

SUBMITTING AGENCY: WHO-DEPT OF HEALTH IN SUSTAINABLE DEVELOPMENT

TITLE

A Micro Hydropower Project In Ganzhou, Jiangxi Province, China.

ABSTRACT

The development of micro hydropower in China has demonstrated that it is an effective approach to improving living conditions of households, promoting economic development, and alleviating ecological erosion. In this case study, two key issues are discussed. Firstly, the report details a micro hydropower system constructed in a village of Ganzhou City, Jiangxi Province of China, from which lessons could be extracted, of value to 88 300 micro hydropower stations developed throughout China. Secondly, the report relates to current governmental approaches and policies. Furthermore, some proposed projects/programs are outlined, which will promote the future development of the micro hydropower system, and for which potential funders might be identified.

INTRODUCTION

In concept, a micro hydraulic system is defined as the equipment that transfers the potential energy of streams and small flows, to electrical power, according to the power needs of one or tens of households. Differing from small hydropower stations, the power output in a micro hydropower system ranges from 100 W to 10 kW. With relatively low levels of investment, one household, or a small village with tens of households, can build a micro hydropower station to supply electricity. Currently, micro hydropower systems are well developed in Guangxi, Jiangxi, Hunan, Yunnan, and Guizhou Provinces in China.

By 1998, around 88 300 micro hydropower stations had been constructed in China. These micro hydropower stations not only provide power to households likely to have difficulty in accessing the national electricity grid in the near term, but also improve the local ecological environment by decreasing deforestation as a consequence of the harvesting of wood for fuel use. The overall benefits are substantial.

COUNTRY PROFILE

1. Location

Ganzhou Prefecture of Jiangxi Province is about 800 km from the provincial capital. It is a mountainous agricultural area, with rice and fruit being the main crops produced.

2. Project Area Profile

As a developing country, China still has a significant proportion of the population living in remote and mountainous areas, without access to an electricity supply. Ganzhou

Prefecture is one such region in Jiangxi Province. On average, the per capita income of rural households in Jiangxi Province is much lower than the national average, due to the constraints posed by the mountainous land.

SUSTAINABLE DEVELOPMENT ISSUE ADDRESSED IN THE CASE STUDY

Prior to the construction of the micro hydropower station, the village was without an electricity supply, due to its remote location. At the same time, the houses in the village are widely dispersed, requiring a relatively large investment to connect all households to the nearby national grid.

The per capita income in Jiangxi Province in 1999 was lower than the national average, and it is prohibitively expensive for households to invest in the micro hydropower station, without external support. Therefore, as a demonstration project, a preferential policy on credit, a grant, as well as technical support was necessary from the government for policy interventions on poverty alleviation and renewable energy development in the area. For further, sustained development of the micro hydropower project on a wide scale in the prefecture, even on provincial scale, the contribution from government grants will be eliminated, and the government would instead focus on credit and technical services.

Due to the lack of availability of suitable, alternative sources of energy, households rely on firewood as the main cooking fuel. Associated water and soil erosion have become a serious problem, worsening ecological degradation, with concomitant implications for health.

OBJECTIVES

The objectives associated with the development of a micro hydropower project in the village are:

- To provide power to households to improve their living conditions;
- To eliminate environmental damage and health risks by replacing firewood with hydro-electric power for cooking;
- To demonstrate the technical feasibility of micro hydro generators;
- To study the affordability levels of households;
- To assess the feasibility of a larger scale expansion of the technology, in a sustained manner.

IMPLEMENTATION

The construction of the micro hydropower system in the village lasted for about two months. Fund-raising by local households was encouraged, to supplement the grant from the government. The Center for Testing and Monitoring of Micro Hydropower Products provided the technical support.

OUTCOME AND IMPACTS

The outcome and impacts of the micro hydropower station constructed in the village are being analyzed in relation to the following aspects:

- Technical scenario and performance;
- Investment and fund raising;
- Households supplied with the power;
- Financial and economic analysis; and
- Environmental and social impact analysis.

PROJECT/PROGRAM STATUS (IF APPLICABLE)

From the case study on the village-scale micro hydropower station, a program that could promote micro hydropower development in the areas of both extension and technical research and development, has gained the interest of the Chinese Ministry of Agriculture. For the extension of micro hydropower on a wider and larger scale, a preferential credit or grant might be appropriate due to its role in poverty alleviation. In addition, the re-orientation technically, of micro hydropower equipment manufacturers is also necessary for commercialization.

In terms of research and development, studies of the baseline situation of resource availability nationwide, aspects of the introduction of advanced technology or equipment, and essential national training courses may be necessary.

REPLICABILITY

According to data published by the Ministry of Agriculture, the potential exists for the production of 80 000 000kW of energy from micro hydro-electric power in China. By 1998, about 88 300 micro hydropower stations had been constructed with a total installed capacity of 164 000kW. The annual power generation was over $2.72 * 10^9$ kWh, amounting to 0.25% of the total capacity potentially available. At present, there are around 43 million inhabitants living in remote areas in china, without any electricity supply. Around half live in the mountainous areas of southern China, where micro hydro power resources are abundant. The electricity requirement is about 3 200 000 kW. With living conditions being improved, those living in mountainous areas can increasingly afford household electrical appliances, and are showing increasing interest in the newly developed micro hydraulic generator model. If the proportion of the population using micro hydro power resources is raised to 5%, the installed capacity will equal 6 400 000 kW in all of China, and could provide power for over 30 000 households in rural areas.

LESSONS LEARNED

Primary barriers to restricting the development of micro hydropower are summarized briefly as follows:

- Lack of policy support: Although the Ministry of Agriculture is in charge of micro hydro power systems, and users are mainly rural peasants, the micro hydro generator has not been included on the government listing of farm machinery, which would confer on it special treatment. It has been difficult to talk about the development of, and popularize, the micro hydro generator in government agendas.
- Lack of scientific research: The development and expansion of the use of micro hydro generators is complex. After ten years work, there is now greater understanding of the main research priorities, their rationale, and the key methodologies which require examination. Due to a lack of financial support, it has been difficult to form a stable scientific research team, to address the key issues. In the past 15 years, little research has been undertaken in relation to the micro hydro power generator in the province, despite a ministerial research budget of more than 50,000 RMB.
- Lack of advertisement and effective promotion campaigns: Because the users live in remote, dispersed areas, communication mechanisms, including transport, are poor. Given that alternative enterprises are poorly represented in these areas, it will fall to local governments and local rural energy stations, to undertake the important work of popularizing and publicizing the micro hydraulic generator.

FURTHER INFORMATION

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