REHABILITATION AND UPGRADING OF AN EXISTING MICRO-HYDRO PLANT (MHP) IN THE PHILIPPINES

PROJECT'S AIM: TO DEMONSTRATE RESTORATION OF A COMMUNITY-MANAGED MHP AND ADVOCATE FOR RESTORATION OF OTHER MHPS IN THE REGION

Location:
Abra province, the Philippines

Technology:
Micro-hydro

Costs:
Total: € 31,500
WISIONS financial support: € 31,500

Partners Involved:
Sibol ng Agham at Teknolohiya (SIBAT)
(www.sibat-inc.org/

Duration:
September 2015 – January 2017

Picture: WISIONS

The rural communities of the Cordillera Administrative Region in northern Philippines have managed micro-hydro plants (MHPs) since the 1990s. Eighteen such plants are installed in the province of Abra. The MHPs in Abra currently suffer from an array of technical, organisational and financial difficulties, including the decay of the water canals and electric generators and the lack of regulatory controls.

This project aimed to demonstrate the benefits of rehabilitating and upgrading existing MHPs in Abra. To do so, it focused on the Adugao MHP, a small 7.5 kW system in a remote mountainous community of 95 inhabitants, long classified as unreachable by the commercial power grid.

The community commissioned its MHP in 2002 in collaboration with SIBAT and with funding from UNDP's Small Grants Programme. The Adugao MHP operated continuously for 13 years (with some downtime) until its rehabilitation became critically necessary in 2016. Decrease in waterflow during a dry season led to a two-month shutdown in 2013 and prolonged rain in the wet season sometimes led to landslides, which affected the canal and further reduced the waterflow, necessitating frequent repairs. The lack of electricity compounded the difficult economic conditions of Adugao, a community that depends mainly on subsistence farming and temporary labour.

The overall goal of the rehabilitation project was to prevent the recurrence of existing problems and to enhance the system to make it operational 24 hours per day, 365 days per year.

The specific objectives were to:

- Upgrade technical components to improve the system's efficiency, reliability and lifespan;
- Improve the organisational and financial performance of the MHP;
- Increase the MHP's utilisation factor;
- Collect experiences and knowledge through two studies on MHP mini-grid options and grid extension; and
- Run a consultation process with local government and communities for restoring other MHPs in Abra province.

TECHNOLOGY, OPERATIONS & MAINTENANCE

The rehabilitation work focused on:

- Civil works: reinforcing the 220-metre long power canal with concrete to recover the efficiency of water flow; refurbishing the power house.
- Electro-mechanical components and controls: refurbishing the turbine; installing an electric load control.
- Transmission and distribution system:

replacing the copper transmission line with aluminium and the wooden street lamp posts with galvanised iron pipes; installing electric meters in each household.

DELIVERY MODEL & FINANCIAL MANAGEMENT

The longstanding community-run system of operation and management had been affected by the technical problems that intermittently surfaced. While the collection of household payments was sustained, the revenue generated was not always enough to cover the cost of repairs. On these occasions the local diocese provided some assistance.

To increase the affordability and long-term financial sustainability of the system, an increase in the basic tariff and in the tariff for additional end-uses (e.g. welding and carpentry tools) was agreed among the community. Community members can pay in cash or in kind. Moreover, selected members of the community received training on technical and managerial aspects, including operation, book keeping and reading the new meters.

The project involved the local community in the planning process. Tasks were presented, workgroups were organised and a timetable was jointly agreed. Local materials such as sand, gravel and lumber were procured from within the community, as was manpower, with food allowances provided to the workers during the *lean months* (periods between crops in which household food reserves were low). The Filipino *bayanihan* tradition – which calls for cooperation to achieve the community's goals – is invoked for the collective maintenance of the canal from debris and vegetation.

ENVIRONMENTAL ISSUES

The project replaced the use of pine pithwood or saleng, bamboo and kerosene lamps for lighting. These fuels were not only unsustainable, they also presented safety risks.

The community uses the traditional *lappat* practice of forest management to protect the MHP's catchment area by forbidding slash-and-burn in the watershed and requiring replanting after tree felling. The community introduced penalties for anyone abusing this practice.

SOCIAL ISSUES

The rehabilitated MHP impacted women in the community through the undisrupted operation of the rice mill, which (a) avoided significant time spent manually pounding rice during the post-harvest period and (b) facilitated movement at night and hence the increased participation of women in community meetings. Despite the improvements made during the project, the men continue to play a dominant role in the running of the MHP in tasks such as operation, tariff collection and in key positions in the management structure. There is still potential to improve the participation and access of women in the MHP management.

RESULTS & IMPACT

The project resulted in a fully reliable system operating 24/7. Lighting for households is available without disruption. Moreover, the community has seen an increase in productive end-uses, with households additionally using the power for tools. At the time of reporting, the power was being used to charge mobile phones, electrical equipment such as power tools for joinery (planes and routers), welding machines and four TV sets.

Indirect impacts on livelihoods were also observed. Concreting the canal of the MHP increased the waterflow from the river through the canal into the rice terraces, which encouraged the community to construct tributary irrigation channels and expand their rice fields. This contributed to an increase in rice production. As a result, at the time of reporting, the number of households experiencing *lean months* in rice had been reduced to only three.

The increase in rice production also translated into increased income for the rice mill. Rice milling has now become a productive activity whereby the community, through the tariffs, can earn cash. Other productive uses, such as sugarcane processing, are currently being evaluated.

REPLICABILITY

This project sought to influence policy and funding decisions by demonstrating that building new infrastructure is not always the best investment. The advocacy process led to the national and provincial governments committing their support for the rehabilitation of other MHPs in the region, commissioning SIBAT for a number of these. Three MHPs in Abra province had been financed at the time of reporting, while a further 20 were being considered for funding across the region.

The project also shed light on the prospects for interconnection of micro-hydro mini-grids and grid connection. These and other results were showcased at two major national conferences.

LESSONS LEARNED

The Adugao experience demonstrated that suitable interventions can significantly extend the lifespan of community MHPs. One key success factor of the project was SIBAT's longstanding experience in the community-based approach, where community members jointly formulate and enforce policies for the operation of the MHP and for sustaining its affordability. In the Adugao case, this was crucial for ensuring that tariffs were adjusted to meet the evolving needs.

Source: Final Report submitted to WISIONS by SIBAT in December 2017