after first 5 years),
- Contingency (capital cost overrun), and
- Discount rate.

It is useful to examine three scenarios which can be used to reveal the sensitivity of economic analysis using these factors. The factors and scenarios used for identifying the economic advantage of PPHP pilot sites are indicated in Table 8-1.

Table 8-1 Parameters and Scenarios for PPHP Pilot Project Economic Analysis

Parameter / Scenarios	Most likely value	Best case value	Worst case value
Inflation	8%	8%	10%
Annual O&M costs (% of construction cost)	3.5%	2%	5%
Escalation of selling rate to NEA:			
• First 5 years	Matches inflation	9%	None
• After first 5 years	Matches inflation	9%	5%
Contingency (capital cost overrun)	10%	10%	15%
Discount rate	15%	15%	15%

8.3 Byamdang Khola Hydropower Project Economic Indicators

With a design flow of 0.435 m^3/s and a net head of 279m, the project is expected to deliver an installed power generation of 950kW. The project is calculated to have a headrace canal of length 3.5 kilometres.

For Byamdang the economic indicators are calculated as:

- Construction cost/kW NRs 146,160 (US$ 2088)

- Internal rate of Return (IRR) 18.9 % and
- Net Present Value (NPV) NRs 39,749,413 (assuming a 15% discount rate)

The summary of economic analyses of Byamdang Khola for the three scenarios is presented in Table 8-2. Currently in Nepal the upper limit of capital cost per kW for a commercially profitable hydro power project is around 2200 US$ per kW installed. Thus Byamdang Khola is thought to be economically feasible. The underlying assumptions for the economic analysis are that the initial rate of selling electricity to NEA are NRs 5.52 during dry season and NRs 3.9 during wet season per kWh. As the escalation on this rate which was set by NEA for five years has expired in 2006 it is estimated that there will be no such escalation for any Power Purchase Agreement (PPA) to be made with NEA for a five year period from this date. After this first 5 years it is expected that the NEA buying rate will again increase – possibly at the rate of inflation.

Table 8-2: Summary of Economic Analyses for Bemdang Khola

	Best Case	**Most Likely**	**Worst Case**
Civil works costs (NRs)	42,466,482	42,466,482	42,466,482
E&M / other works costs (NRs)	90,299,724	90,299,724	90,299,724
Total construction cost (NRs)	146,042,826	146,042,826	152,681,137
Labour cost as % of total cost	19.6%	19.6%	19.6%
Cost / kW			
NRs	146,160	146,160	152,803
USD	**2,088**	**2,088**	**2,183**
IRR	22.8%	18.9%	9%
NPV (NRs)	83,719,045	39,749,413	-43,814,769

8.4 Investment Structure

The investment is the capital value that the investors (local poor, local non-poor and the commercial investors) are going to put into the project during the construction and establishment of the Local Hydro Power Company (LHC). For the LHC, to be established as the outcome of the PPHP pilot project, four types of investments have been identified – cash, labour, grant and debentures (loan). The investment from the local poor will be as labour contribution, grant contribution (from donors on behalf of the poor) and debentures (lending to the LHC). The investment from the local non-poor and the commercial investors will be as cash investment and debentures (lending to the LHC).

The amounts of cash put in into the LHC as direct cash, labour contribution or grant funding will be the resultant share held by the investors in the LHC. However, the investors are facilitated into lending a proportionate amount of capital to the LHC. This amount would be the debentures held by the investors in the LHC. The local poor and the non-poor will be facilitated to obtain soft loan to enable them to buy debentures in the LHC (refer Section 5.3.5).

The initial estimation is that the pilot project would require 146.04 million NRs of investment (Table 8-2). The initial plan has been that the local poor will have as much as 60% of investment, the local non-poor a 20% and other commercial investors another 20% investment in the project in totality (including cash equity and debt equity) (Figure 8-1). It is assumed that all investors will invest loan equity equal to their cash equity, and that they invest their debt equity as debentures in the company. Hence only the cash investment (labour + grant for the labour investors) will be counted as share investment.

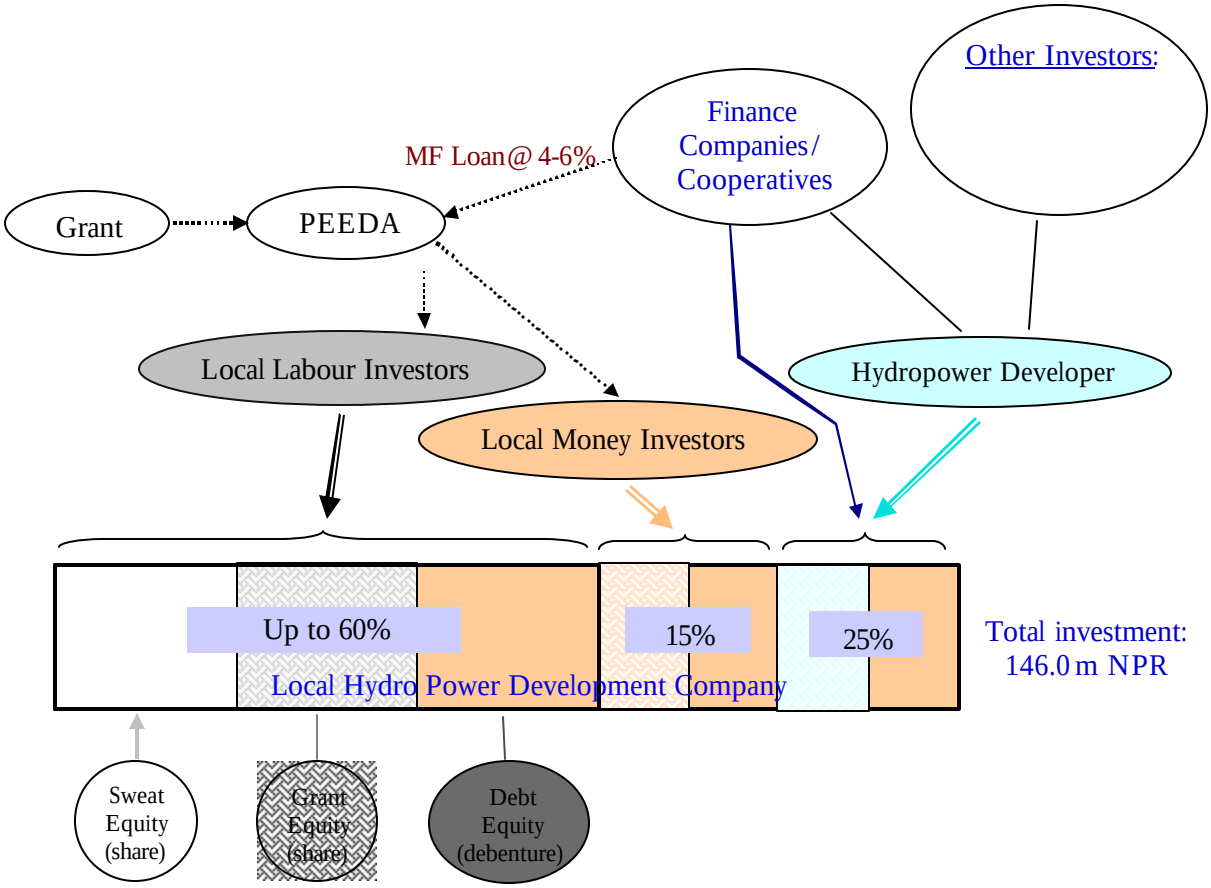


Figure 8.1: Financing Local Investments

The intention of the project with respect to investment is to facilitate the local poor of the community into the civil and labour works of the project with the objective of involving them in the share ownership of the project. The preliminary estimation indicates that the labour proportion of the project will be approximately 20% of the project cost. It is intended that fifty percent of the value of their labour will be set aside as their share investment in the project. This labour contribution as their share investment will amount to 14.3 million NRs. Through proportionate grant and soft loan mechanism the total investment of the local poor will be maximised up to 60%. These intentions are based on the assumption that the project would be able to manage a grant as much as twice the labour investment and a soft loan equal to the combined investment through labour contribution and grant (Figure).

This financing structure envisaged also implies that an amount of NRs 38.12 million will come from the commercial investors including Jyoti Power Company. The envisaged modality of such investment is that about 50% the amount (NRs 19.06 million) will be in cash as their share value in the LHC and approximately the other 50% (NRs 19.06 million) as lending (debenture) to the LHC. Such investments could be either through Jyoti Power Company or directly to the Local Hydropower Company.

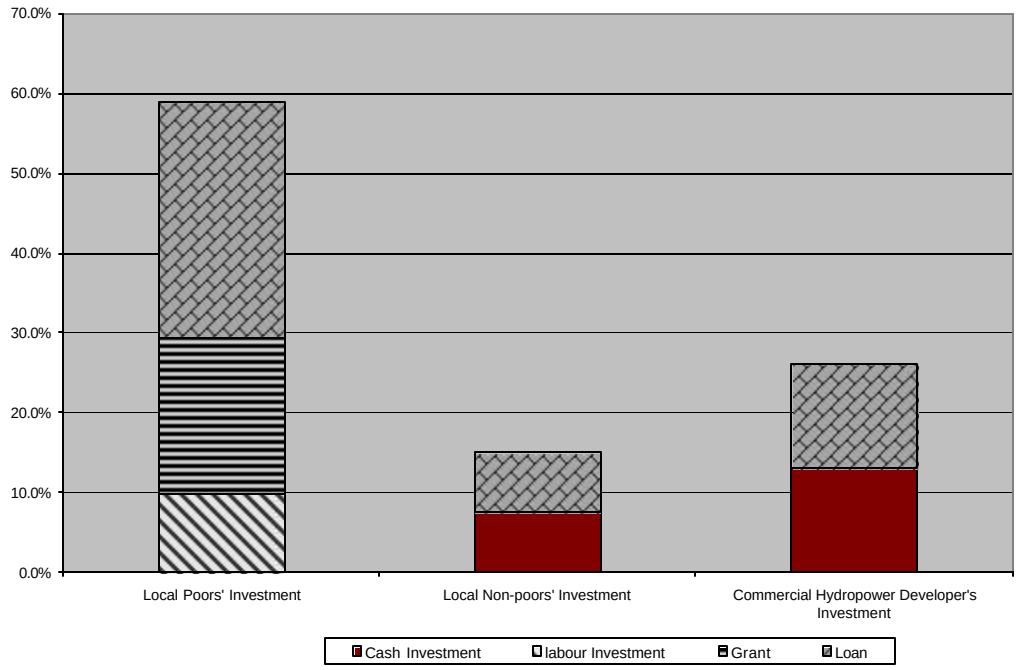


Figure 8-2: PPHP Investment Breakdown

The preliminary calculations are that in terms of project value as much as 7.5% of it as cash equity will be kept open for investment from the local non-poor and 13.1% from the commercial hydropower developers. As already stated, the share equity from both the local non-poor and the commercial investors will be coupled with equal percentage of debt equity in the form of corporate loan (debentures) (Table 8-3).

Table 8-3: Investment Breakdown

	Cash Investment	Labour / in-kind Investment	Grant by donor	Loan	Totals
Local Poors' Investment	0.0%	9.8%	19.6%	29.4%	58.9%
	0	14,335,377	28,670,755	43,006,132	86,012,265
Local Non-poors' Investment	7.5%	0.0%	0.0%	7.5%	15.0%
	10,953,212	0	0	10,953,212	21,906,424
Commercial HP Developer's Investment	13.1%	0.0%	0.0%	13.1%	26.1%
	19,058,589	0	0	19,058,589	38,117,178
	20.6%	9.8%	19.6%	50.0%	100.0%
TOTAL COMMERCIAL INVESTMENT	**30,011,801**	**14,335,377**	**28,670,755**	**73,017,933**	**146,035,866**

The soft loan, which the local poor and the non-poor will be entitled to, will be obtained as a soft loan to the investors, who then would lend the money to the company (debentures). The loan (debentures) will be stapled with the equity share of the community people, where the equity share will be in terms of cash for non-poor and as the combination of labour contribution and grant for the local poor. The arrangement and management of the corporate loan will be the joint responsibility of Coordinating Agency, Local Hydro Power Company and Commercial Developer.

8.4.1 Investment Share of the Local Poor

The primary base for the local poor enabling them to obtain share ownership in the project is their labour contribution during the construction of the project. The preliminary economic analysis on Byamdang Khola indicates that the labour cost of the project would be

approximately 20% of the total project cost, which would result in a labour cost of 28.7 million rupees.

The pilot project expects that of the total labour component of the project cost, the local poor would be able to invest half of it (10%) as the share contribution (sweat equity) of the local labour in the project. This would amount to 14.3 million rupees. As per the inception of the PPHP, the share ownership of the local poor will be maximised through the arrangement of grant and soft loan for the local labour investors. It is envisaged that as much as twice that of wage (or labour) contribution for the share ownership can be arranged through grant. This would amount to 28.7 million rupees and summing the share investment by the local poor to 30% of project value and 60% of share value. The objective intention is to arrange soft loan mechanism enabling the local poor to invest in debentures as much as that obtained from labour contribution and grant together. A detailed break down of the share ownership is presented in table 8-3.

Under the prevailing labour market in Nepal, the value of labour work per day is NRs 150. Given that 'facilitating the local poor into equal benefits from the project' as the basic principle of the project, and taking NRs 150 as the value of a day's labour work, each household will work for a total of 562 days which will amount to a value of NRs 84,326 and half of which will be contributed for share earning. Through the proportionate labour contribution and grant as discussed in the previous paragraph, each household will be facilitated into owning NRs 126,489 as equity share and an equal amount as debentures (Table 8-4).

These figures have been calculated with the assumption that the investment in the LHC will be in 50/50 debt-equity ratio. This implies that it is still possible to increase the corporate debt to reduce the grant needed for each household.

Table 8-4: Summary of Share Ownership for the Local Poor

	Total Poor Households (340 HH)		***Each Poor Household***
	% of Project Value	**In money value**	**In money value**
Labour investment	9.8%	NRs 14,335,377	NRs 42,163
Grant share	19.6%	NRs 28,670,755	NRs 84,326
Soft loan (for debenture)	29.4%	NRs 43,006,132	NRs 126,489
Total	58.9%	NRs 86,012,265	NRs 252,978

8.5 Return on Investment

The return on investment in the project and particularly the investment by the local poor is an important indicator that primarily can be and should be used to decide whether it is worthwhile to facilitate the investment by the local people and particularly the poor in the hydro power project. A number of factors are influencing the return on investment on PPHP project. However, in correspondence with the primary developmental objective of the project it is essentially important and interesting to look into factors having major influence on the return on investment of the local poor (labour investors). Important of these factors are the rates of selling electricity in the market, the rate of escalation (to be adopted) on this selling rate, the real rate of inflation, the real operation and maintenance cost and the depreciation.

The "easy" market to sell the power produced is the Nepal Electricity Authority (NEA). In order to do this, projects must be able to connect to the national electricity grid and enter

into a power purchase agreement (PPA) with (NEA). The rate of selling electricity and the rate of escalation on the selling rate(s) is determined in the PPA.

Under the present policy of the Nepal Electricity Authority, the PPA is done at NPR 5.52 per kW in dry season and 3.90 per kW in wet season. Ironically, the escalation rate on the power purchase that the NEA had fixed for five years had expired in 2006. As no renewal has so far been made on this escalation rate, it is likely that the situation without any escalation on the selling rate will exist for the coming few years.

However, to get an initial estimation of the return on investment, these factors has either been assumed to match the realistic value or taken from the standard recommendations or values being used in practice by other similar projects. For the PPHP pilot project these values have been taken as:

a. ***Electricity selling rate***: NRs 5.52 per kW in dry season and 3.90 per kW in wet season
b. ***Rate of escalation on the selling rate***: 8% for the first five years from now and 8% after first five years. This implies the escalation of rate will start from year 1 of operation.
c. ***Rate of inflation*** : 8%
d. ***Operation and maintenance cost*** 3.5% of the project capital cost with an inflation rate of 8 percent.
e. ***Cost of depreciation***: the cost of depreciation is based on the following rates of depreciation
   - 20% for electro mechanical equipment and vehicle,
   - 13.3% for furniture, fixtures, pre operating expenses and contingencies and
   - 6.7% for land and civil works

f. Discount rate: The discount rate has been assumed at 15%.

The initial calculation indicate that in relation to the investment of the local poor, the project will give a positive Internal rate of Return (IRR) on their share value from the 5th year of operation i.e. from 2015 (operation starts in 2011).

Table 8-5: Return on Investment Per Local Poor Household for Selected years

Byamdang Khola (B)	2009	2010	2011	2012	2015	2020	2030
Local Labour Investors							
LLIs' share value	60,085	114,990	126,489	126,489	126,489	126,489	126,489
Share cash flow	-20,028	-18,302	-3,833	5,173	25,930	60,842	161,047
LLIs' debentures held	60,085	114,340	124,440	122,712	116,185	98,921	14,875
Debenture cash flow	2,523	4,781	5,243	5,243	5,243	5,243	5,243
Combined cash flow	**-17,505**	**-13,521**	**1,410**	**10,416**	**31,173**	**66,085**	**166,290**
Combined NPV	**-17,505**	**-29,262**	**-28,196**	**-16,507**	**58,877**	**222,938**	**488,311**
Combined IRR				**-17.66%**	**48.83%**	**62.90%**	**64.52%**

The local poor will receive an estimated combined total amount of NRs 3,550,967/-(10,444 per household) for the second year and it will gradually increase to a total of NRs 56,538,945 (166,291 per HH) on the twentieth year. The return received increases in average by an amount of NRs 2,800,000 each year. The summary of return received by the local poor households for some selected years is presented in the Table 8-5 above.

9 OPERATIONAL REQUIREMENT OF PRO-POOR HYDROPOWER

9.1 Profitable Pro-Poor Hydropower

The core to testing of the Pro-Poor Hydropower Concept is the development of commercially profitable and socio-ecologically sustainable local hydropower projects. By its very nature, the local hydropower project will be located in a rural environment. The project cannot be developed unless it enjoys the support of the local community. It is therefore imperative that the project be undertaken in the context of good community relations and that its pro-poor biasness is clearly understood.

Experience in the private sector in Nepal has shown that well implemented [23] hydropower projects make a good return on investment – provided that there is a market to sell electricity to.

9.1.1 Grid connected power projects

The "easy" market to sell to is the Nepal Electricity Authority (NEA). In order to do this, projects must be able to connect to the national electricity grid and enter into an acceptable power purchase agreement (PPA) with NEA.

9.1.2 Off-Grid power projects

Much effort is being put into improving the commercial viability of "off-grid" hydropower in Nepal, with considerable government subsidies and tax concessions available. However, off-grid hydropower continues to struggle to be a commercially attractive investment. The main reasons for this are that most off-grid hydropower programmes will be located in more remote rural areas that have:

- An insufficient underlying economy to support the project. So while there is strong demand for electricity in the local community, they are often unable to afford it – even with the significant subsidies and tax concessions available. The underlying economy of a rural area needs to be addressed. Interestingly, sale of electricity to the "outside world" would result in income that could be the economic basis for local electricity consumption.
- Demand for electricity for lighting in the evenings only. The result is that the hydropower programme can often only sell a fraction of the power that it can generate in a given time[24]. While this may result in less wear and tear of the machinery, the loss of revenue against the same capital costs of the project are crippling. The building of off-peak demand such as mills, or the developments of fixed power tariff connections[25] are ways of addressing this problem.

[23] There are too many examples of poorly implemented hydropower projects in Nepal. Investors in Nepal generally place a priority on lowest cost rather than quality. This normally results in underperforming hydropower plants that end up costing more per unit of power generated than if they were constructed to higher 'more expensive' quality standards.

[24] The ratio of power demand to power generation capacity is referred to as the 'plant utilisation factor', or simply 'plant factor'. Good plant factor is close to one. Poor plant factor is closer to zero.

[25] The use of fixed power tariff connections was pioneered successfully by UMN and Butwal Power Company (BPC) at Andhi Khola in the 1980s. Households pay a fixed monthly fee for as much electricity as they wish to consume – up to a fixed power level. This power level varied from 25 watts (enough for a weak light bulb) up to 400 watts (several lights, but not enough for a kettle or toaster). An electronic current cut-out (ECC) was used to ensure that excess power was not used. The bijuli dekchi (electric cooking pot) technology was developed to allow people to use this small amount of power during 'off peak' times to heat water, and so reduce their fuel-wood consumption for cooking. Not only did this improve plant utilisation, it also meant that all the transmission and distribution power lines are operating more efficiently. Conventional transmission and distribution power lines are designed and built to handle peak load situations, but are normally operating at only a small fraction of this peak. For a given total power delivered, transmission and distribution costs are substantially lower for fixed power tariff connection systems.

For the Pro-Poor Hydropower concept to be successful the hydropower projects will be profitable either as a result of being connected to the grid and having PPAs with NEA, or as a result of the development of a healthy enough local market to purchase the power at a price no less than that paid by NEA.

9.2 Bringing the Grid to the Project

Many of Nepal's poor are in remote areas with no proximity to the national electricity grid. A major impediment for commercial hydropower development in Nepal is the cost of constructing transmission lines to this grid.

In order for the Pro-Poor Hydropower concept to be viable in rural areas remote from the national electricity grid, the transmission lines connecting to the grid must be constructed – but not at the cost of the hydropower project. The source of finance for these transmission lines is expected to be large multi-lateral or bi-lateral donor agencies.

9.3 Construction in remote areas

Most remote areas are not only distant from the national electricity grid, but they normally have poor access in terms of roads. Another major impediment for commercial hydropower development in Nepal is the cost of constructing access roads to the construction site.

As with the connection to the national electricity grid, in order for the Pro-Poor Hydropower concept to be viable in rural areas remote from the national road network, access roads will often need to be constructed – but not at the cost of the hydropower project. The source of finance for these roads is expected to be large multi-lateral or bi-lateral donor agencies.

9.4 Rural Electrification

The community living near any local hydropower project will expect to receive the benefits of electricity. There will be substantial social pressure to carry out rural electrification by constructing a local electricity distribution network and connecting local community households to it. The cost of constructing this local electricity distribution network is high compared to the revenue that could be raised through sale of electricity through it. The capital cost of this rural electrification is a necessary component of any local hydropower project, but not at the cost of the hydropower project. In order to make operation of this rural electrification sustainable, the operational costs must be at least matched by the local revenue received from sale of electricity through it.

10 PROJECT CHALLENGES

10.1 General Challenges - Relevant for both Modalities

As Pro-Poor Hydropower is a new concept and needs to be tested before widespread implementation, it is necessary to list some of the possible challenges of it. The PPHP concept itself normally does not expect any conventional subsidy from the government, as is being provided for micro and mini hydropower projects in Nepal. Some of the possible challenges relevant for smaller project (i.e. 'Pure' approach) and for larger project (i.e. 'Dilute' approach) are as follows:

1. It is new concept. Therefore, investors, donors as well developers are reluctant to adopt the concept until it is tested and proven to work.
2. The conventional mindset of the rural people may find it difficult to understand share ownership and long-term investment because they are not used to dealing with such things.
3. Subsistence farmers and the rural poor people generally do not have opportunities of using cash income. When there will be new regular cash income in the rural poor households, there might be possibilities of misuses of the cash like gambling or spending in alcohol etc.
4. It is very important to integrate the PPHP with the overall development of the communities in the PPHP area. Therefore, the success of PPHP depends on how PPHP is integrated into overall development of the communities.
5. The level of skills and expertise the rural people have may generally be not enough to contribute their labour to the required level of quality. Therefore, it is very challenging how to train the rural poor so that the contractor can accept them as labour contributors.
6. In many rural areas of Nepal the fit younger men have been sent to work overseas in order for them to send remittances back to Nepal in order for their family to live. Thus local labour could be quite scarce and also be expensive. In this situation a contractor employed on the project may be unwilling to employ local people if they are more costly to hire than external labourers coming from other areas of Nepal or India. On the contrary, if local people know that there are reasonably paid jobs available in their own village, then maybe they will return from their overseas locations.
7. To invest labour and/or cash in a commercial company is something new for the rural poor. Therefore, it is quite challenging how to manage the labour and cash from these people and invest in the company in a manner that gives the local poor confidence to make this long-term investment.
8. Setting up an accountable and transparent system to mange the investment and resulting dividends will be challenging because local people are used to mismanagement of these kinds of funds – especially when the funds are cash based.
9. There is a risk that rich people in the community may try and buy the shares owned by the Local Poor. This may be possible because the local poor do not truly understand the real value of their shares. Also, they may have existing debts with the rich, whereby the rich will demand the shares at a lower value than their true worth. This challenge can be overcome by careful design of the share ownership system such that shares cannot easily be sold until their real value has become apparent (eg 3 to 4 years into operation)
10. The existing 'feudal' system that still exists in many remote villages that depend upon there being an economic and social disparity could result in local opposition to the PPHP concept. This is because the local feudal 'lord' derives his power within the village from this economic disparity. Following implementing PPHP, the social and economic empowerment is likely to challenge or even over-turn this system..

11. Nepal Electricity Authority (NEA) is a single buyer of electricity from the Independent Power Producers (IPPs). Therefore, there is practically no freedom of choice for the developers regarding the sale of produced electricity. In this regard, one of the major challenges for PPHP is how the PPA can be made so that it is fair and provides the necessary inflation clauses to allow the buying price to be reasonable in the future.

10.2 Challenges for 'Pure Approach'

With 'Pure Approach' of PPHP, the rural poor will hold a majority of share-ownership in a relatively small hydropower company of about 1 to 5 MW size. Therefore, the first challenge will be finding a suitable site and getting regulatory approval from the government for survey and development. The challenges can be formulated as follows:

1. Good sites in Nepal in terms of technical and economic viabilities are already occupied by other developers who either have the licensed or who have applied for the licence
2. There is potential for conflicts with other water uses - particularly with irrigation
3. The cost of constructing an access road and/or transmission line often makes a project economically less feasible.
4. The time taken for the regulatory approval e.g. licences and power purchase agreements takes too long and is very uncertain.
5. So far, there is no provision for an escalation rate in the buying price of electricity to NEA to cover for inflation. Furthermore, the prices of construction materials are increasing at a faster rate than the inflation rate. Therefore, the financial viability of a hydropower project, particularly the PPHP, depends on how these price increases can be compensated by higher buying rates in a PPA.

Whilst all the above issues are also significant for a larger hydropower developer, they particularly impact the smaller hydropower projects that are used for the 'pure' approach. This is because smaller hydropower developers do not carry so much commercial weight (and hence politically backing) and do not enjoy the same economies of scale. For instance, the cost of constructing an access road for a large 20MW project is likely to less proportionately to the overall project cost as for a small 1MW project.

10.3 Challenger for 'Dilute Approach'

PPHP as part of a larger hydropower Scheme, i.e. with 'Dilute Approach' might have some different challenges than those with 'Pure Approach'. In the dilute approach, the rural poor may hold only a tiny part of the share-ownership in the company and the commercial developer will lead the company and the construction as well. Therefore, the commercial developers will take care of the regulatory, approval, survey, technical design, financial mobilization and contractual procedures. The community and the PPHP will just follow the developers progress. However, there are some challenges for PPHP with this approach as followings:

1. The rural poor may have only a tiny share-ownership, which might not be enough for the poor in order to provide a significant support for poverty reduction
2. Having a majority share-ownership, the commercial developers dominate the company. There may be conflicting interests of the commercial developer and rural poor and the rural poor most likely will loose the battle for the interests.
3. The pace of the project is likely to be set by the commercial hydropower company, not the local community. Thus, where the local poor may favour a slower construction timeline so that they can maximise their labour contribution, the contractor maybe unwilling to accept any reduction in pace.

4. Being in a minority, the rural poor may have fewer opportunities for their empowerment as they do not control the company.
5. A larger hydropower company generally might have greater environmental impacts in the areas where the rural poor live – yet benefits to the local poor are relatively small because of tiny share-ownership.

ANNEXES

ANNEX - A

Terms of Reference

Terms of Reference

for

A Study on Facilitating Local Poor People into Ownership of Commercial Hydropower Projects

1. BACKGROUND

When well designed and built, commercial grid-connected hydropower projects have proved to be very profitable. On average the debt servicing period is eight years and thereafter, the dividends increase significantly. Thus, wealthy Nepali and Foreign investors are earning high returns on investment through the development of the hydropower potential of Nepal.

As a result of some of these hydropower plants, the poorer people living near the projects have enjoyed a few social benefits - rural electrification, basic infrastructure, some employment, training, irrigation etc. However, these projects would have still better met the needs of the poor and have been a means for poverty alleviation thus breaking the vicious circle of poverty, if the poor actually gained more directly from the wealth generated from their rivers. This can be achieved through giving them access to the ownership and to the revenue stream from the projects. Given the current voices for "decentralization" and principles of inclusion, there is also a growing demand among local communities for so to happen.

In this background, it has been essential to develop modalities how to facilitate local poor people with no or very limited available cash funds into ownership of the commercial hydropower projects in Nepal.

2. OBJECTIVE

The principal objective of the assignment is to identify and describe practical and workable modalities for how local poor people with no or very limited available cash funds can become shareholders and/or revenue recipients of commercial hydropower schemes in Nepal.

3. SCOPE OF WORK

The scope of the assignment shall be, but not limited, to the following:

- Describe the current status of the Nepali hydropower sector with regards to poor people's involvement
- Develop and describe a conceptual model for poor people's involvement as investors in commercial hydropower projects, both bigger and smaller size of projects.
- Identify the stakeholders and analyse their role in such a concept
- Develop and describe an institutional set-up in such a concept including legal issues if any.
- Develop and describe an implementation modality, particularly focusing on the mobilisation of local poor communities and their involvement. As far as possible "start to finish" steps should be listed out.
- Analyse the commercial and financial aspects of such a concept, particularly focusing on additional financing needs (compared to a traditional approach) and the return for

the poor investors. As far as possible, actual data from planned or implemented projects in Nepal should be used as an example.
- Identify financing options for the poor peoples involvement
- Identify and analyse the risks involved in implementing such a concept

4. OUTPUT

The final output of the assignment shall be a narrative report in both hard copy and in electronically consisting of comprehensive study of the topic within the scope as mentioned above.

5. TIME FRAME

A draft report shall be completed and submitted to JVS within 30th June 2008.
Comments to the draft report will be provided by JVS within 7th July 2065.
The final report shall be completed and submitted to JVS within 14th Asar 2065.

ANNEX - B

Organisation Charts and Figures

Figure B-1 Organisational Structure of PPHP – 'Pure' Approach

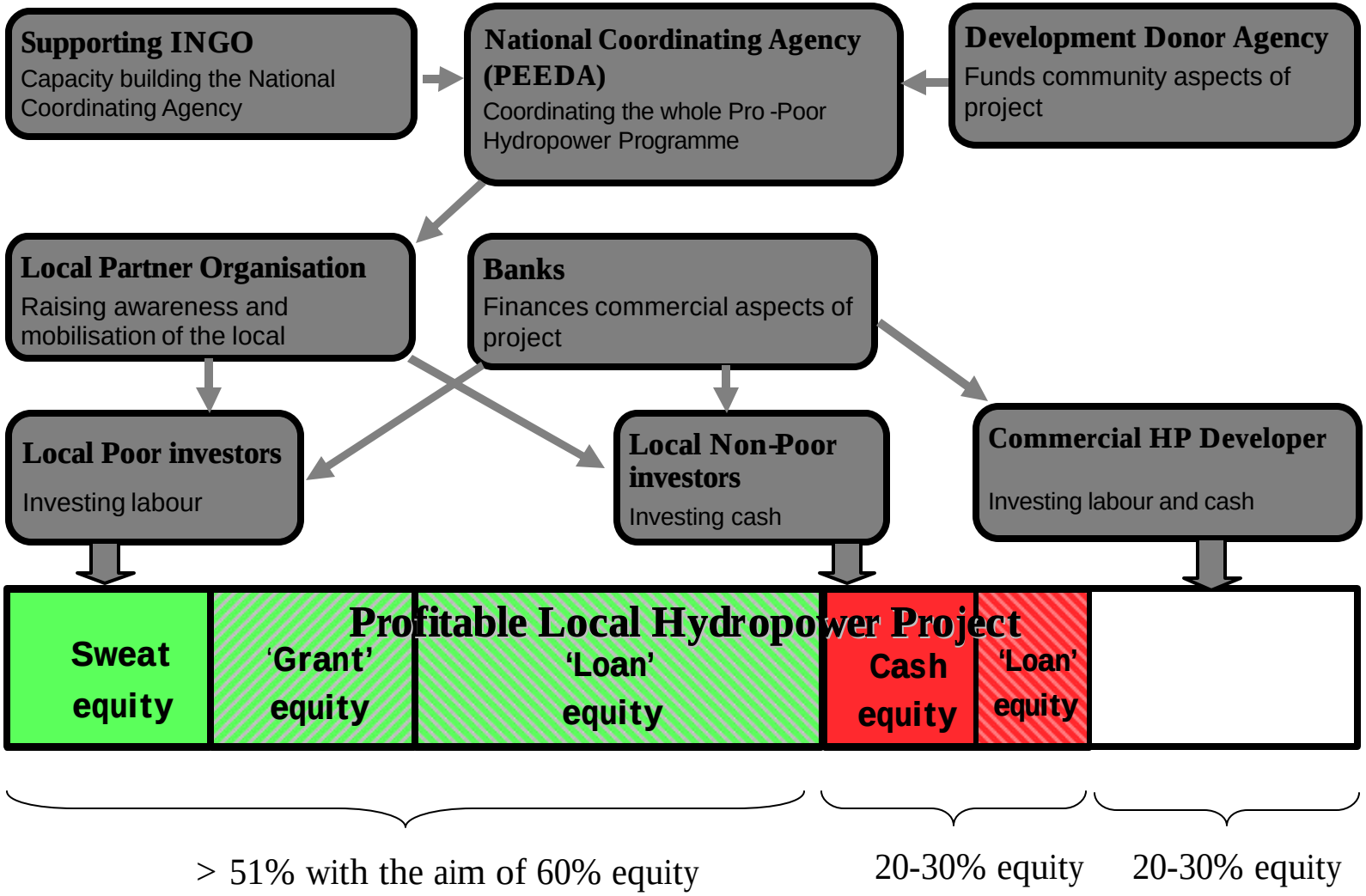


Figure B-2 Organisational Structure of PPHP – 'Dilute' Approach