

Micro Hydro Power and Watershed Protection, The Philippines

Themes

- ★ Renewable energy
- * Linkages with other environmental goals
- ❖ Technical capacity development
- ❖ Institutional capacity development
- ❖ Awareness, culture and practices
- * Poverty alleviation (MDG 1)
- * Education (MDG 2)
- * Gender equity and empowerment (MDG 3)

PROJECT DATA

Name: Community based watershed management and water resource utilization for hydro power

Implementing organizations: Yamog Renewable Energy Development Group, Inc. (NGO), and the Polocón Farmers Association (CBO)

Location: Polocón, outskirts of Davao City, Philippines

SGP Contribution: \$44,914.00

Start Date: September 1998

ENERGY OVERVIEW

Energy resource: water power

Technology: micro hydro

Application: lighting, information access, entertainment, hulling and milling, battery-charging

Sector: Residential, public spaces (related to education), and income generation (agro-processing and battery charging)

Size of micro-hydro system: 15kW

Per person energy tariff: 2 PHP (\$0.04) per watt per day; average household use of 40W costs approximately \$1.50 per day for lighting, and more to have a television or cassette player.

Households Served: 110

BACKGROUND

Polocón is a small farming community of around 100 households located in the southernmost part of the Philippines. Polocón, and other communities like it, were established in the 1960s and 70s when logging companies opened roads and began deforesting this tropical region. Today, the original forest is nearly gone, and instead the area is covered with secondary forest and farmland. Although it is technically part of the country's third-largest metropolis, Davao City, the city's electric grid ends 20 kilometers away, and there is little hope for its extension in coming years. Prior to the project, only a few families in Polocón had access to electricity via a shared diesel generator. Others used car batteries to power radios, but had to lug them 20 kilometers on the "jeepney," the only available public transportation, to the nearest battery charging post. The closest telephone is also 20 kilometers away. The circumstances in surrounding settlements are similar; about half of the rural com-

munities on the island of Mindanao lack electricity. Overall, in the Philippines, about 1.5 million people do not have access to electricity.

PROJECT DESCRIPTION

Overview

The main goal of this project was to reduce technical, institutional, and informational barriers to the implementation of community-managed micro hydro schemes. This project demonstrates the significant environmental and livelihood benefits associated with the establishment of community-based renewable energy projects in this area.

Implementation

The community was integrally involved in the design, building, operation and maintenance of the 15kW micro hydro system in Polocón. The community gained the capacity to manage the micro hydro plant and has integrated it into the overall development of the community by channeling funds from milling and battery charging services into the local school and other community needs. Restoring and protecting the watershed is also incorporated into the project, since without the 70-hectare watershed, the river's flow would decrease and the micro hydro plant would not work.

Environmental Benefits

Global: 110 households, as well as most public spaces, have electricity without any carbon dioxide emissions. The old diesel generator and kerosene for indoor lighting are no longer used, and batteries no longer need to be charged via fossil fuel powered electricity. In addition, people in neighboring villages can now recharge their batteries and grind their corn using renewable instead of fossil fuel power. Finally, conserving the watershed helps store carbon in the newly growing forest there.

Local: Conserving the watershed helps maintain a good water supply for Polocón and the communities downstream. Local pastures and farmland have been reforested with native species and fruit trees, helping restore the local ecosystem following decades of government reforestation with exotic species. The community has re-planted 25 of the 70 hectares in the watershed region. The community has institutionalized watershed protection, requiring each elementary school student to plant and care for 10 trees in order to graduate. Project leaders are coordinating with the Department of the Environment and Natural Resources to reforest the areas more distant from Polocón.

Local livelihood benefits

Health: 110 households now have electricity, replacing kerosene lamps. This reduces the risk of respiratory and eye problems.

Poverty alleviation: The micro hydro plant has helped alleviate poverty in many ways. First, the corn mill powered by the plant allows Polocón residents to grind their corn (a major crop in the region) for less money. They can also sell grinding services to people from neighboring communities. The coffee hulling

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machine and the battery charging post similarly reduce costs for these activities for residents and generate income from selling these services to neighboring communities. Since a community-based power cooperative owns and operates the plant, its revenues are invested in community projects that help improve life in Polocón. Tariffs for corn milling and other uses are set at a level to cover maintenance costs, the salaries of the couple that operates the plant, and a set-aside for community development projects. Funds have already been invested in the local school, and other planned projects include a bakery run by a women's group that runs a community store and was instrumental in initiating the hydroelectric project.

Education: The local elementary school, which used to get dark in the afternoons, now has lights. Students can study in the evenings using lights at home. The school has benefited from funds raised through the sale of grinding and hulling services at the hydropower plant. Environmental education is incorporated into the curriculum by involving students in watershed protection efforts.

Reduced drudgery: Residents of Polocón, as well as neighboring communities, no longer face 20-kilometer journeys to the battery charging station, or 12-kilometer journeys to a corn mill. Women's work at home is easier since the homes have better lighting.

Improved local opportunities: Life has changed in Polocón since the lights went on; as the treasurer of the hydropower plant cooperative put it, "It is very bright." In addition to improved educational and economic conditions and opportunities, community life has blossomed. The town can have Christmas lights at Christmas, and social events in the evenings. Finally, the town also has far better access to information via television and radio, helping townspeople keep abreast of local, national and international events. TV shows related to agricultural technology help Polocón's farmers learn about the latest farming methods. All of this makes life in Polocón a bit more attractive to young people, helping to stem rural to urban migration. "Now we feel we are in the city," says the cooperative's bookkeeper.

National livelihood benefits

A model for rural electrification: Rural electrification is a priority for the government; on Mindanao alone about half of rural communities have no electricity. However, government programs have made little progress toward changing this. Projects like the one in Polocón help demonstrate the possibility and the benefits of renewably powered electricity, particularly hydropower. As described below, the project collaborated with several government agencies, which may help to spread awareness in the government of the possibilities. In fact, the successes in Polocón achieved national recognition when it was awarded a prize from the Society for the Advancement of Technology Management in the Philippines for the "Most Innovative New and Renewable Energy System" in August of 2000.

Capacity Development

Capacity building played a central role in this project. The community received training in the following areas:

Technical: Designing, building and maintaining the hydroelectric plant

Institutional: Managing the plant, including setting fees for services, good book-keeping practices and financial management, and choosing and managing new income generating efforts using hydropower

Environmental management: All aspects of restoring the watershed, including planting and caring for saplings, and developing and running a nursery

Beneficiaries

The main beneficiaries are the residents of Polocón. Secondary beneficiaries are residents of surrounding communities who can now access milling, hulling and battery charging services locally for a lower price than before. Further beneficiaries are all those who depend upon this watershed for their water supply; the restoration efforts will help maintain water quality over time.

Partners

The Yamog Renewable Energy Group, the NGO receiving the SGP grant, built exceptionally strong partnerships with the local community as well as with relevant government agencies and a diverse set of funders.

Community: The Polocón People's Power Cooperative owns and operates the hydropower plant, and was formed by members of the local farmer's association and the Polocón Women's Group. However, the entire community of Polocón took ownership of the project during its design and construction. Each family spent an estimated 13 weeks working on the construction, which involved arduous tasks such as burying hundreds of meters of pipe, hauling bags of gravel, sand and cement up muddy slopes, and even hauling the generator for three kilometers.

Government: Yamog linked with Davao City's Environment and Natural Resources Office (CENRO), which provided seedlings and expertise in tree planting. A federal agency, the Department of the Environment and Natural Resources, is involved in reforestation in areas of the watershed far from Polocón.

Funders: In addition to support from SGP, Yamog found funding from two North American foundations, Green Empowerment and EnerGreen, to install an electrical load controller to facilitate corn milling. UNDP connections put Yamog in touch with the Japanese embassy, which contributed funds for the corn mill itself.

LESSONS LEARNED

Environmental Management

This project has successfully linked watershed protection to basic energy services. When possible, this can be a very effective way to motivate conservation efforts; the preservation of the forest area is essential to maintaining access to electricity. Also, maintenance of the watershed helps maintain water qual-

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ity. However, the community cannot fully protect the 70-hectare watershed on its own. It needs government collaboration and assistance to reforest areas far away from the community but critical for their maintaining their water flow. Yamog was able to help the community make links with key government agencies to achieve this goal. This is one of the key roles that NGOs can play to help facilitate effective environmental protection.

Barrier removal

Technical: Very extensive community involvement and capacity building efforts have built up technical understanding among local inhabitants about the construction, operation and maintenance of micro hydro plants. The people of Polocón can now manage the plant on their own.

Institutional: The Polocón micro hydropower plant is exceptionally well integrated into the Polocón community. The community has committed to long-term efforts to preserve the watershed to maintain their power source, and the benefits of productive activities powered by the plant are returned to the community. Some keys elements of Yamog's strategy to achieve this are:

Building a broad sense of community ownership through community participation, beginning even before the project was conceptualized. The entire community played a role in building the plant, investing considerable amounts of time and effort. This appears to have been critical for sustaining community involvement over the long term, which is especially important for watershed preservation efforts.

Allowing sufficient time for integrating the community into project development. The project leader, Nazario Cacayan of Yamog emphasized this, saying "It's a really long process to enhance the community's capacity to manage a project like this."

Encouraging the community infrastructure necessary to manage the power plant to emerge from existing community groups. In this case, the Polocón People's Power Cooperative was formed by joining the local farmer's association with the local women's group. Without the power cooperative's integration into the community, the cooperative would not be setting aside funds for community development.

Financial: Polocón has established a tariff structure not only to pay for continued maintenance of the plant, but also to fund other productive uses of micro-hydro power. Fees for corn milling and other services include a set-aside fund for community development. Ideas include a cacao bean sheller and a women-run bakery. However, most of the up-front cash costs of this project were funded by grants, while the community itself contributed all the labor.

Informational: In order for the community to even consider undertaking this project, Yamog had to educate them about micro hydropower and its connection to the preservation of the watershed. This initial education was institutionalized in the community by integrating some environmental education into

school programs, ensuring that students all learn why it is important to preserve the watershed.

Scaling Up

The above discussion about technical, institutional, financial and informational barrier removal applies only to Polocón itself. As this is a demonstration project, it should be expected to help remove these barriers for other similar communities.

A critical barrier to overcome when scaling up is the financial one: how are the up-front costs for construction to be paid? As mentioned before, most of the up-front costs for equipment in this project were funded by grants. Yamog has begun similar projects in two other communities – Megkawayan and Saloy – and has completed feasibility studies for several others. However, it appears that these projects also depend upon grants for the purchase of equipment. The director of Yamog suggests that one way to address these financial barriers is to connect micro hydro power strongly to income generation, for example by using it to power ice-making. Loans could be taken out against this future income. However, sufficient credit market must exist for this to be possible.

The effectiveness of a demonstration project also depends critically upon sufficient information-sharing about how the project was carried out and lessons learned in the process. There are several key ways in which scaling up may occur, including:

Learning on the part of government agencies involved as partners. The Polocón project involved both local and federal government agencies, which may be encouraged by this experience to provide additional funding or other resources on a broad scale for projects similar to that carried out in Polocón. The director of Yamog notes that the local government's interest in micro hydro has increased since its involvement with the project. In April 2001, the Department of Energy in the Philippines, with the support of USAID, has produced a guide for communities seeking to establish small-scale power cooperatives. However, the production of this guide cannot be specifically linked to the success of the Polocón project.

Specific efforts by the people of Polocón to provide technical assistance to other communities seeking to establish similar projects. Polocón residents, especially the couple that runs the power plant, can provide valuable assistance to neighboring communities. Yamog is in the process of organizing a group of trainers from Polocón and other communities with experience in micro hydro to help other communities through the process.

Media coverage of the project. The project won an award for excellence from the Society for the Advancement of Technology Management in 2000. This may have generated media coverage, but no specific information is available to gauge this.

Gender Aspects

The Polocón Women's Group played a key role in the community's experience with micro hydro development. The women's group helped initiate the effort, and helped form the

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basis of the power cooperative itself, in conjunction with the farmer's association. Three members of the cooperative's board are women. It seems that one way to facilitate women's leadership and involvement in energy projects is to involve existing women's organizations in the development of the project so their leadership stems naturally from existing local institutions.

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