

Case Study: Micro Hydro Scheme, Ghandruk, Nepal

Background

Ghandruk is a small and well-established village in central Nepal, and a popular tourist destination, attracting both local and foreign tourists with its traditional Gurung lifestyles and old-world charm. In addition to tourism, the main sources of income are in agriculture and the military. The statistical details of Ghandruk village are provided in the table below.

Table 1: Statistical details of Ghandruk village

No. of households	1142
Electrified Households	278
Total population	5138
Number of males	2,497
Number of females	2,641
Electricity tariff	Rs 0.50 a watt

The thriving tourism industry paved way for investment in hotels and other related infrastructure, and tourist figures rose from 5000 in 1990 to 17,000 in 1999. Carpet weaving is another economic activity mostly undertaken by women. The main energy sources in Ghandruk are firewood, kerosene, LPG and electricity. Solar heaters are also commonly used by hotels for heating water which is seen as a special service to the tourists which generates income.



Residents of Ghandruk

Electricity in Ghandruk is supplied by an off-grid micro hydropower plant built in 1992 with assistance from Annapurna Area Conservation Project (ACAP), a non-governmental organisation working to preserve the

area's natural resources. The hydropower plant has an output of 50kW.



Interior of Ghandruk powerhouse

Financing

Construction of the hydropower plant cost Rs 3.4 million (US\$51,000) and was financed through a combination of loans, grants and both cash and in-kind contributions from the community. The project was initiated by the community leaders who mobilised the people in a fundraising drive, and approached ACAP for assistance. After 12 years of operation, the project is in a strong financial position. It has paid off the bank loan and has an annual operating profit of around 6% of the original cost of constructing the project. Given that the current tariff is well below those of similar projects, the present financial position is very favourable.

Public-Private Partnerships

The electrification of Ghandruk village required close co-operation between the community, the private sector, government and civil society. The Agricultural Bank of Nepal provided a loan; the Government of Nepal gave a grant, while ACAP helped with community mobilisation and financial aid.

A private company, Development and Consulting Services (DCS), was contracted to design and build the hydropower plant, while overall management of the project was left to the electrification committee which is elected from among the consumers. The committee recruited a manager and two operators and put them in charge of collecting revenues, levying fines from defaulting customers, and general operation of the plant.

An NGO, Intermediate Technology Development Group (ITDG), also participated by providing hotel owners with low wattage cookers. ACAP got involved with the project with the major aim of helping the community combine tourism with sustainable resource management.

Access to Electricity

Livelihood benefits – Direct Consumers

Electricity consumers in Ghandruk said they thought service delivery was highly reliable, but could not help complaining about their failure to get more electricity to their houses. Consumers initially connected small amounts of electricity believing that they would only need it for lighting up their houses. When they later need more electricity for their radios and television sets, it was too late. The hydropower plant was already running to capacity, so it was impossible to generate more electricity.

Table 2: Use of electricity by households

Cooking	33%
Refrigeration/freezing	7%
Lighting	100%
TV and/or radio	88%
Telecommunications/IT	0%
Security	59%
Productive uses	0%
Hot water	26%

Electricity is used for cooking and heating water by almost a third of households. This can be attributed largely to a flat tariff system and the promotion of low wattage cookers and hot water devices as part of the hydro project. Availability of hot water has encouraged improvements in personal hygiene as well as convenience in cooking.

Commercial and institutional users

Ghandruk has only a handful of institutions - one school, one health centre and ACAP. Since electrification, the health centre is able to sterilise its clinical equipment, which is a huge improvement to the days when they used kerosene to perform the same task. ACAP, however, is the institution that has reaped the largest share of benefits, including reduced fuel requirements, operation of audio-visual equipment, and introduction of computers and communication radios. The only school in Ghandruk village does not have electricity because it only operates during the day.

Commercial users have made the most of the electricity, especially since they were the main target of the electrification process. Many hotels and restaurants have switched from using local stoves to low wattage electric cookers, as promoted by ITDG.

They are also now able to attract new revenues by offering tourists hot water for bathing.



New hotel under construction in Ghandruk

Benefit: Hotels are now able to use washing machines, fridges, food processors, microwaves and toasters. The impact of this has been that they are able to provide a better service to tourists and thus increase their incomes.

Livelihood benefits – Indirect Consumers

All households within the project area in Ghandruk have access to electricity. They also share the benefits of increasing opportunities in the local economy, and the improvement of local institutions, especially the health centre.

Conclusions

The construction and management of the micro hydropower plant in Ghandruk is an example of a successful public private partnership.

- Community based electrification schemes (especially microhydro) require a strong institutional support mechanism to succeed. In this case, ACAP's role has been crucial.
- Demand for power increases rapidly once the uses of electricity become known, and adequate planning is required if the economic and social benefits of electricity are to be maximised.
- Decisions on expansion and tariff-raising can be delayed due to conflicting interests and a need for consensus amongst users.
- Electricity can alleviate pressure on biomass resources for cooking and heating water. However, this must be supported by efforts to promote technologies to use electricity for these purposes.