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Micro-credit and Rainwater Harvesting

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Abstract

Rainwater Harvesting (RWH) has proven to be a viable alternative water source in challenging environments where other means of water supply have very little or no potential.RWH is often the only solution for water supply particularly in: areas where groundwater levels are very deep or contaminated due the composition of geological aquifers; lands that are arid or semi-arid lands; small coral and volcanic islands, and in remote and scattered human settlements. In the last two decades, interest in RWH has grown. However, one of the main challenges in relation to the construction of RWH systems is that initial investment costs for rainwater harvesting systems are relatively high, limiting replication in poor communities. Access to micro-credit could empower households in remote and underserved areas to finance their own RWH systems. Next to this, micro-credit could replace subsidy, making it a more sustainable water supply option. Through the promotion of RWH, there is also the possibility to enhance the income of poor people if it is combined with income generating (IG) activities and programmes.

In cooperation with BSP-Nepal, the RAIN Foundation, which was established in 2005, is currently conducting a 3-year pilot research project into the combination of RWH and micro-credit in rural areas of Nepal. The purpose of this pilot is to field-test a procedure for micro-credit services that should result in access to water, adapted to the specific socio-economic and environmental context.

In Nepal, it is estimated that more than 10,000 different types of Micro-Finance Institutes (MFIs) are operating at different levels, so there is a huge potential to promote RWH technology via micro-credit with the appropriate mechanisms. Based on a pre-feasibility study, four districts (Sindhupalchowk, Baglung, Gulmi and Syanja) were selected for a three-year pilot, which started in April 2010. The Nepal Federation of Saving and Credit Union (NEFSCUN) assists BSP with trainings, the selection of MFIs and project implementation. In the first phase of the pilot, subsidy and credit is combined for the construction of rainwater harvesting systems. Gradually the subsidy will be reduced and then replaced with credit. RWH systems will be one of the credit products for the MFIs. Women are the main target group of the micro credit pilot. The credit serves to stimulate the use of RWH for domestic as well as productive uses. The time that is saved for fetching water after the installation of a RWH system at their homes can be diverted into the productive work. Availability of water plays a significant role in IG activities such as the production and processing of vegetables, fruits, cereals, dairy milk, poultry, seeds, medicinal herbs and plants, spices, fishery, non-timber forest products (e.g. bamboo products), etc. This paper summarizes the methodology of the pilot project and discusses a procedure for micro-credit services in relation to RWH.

Keywords

Rainwater Harvesting, Micro Credit, Income Generation, Poverty Reduction

INTRODUCTION

People living in remote and water scarce areas are mostly the poorest people within the country. Their natural resources are very limited and living conditions are harsh. Although a regular supply of safe water is a basic human right according to the United Nations Committee on Economic, Social and Cultural Rights (2002), many governments fail to guarantee water supply in remote areas, and private companies have no interest in providing water services, since profits are difficult to obtain. Climate change is aggravating this situation. The longer dry periods mean that the available water sources are no longer sufficient, and groundwater levels drop even further, resulting in people having to travel longer distances to fetch water.

With the increasing availability of hard roofs in many developing countries, roof water harvesting is becoming a viable option for the collection of rainwater. Moreover, rainwater can replenish groundwater resources, thereby reviving nearby shallow wells. A decentralised and low-cost technology, RWH enables people at household and community level to manage their own water without the need to walk long distances. An average rainfall of 200mm a year can be sufficient for RWH to provide a reliable source of clean drinking water for vulnerable communities to bridge the dry periods of the year (UNEP, 2006).

In order to increase the awareness and adoption of RWH by public as well as private actors, RAIN and its partners establish Rainwater Harvesting Capacity Centres (RHCCs) in each country under the RAIN programme, overseeing project implementation, as well as the coordination of promotional and lobbying activities at national level. One of the aims is the inclusion and recognition of RWH in national water policies. The RHCCs involve and bring together key players within the sector through workshops, day-to-day consultation on RWH policies, water source mapping, water quality testing, and other activities.

For programme implementation, RAIN and the RHCCs identify priority intervention areas at national level and contract NGOs already working within these regions. The RHCCs and RAIN then train these partnering NGOs in RWH and monitor and evaluate project implementation. The centres also play a central role in learning and knowledge exchange, systematizing best practice and experiences. Manuals have been developed in English and French (Worm and van Hattum, 2006), as well as rainwater quality guidelines (RAIN 2008).

Most NGOs have been able to achieve ambitious construction targets despite the remoteness of most of the sites. In-country capacity development has increased the number of trained and experienced NGOs, technicians, masons and trainers in RWH technology, as well as community-based water committees and households in the management of RWH systems. Until now, more than 25 community water management committees have been established and over 800 households have been trained in operation, maintenance and management. Extension workers support households and water committees to manage water distribution and payment schemes, and to maintain water quality and hygiene.

RAIN's experience is that community willingness to replicate RWH systems is high, however the costs, as compared to other safe water supply options, also remain high; €40 - €80 per m^3 storage capacity for ferro-cement tanks in RAIN's remote target areas. According to the World Water Development Report 2009, the main obstacle to the expansion of small-scale water providers is lack of financing. A supposedly more sustainable way of financing the initial costs for a RWH system could be the provision of micro-credit. Experiences with micro-credit for RWH are few to date on a global level. The subject of this paper is a pilot project with RWH and micro-credit in Nepal, building on the lessons learned from BSP's experience with micro-credit for biogas plants in rural areas.

Micro-credit is the principle of giving small loans to the very poor to help them generate an income of their own (Wheat, 1997). Micro-credit, used properly, can help to reduce income poverty, lessen the vulnerability of the poorest and empower women (Fonseca, et al. 2007). The idea of small loans was first explored in Bangladesh in 1976, when the Grameen Bank was created. Their strategy was to get around the problem of a lack of borrower guarantee's or collateral, by creating a solidarity group of five or so borrowers who could vouch for each others' loans. Because the borrowers all know each other, there is increased peer pressure to repay. Grameen's experience revealed a very low rate of default on solidarity loans and repayment rates greater than 90% (Fonseca, et al. 2007).

Rainwater harvesting in Nepal

In Nepal, access to water is becoming more problematic due to climate change and deforestation. The weather conditions have become hotter over most of the regions in the country. According to the Department of Hydrology and Metrology, every year the average temperature rises at a rate of 0.06 degree Celsius in Nepal, which is six times higher than the rate of the world. In the Himalaya's, a key source of fresh water supply, snow is melting at an alarming rate. Whilst monsoon rainfall has become erratic, winter rainfall has become more scarce and periods of drought have become longer.

Higher levels of sedimentation have altered the water courses. There are drastic drops in the number and quality of water sources with springs and streams continuing to recede further and some drinking water supply systems having been flooded. Increases in the price of materials and spare parts have raised the cost of both the construction of drinking water supplies via pipelines, *and* the operation and maintenance costs of these systems. Most of the communities do not have money to rehabilitate their drinking water system. Conditions like drought and erratic rainfall are reducing the productivity of crops throughout the nation. Drinking water shortage at household level further reduces productivity. The drop in agricultural production is expected to create food scarcity in the near future.

About 60% of Nepal's terrain can be graded as steep to very steep (i.e. mountainous). The problem in the hills and mountains is that excessive rain during the monsoon season causes catastrophic soil erosion while water scarcity poses other problems during non-monsoon periods. A substantial part of monsoon rainfall is wasted as surface runoff. Most people in these areas rely on natural springs and gravity-flow water supply systems (Merz, 2003). Women and children in particular experience the dangers involved in water carrying along steep hills and slippery footpaths.

Water source depletion is an increasing problem. Farmers have traditionally managed ponds along ridges and on slopes for the watering of animals. These ponds improved recharge and also helped to increase spring yields. Over time, however, many ponds silted up and disappeared because farmers did not maintain them.

In order to address problems of water shortage and land degradation, RAIN and its RHCC at Biogas Sector Partnership Nepal (BSP-Nepal) are providing water through rainwater harvesting – mainly rooftop harvesting – to remote hilltop households. The average annual rainfall in Nepal is 1,700 mm (between 1,500 and 2,500 mm) which is more than enough for RWH (see Box 1). The programme is not only looking at rainwater as a source of drinking water, but also for other uses and livelihoods, like the production of biogas. Nepal has over half a century of glorious history on the development and broad dissemination of biogas technology.

Box 1 Rainwater potential for water supply in Nepal

For an average family of 5 household members, 1,500 mm of rain per year x 50 m^2 roof surface (multiplied by a runoff coefficient) results in a rainwater harvesting potential of 60,000 liters per year. With two rainy seasons and an average tank capacity of 6,500 liters in Nepal, 13,000 liters (2 * 6,500 = 13,000 liters) of water per year can be made available for consumption and other uses. If 3 liters per person are used for drinking (5,475 liters per year per household), 7,525 liters can be used for biogas production and other uses.

After BSP-Nepal was established in 1992 by the Netherlands Development Organisation (SNV) with Dutch government support, the efforts became better coordinated and institutionalized. BSP has been a huge success in many aspects with more than 200,000 household size biogas plants having been commissioned in Nepal to date. Hundreds of institutional or community-sized plants have also been constructed. Considering that 50% of the raw material required to run a biogas plants is water, and that water is also required to keep the cattle that produce the manure, the initial objective of BSP-Nepal was to promote the biogas technology in water scarce areas by encouraging potential biogas users to install RWH systems next to biogas plants.

Rainwater harvesting tanks under construction in Nepal

Currently, the RWH systems are being financed via the subsidy contribution from RAIN (50% of the total initial costs: approximately €500 per system) and the contribution made by the users (45% of the total initial costs in cash/kind/labour). Those users who can contribute the cash immediately are getting the benefits from the RWH programme, but those who cannot provide the cash up front suffer a delay in the installation of the RWH system. There is a need for alternative financial models in addition to the subsidy, to reach out to more families and create a self-sustaining programme.

Lessons learned around micro-credit for biogas plants in Nepal

Biogas is a combustible gas produced by anaerobic fermentation of organic materials by the action of methanogenic bacteria (Bajgain, 2005 and Karki, et al. 2009). It is principally composed of methane and carbon dioxide. The organic materials needed to produce biogas are dung, human excreta and waste from food or plants. The organic sludge needs to be mixed with water (1:1 ratio). In Nepal, biogas is primarily used for cooking and lighting, using special types of gauze mantle lamps. If a farmer owns seven cows or four buffaloes, he can produce around $2m^3$ of gas per day, which will meet the cooking and lighting requirements for a family of six. Other potential uses include refrigeration, engine running, and electricity generation.

Financial analyses show that both the financial and internal rates of return from biogas plants are high, meaning that biogas plants are very profitable in Nepal. Other benefits include those related to the health aspects of those involved in cooking, since biogas does not produce smoke. The return from a biogas plant is higher than the market interest rate, which has been taken as 16%per annum (Karki, et al. 2009).

Initially, the biogas programme was primarily based on external assistance. One of the important features of the financing model has been the application of consumer subsidies of around 32%of the total costs of a biogas plant. The subsidy includes a regular subsidy, an additional subsidy for disadvantaged groups (poor, janajatis/dalits, conflict victims), a subsidy for low coverage districts and a transportation subsidy for the most remote districts. With the announcement of the subsidy, the installation rate for all sizes of biogas plants increased rapidly. BSP provides around 45%of the subsidy directly to farmers and disburses the remaining 55%of the total subsidy to the biogas company on behalf of the farmers. Commercial banks are willing to provide biogas loans since repayment is high compared to other loans. The total repayment period ranges from 5 to 7 years with interest rates varying between 11.5 and 16% (Karki, et al. 2009).

Although the lengthy and cumbersome loan approval procedures of banks need to be simplified, bank credit together with government subsidy has made biogas technology very popular among people, especially those residing in rural area of the country. Trained Biogas construction companies collect demands from interested households to install biogas plants. The bank approves the loan based on the quotation from the company. Finally, the bank credits the amount in the name of the household by deducting the subsidy amount. A small loan is provided to poor households with or without collateral or on a group guarantee basis, and repayment is made through small instalments. More than 90%of the biogas plants were installed under the loan and subsidy programme in Nepal and the remaining biogas plants were installed using only MFIs' loan. Some of the MFIs have started to provide loans from their own sources, while other MFIs combined their loan with an AEPC loan fund. As the market for biogas credit has grown, some of the commercial banks have started to provide wholesale loans to MFIs as well as to biogas companies directly. The Biogas companies work as agents of the bank and collect the repayment/instalments on behalf of bank where they receive commission (about 3% of interest) from the commercial bank.

The following are the major lessons learned from the programme:

- Awareness must be created amongst all stakeholders that the project/programme will not be implemented forever, but will one day stop. Capacity building must be chalked out and communicated in time. Before discontinuing the project/programme an exit strategy must be prepared and communicated to all stakeholders.

- Massive awareness on the linkage between poverty reduction and biogas is necessary for all players (BSP-Nepal, MFIs, Biogas Companies, etc.). Key programme partners should have some knowledge of poverty and other development issues. A programme like BSP is not just for business development but mainly for poverty reduction.

- Quality (including guarantee and after sales services) must be ensured to motivate users and protect their interests. In case of failure, the poor suffer the most. Information exchange between neighbours plays an important role for the promotion of biogas. The degree of exchange depends on the satisfaction of existing users which in turn is related to the quality of the biogas plant constructed and the services provided by the biogas company. Word of mouth has been found to be the most effective means for promoting the use of biogas.

- Good relations between players at all levels, particularly between Biogas Companies and MFIs, is very important. Biogas is a business for both parties (Biogas Companies and MFIs). In some cases, there is a lack of understanding between biogas companies and MFIs since the MFIs have strong social objectives and biogas companies have commercial objectives. The two parties must find a way to work together to satisfy their respective objectives in a good partnership.

- The uptake of biogas technology is enhanced if poor people also have access to micro-credit to co-fund the plants. Realistic financial cost and benefit analysis is very important to convince both the MFIs and the community that the technology is affordable and profitable. Without the provision of credit, it is very difficult to offer an energy solution to poor communities and thus the involvement of MFIs is very important. In order to convince MFIs and their members or clients of the benefits of the programme, there should be a realistic and convincing financial cost and benefits analyses.

- Further market segmentation of the poor needs to be done based on: easy or cheap availability of construction materials; their current expenses on the purchase of fuel wood, kerosene, LPG, chemical fertilizer and medical treatment; and hardship in collection of fuel wood, etc. As a lot of effort and time is needed to convince the poor to engage in biogas (due to illiteracy and competing priorities), modest targets should initially be set.

- Biogas promotion among prospective support institutions is a crucial factor to improve access to energy for the poor. Additional subsidy or other technical or credit support for biogas plants, support for toilet construction and connection, support for transportation of cement, rods, etc. for the poor help make the market work for the poor as well.

- Most of the MFIs have a strong and loyal member/client base.

METHODOLOGY

The purpose of the pilot project is to identify strategies for MFIs that result in access to water for the rural poor and are adapted to the specific socio-economic and environmental context in Nepal. Based on a pre-feasibility study, four districts (Sindhupalchowk, Baglung, Gulmi and Syanja) were selected for a three-year pilot. The Nepal Federation of Saving and Credit Union (NEFSCUN) assists RAIN with trainings, the selection of MFIs and project implementation.

The methodology is based on BSP-Nepal's experience with micro-credit for biogas tanks. The following procedure for loan sanctioning and disbursement procedure for MFI to their member/client will be followed by the MFIs for RWH systems:

a. Informing the member/potential user of the benefits of RWH tanks;

b. Collect the demand (in prescribed format);

c. Facilitate entrance into sales agreement between user and construction partner;

d. Sanction the loan to the user;

e. Motivate the user to contribute at least 20% of total cost of the RWH system in the form of cash/labour/kind;

f. Sign a loan agreement with the user. The maximum loan amount is NRs 15,000 per RWH, with a maximum interest rate of 14%, and repayment over a period of 3 years;

g. Provide the coupon to the CP (Construction Partner);

h. Disburse the first instalment to the user to purchase the materials which need to be managed by the user according to the sales agreement;

i. After the completion of RWH, the MFI along with the recommendation letter of the CP may request for reimbursement from NEFSCUN;

j. After the completion of RWH system, the MFI will pay the second instalment to the CP which should not be more than total cost charged by the CP minus subsidy amount;

k. Loan sanction, disbursement and collection criteria will be monitored by the MFI's regular system;

l. The MFI's should give priority to providing credit to disadvantaged groups (deprived people, group, women, etc) with group guarantees and without collateral.

BSP-Nepal reserves the right of supervision, inspection and monitoring of the activities and documents of the MFI and CPs. The MFIs and CPs should co-operate to provide the necessary documents and allow for field observation as required. The suggestions and recommendations given by BSP-Nepal, in relation to RWH, should be followed by the MFIs and CPs. MFIs must check whether the RWH system has been completed or not before making the final payment. Likewise, NEFSCUN will also closely monitor the lending activities to prevent the misuse of RWH credit funds. RAIN Foundation will monitor the progress and disseminate the lessons learned.

Over the year, the following parameters will be used to assess the results (performance) of the MFIs involved in providing the micro credit to RWH to determine whether these parameters have remained constant (the baseline data), increased or decreased:
Total Loan amount; No. of Loans; No. of Members; No. of RWH Financed; Saving Collection; Annual Income; Annual Profit; Overdue Amount; No. of Loan products; No. of Saving products; No. of Defaulters; Member/Staff Ratio; No. of Staff; Level of Operational Self-Sufficiency; Level of Financial Self-Sufficiency; Market Share; AGM in Time; Audit in Time; and Reporting in Time.

Progress made

To date, awareness raising events have been organised for a number of MFIs at national and local levels. The purpose of the workshops was to increase the knowledge the MFIs concerning RWH systems and their potential, and to give them the confidence in the feasibility of the RWH and micro-credit combination. In addition, loans have been provided to the interested households with a total amount of €10,000. Monitoring is ongoing and the latest results will be presented during the IRC conference, Pumps, Pipes and Promises in November 2010.

A Nepalese farmer using rainwater harvesting

CONCLUSIONS

Micro credit can greatly contribute to the promotion of RWH technology in Nepal, especially if it is combined with biogas and income generating activities. The success of the BSP-Nepal can be taken as an example, since its Biogas Support Programme facilitated the construction of biogas plants, of which 90% were constructed in parts of Nepal using microcredit from the Agricultural Development Bank Ltd in combination with donor subsidies.

In relation to the pilot project, both household level RWH systems and micro credit programmes mainly target women. In Nepal, the collection of water is one of the main responsibilities of women, and scarcity or shortage of water creates more difficulties for women. The promotion of RWH through micro credit can therefore reduce the workload of poor women. Emphasis should be placed on the multiple uses of water to stimulate income generation.

Potential obstacles and barriers require adequate risk management. The main risks are: the relatively high cost of RWH systems; the geographic distribution of the RWH construction partners; the low level of technical knowledge among MFI staff; limited business motivation in RWH lending due to lack of income generation; poor understanding of RWH costs and benefits among clients and MFIs; policy obstacles related to RWH; lack of RWH data as part of MFI performance measuring; and ineffective RWH system standardization. RAIN Foundation and BSP-Nepal will carefully manage and monitor these risks during the pilot phase to identify the best strategies for micro-credit facilities that result in access to water, and are adapted to the specific socio-economic and environmental context of Nepal.

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