## I. Project Identification

A. Project Title : Rehabilitation of Solar Powered Potable Water System in Sitio Paang Bundok

B. Location of Proposed Project : Sitio Paang Bundok, Brgy. San Celestino, Lipa, Batangas

C. Implementing Organization : Sibol ng Agham Teknolohiya (SIBAT)
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E. About SIBAT:

Sibol ng Agham at Teknolohiya, Inc. (SIBAT) is an advocate, developer, mover and groundbreaker of appropriate technology for rural development, guided by the principle of making science and technology (S&T) serve the Filipino people.

Appropriate Technology (AT) is SIBAT's main tool in pursuing its development mission to target communities. SIBAT's core technological competencies are community-based sustainable agriculture (CBSA) and community-based renewable energy systems (CBRES), which it has pioneered in non-government organization (NGO) and people's organization (PO) led development work for the past 25 years.

Presently, SIBAT pursues the development of the village level sustainable development (VLSD) model which comprises the core objective of SIBAT's 10-year Strategic Plan (2003-2012). VLSD is basically a community-based model of integrating AT components with community plans and participatory research - through NGO-PO-SIBAT collaboration in the context of the POs' struggle for land and resources. CBSA (with focus on diversified integrated farming systems in respective typological contexts), supported by CBRES, constitute the basic technological components of this model.

SIBAT is currently the lead convenor of the Philippine Misereor Partnerships (PMP) Environment Sub-cluster and currently partners with developmental institutions such Church Development Service (EED) and Volunteer Service Organization (VSO) Bahaginan Philippines, among others.

F. Project Duration : Six (6) Months

## II. Project Description

Barangay San Celestino is located 13 kilometers from Lipa City in the province of Batangas. Lipa is about 85 kilometers from south of Manila. Barangay San Celestino has a total land area of 402.15 hectares and it comprises of four major sitios namely, Papayahan, Central, Sinturisan and Paang Bundok. Sitio Paang Bundok, the project site, is about 1.2 kilometers away from the barangay proper. Current population in Sitio Paang Bundok is pegged at 435 comprising a total of eighty-five (85) households with five family members as average household size.

Sitio Paang Bundok had a history of a successful agrarian struggle in 2003. With the united action of the community, led by the women organization of Paang Bundok, they were able to successfully claim the land by fighting for their rights to own the land they were tilling for a long time. But the success was not that easy as the community needed to organize themselves and face the pressure of hacienderos claiming ownership of the agricultural lands. NGOs helped greatly in providing technical and legal know-how for the community organization in their struggle.

At present, the community is now reaping the bounty of palay, coconut, coffee, and pepper planted on the farmland they now own as beneficiaries of the agrarian reform program of the government. Average production is now recorded at 35 cavans per hectare, coconut at 2,000 nuts per hectare, and corn about 5.8 metric tons.

After the women-led community organization settled the agrarian problem, they were faced with another one: the lack of accessible water system. The main water sources in Bgy. San Celestino are artesian wells that dry up easily during summer and the commercial installation of the local water district that charges high fees with unpredictable water supply. Only 20 households of the community have availed of the commercial water system. As an alternative, residents have to walk for more than a kilometer to fetch water from the nearby Paliparan spring.

In 2005, SIBAT, in partnership with Women's Institute for Sustainable Economic Action Inc. (WISE-ACT), completed the installation of a Potable Water System using solar energy in Sitio Paang Bundok. The aim of the project is to utilize the water resources in the nearby Paliparan Spring for the benefit of the whole community.

Due to the lower elevation of the spring to that of the households' location, a water pumping system was advised by the technical experts of SIBAT. Based on the technical study, solar power was decided to be the best type of energy source to power up the water pump. Solar or photovoltaic power system is a kind of renewable energy system that generates and converts energy from the sun. SIBAT had been in the forefront of utilizing the conversion of sun's energy to provide power requirements for rural communities as part of its Community-Based Renewable Energy System (CBRES) program utilizing alternative technology.

The over-all system has the following technical specifications:

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| Capacity | 600 Watts |
| Energy source | Solar |
| No. of Panels | 8 twin panels |
| Water Pump description | ETA Pump HR14<br>Including controller, well probe, cable, termination kit, control panel and accessories |
| Gross Head | 60 meters |
| Distance | 384 meters |
| No. of beneficiaries | 85 households |
| Volume of water | 17 cubic meter per day (enough for the whole community) |
| Water Source | Paliparan Spring |

The solar power system is a 1,200 WP using a submersible pump to fetch water from a spring located 60 meters below the community and distributed to the three clusters where a central water tank is located. Residents collect water from distribution faucets connected to water tanks.

For years, the project had been managed by SIBAT's people's organization partner, the Samahang Patubig ng Paang Bundok (SPBB).

Project Impacts

With the existence of the water system, residents of the community do not have to walk for long hours to fetch water from the spring or depend on the high cost of commercial water provided by the local water district. In this way, they have maximized the natural water resources in the community while at the same time having more hours for productive use.

The women of the Sitio Paang Bundok were the most grateful for having the potable water system. In the past, they were the ones who manually fetch the water from the spring. This job would take them one to two hours trekking the slope hills just to get to the Paliparan spring, then back to their houses and begin domestic work. But now, the hours saved in fetching water are now being used for other purposes other than household chores. These are taking part in farm labor and participation in community organization and implementation of its programs and services such as gender training, livelihood activities, and over-all management of the water system.

At the community level, the water system helped in improving the health status of the residents. According to technical experts, the spring provides a natural mineral water that is of best quality. This lessened water-borne illnesses afflicting mostly the children. Livestock raising, that requires an ample amount of water, was also employed by the residents which in the past is not possible because of the lack of water source. This augmented the average income in the community. The children also highly benefited. Apart from the women, they were the regular water fetcher in the past. The water system hinders the children to do this kind of manual labor and use their time for learning.

Damage to the System

Unfortunately, during the three-year operation of the potable water system, some of its main technical parts (electrical inverter) were accidentally hit twice by lightning that affected the over-all performance. Most of the solar panels were badly damaged and some inverters were missing. Although some parts replacement was done with the help of a partner institution, the maximum capacity of the water system to supply the requirement of the whole community was greatly affected. At present, the whole potable water system is at zero performance level due to the missing inverters and damaged solar panels. From September 2008 up to this time, the residents are doing the old ways of fetching water for their daily needs.

## III. Project Objective

The proposed project aims to rehabilitate the damaged solar power system to energize the water pump supplying potable water to the community of Sitio Paang Bundok. On top of the rehabilitation and construction is the over-all management of the water system by the Samahang Patubig ng Paang Bundok through meetings and consultations and related trainings in partnership with SIBAT.

The rehabilitation aspect aims to replace/repair the following electrical components of the solar power system:

- Replacement of 13 solar panels; 3 panels are still working
- Replacement of charge controller
- Replacement of 4 batteries
- Replacement of electrical inverters
- Rewiring of cables
- Minor civil works are also needed to be done

The completion of the engineering works will save the renewable energy system being enjoyed by the residents of Sitio Paang Bundok particularly the women and children who are mostly doing the old ways of fetching water from long distances. Thus, mothers will have more time for productive and domestic work while children can focus in their education instead of fetching water for long hours.

Over-all, the proposed project will benefit the whole community in terms of lessening water-related health problems, augmentation of household income, greater participation in agricultural productivity, creation of possible livelihood programs, and preservation of natural water resources.

## IV. Project Management

This one-year rehabilitation project will be managed by SIBAT in partnership with the established community organization, the Samahang Patubig ng Paang Bundok (SPBB). Co-management partnership will be established between SIBAT and SPBB. SPBB will focus on the hands-on management operations while SIBAT will handle the technical maintenance and upgrading. This is to ensure operational efficiency and sustainability of the water system project.

The engineering works will be done by SIBAT's engineer staff and volunteers who have been working for years in other renewable energy projects in different locations of the country. Administrative and finance work will also be handled by SIBAT through its main office and assigned regional coordinator working with the community.

At the community level, SPBB will manage the service operations. As a women-led organization, it has a considerable knowledge about water resources, including water quality and reliability. As proven in the past operations of the water system, women were the key for the success of water resource development.

SIBAT will also conduct community consultations and trainings before and after the rehabilitation work. This is to ensure that proper technological transfer is done and sustainability mechanisms are learned and owned by the community. These activities will facilitate the following:

- Continuing operation and maintenance training.
- Strengthening of management team and enhancement of its tasks and functions.
- Review of water distribution and maintenance policies.
- Training on Water and Gender integrating Resource Management
- Training on Financial Accounting

Technical monitoring and project management monitoring will be done regularly by SIBAT aside from the six-month project report and terminal report at the end of the one-year project period.

Furthermore, as a learned lesson from the theft incident, SPBB is tightening its security of the whole water system by providing round-the-clock watchman coming from the members of the community. This is in addition to the construction of fence for the solar panel location. In this case, the unfortunate incident will surely be avoided and continuous operation of the water system project will be achieved.

**Schedule of Activities**

| Activities | Schedule | In-Charge |
|---|---|---|
| 1. Site survey | Month 1- 1st week | SIBAT |
| 2. Community meeting for the presentation of the rehabilitation design and tapping of local workers | Month 1 – 2nd week | SIBAT |
| 3. Canvassing and procurement of materials | Month 1- 1st & 2nd week | SIBAT / SPBB |
| 4. Hauling of materials | Month 1 – 3rd – 4th week | SIBAT |
| 5. Repair and replacement work | Month 2 & 3 | SIBAT / SPBB |
| 6. Training on Continuing Project Operation and Maintenance | Month 4 | SIBAT |
| 7. Strengthening of management team and review of task & functions | Month 4 | SIBAT / SPBB |
| 8. Training on Water and Gender integrating Resource Management | Month 5 | SIBAT |
| 9. Review of policies for water distribution, maintenance, management, and collection | Month 5-6 | SPBB |
| 10. Training on Financial Accounting | Month 6 | SIBAT |
| 11. Project technical monitoring | Month 5 & 10 | SIBAT |
| 12. Community meetings/ organizational development | Month 8-12 | SIBAT |

## V. Beneficiaries and Participants

As mentioned earlier the rehabilitation of the potable water system will largely benefit the women population of Sitio Paang Bundok.

In a recent site visit, SIBAT's staffs were able to see first hand that mothers have to trek a 500-meter steep slope just to fetch water from the spring. This activity would take them one to two-hours to complete the job. For the children, longer hours would be needed whenever they are doing the same job. Since the water system employs a water pumping station servicing the three clusters of the community, the manual work done by the mothers and children will be lessened.

The clean water from the Paliparan spring will also bring health benefits to the residents.

In general, the ultimate benefit for women and children is the conversion of their time used in manual water-fetching to productive use and learning. Aside from this, the cheap monthly service fee (P50) of the project provides the families additional purchasing power for other basic needs. This is compared to the commercial water provider that charges P120 monthly service fee.

The water system capacity will be notched higher during rainy season from May to December. Since this project will ensure full maintenance of the whole system, its 17 cubic meter full capacity can be increased and extend the water service to nearby sitios.

In terms of the beneficiaries' participation in the project, it is noteworthy that SPBB had already established a management policy during the three-year operation of the potable water system. The three clusters have their own set of officers that manages the distribution of water and collection of monthly service fee. The maintenance aspect falls under the officers of SPBB.

## VI. Summary Project Budget.

An amount of **Fifteen Thousand Dollars** (**US$15,000)** will be requested for project expenditures such as cost of materials, technical supervision, series of community trainings (technical, organizational, watershed management, project/financial management) travel, coordination and administrative costs.

## VII. Sustainability

Part of the proposed project activities is to review and enhance the management system and policy of SPBB in managing and operating the water system. The management system includes distribution of water supply, collection of monthly service fee, and regular meeting-consultations with direct beneficiaries and among the management officers. This strategy is geared towards ensuring sustainability and continuous operation of the project.

The monthly service fee being paid by the beneficiaries, at present, will just be enough for minor maintenance cost. But if the full operation of the system regularly maximizes its full capacity, a projected additional income can be achieved. This, in turn, will provide space for SPBB to develop additional resource mobilization activities to augment the sustainability of the project.

Another sustainability project offshoot of the project is the development of resource mobilization through packaging of the natural mineral water coming from the spring. As mentioned earlier, experts have concluded that the spring water is of best quality and can be readily packaged and sell to potential markets. The water quality was validated from a recent health study by the Lipa City health office that concluded that diarrhea cases in Sitio Paang Bundok was lessened from 2005-2008 during the operation of the water system as compared to when the system was not yet installed and when it stopped operating from 2008 up to present.

## VIII. Impact on Women/Gender Mainstreaming Plan

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| Gender issues that need to be addressed for the project to positively impact on women and girls | Women are the most affected of manual water-fetching; their lost time in doing the job need to save for more productive and domestic work with the full operation of the potable water system. |
| Expected gender equality results, including impact on women | Maintain the 40-60 % representation of women in the SPBB management officers; increased awareness among project staff and community of women's right to management and services; increased access of women and girls to livelihood opportunities and farming or livestock activities given the conversion of their time from manual water-fetching to productive use, and availability of water resources. |
| Proposed strategies and activities to address the gender issues and produce results | Strategy – build gender equality into the design of project supported training, and other implementation activities including reporting.<br>Activities:<br>- Training on Water and Gender integrating Resource Management<br>- Review of management system and policy |
| Indicators for tracking gender equality results (to be integrated in the project's M&E) | Ratio of women to men officers in the SPBB operations management rank; Number of women and girls who benefited from the project. |

The related gender mainstreaming program of the project was supported by the present study being conducted by ENERGIA. Implementation of gender integration is presently being prepared within the framework of gender and energy. This whole process is seen to impact the gender mainstreaming plan, giving importance to the role of women in the project management and the community as a whole. As mentioned above, women's share in the agrarian struggle and installation of the water system project had been very crucial in achieving the success and sustainability of community issues and projects.

## IX. Impact on the Environment

The technical feature of the water system project is the utilization of solar-powered water pumping system that provides potable water to community. Solar power is considered as new and renewable energy (NRE) systems that generate and convert energy from renewable sources including sun, wind, water, and biomass for applications.

These small-decentralized systems are practically applicable for the marginalized rural communities that are in dire need of energy sources. Examples of these NREs are microhydro power system with a maximum of 100 kilo-watts capacity, solar photovoltaic system and wind turbine power system for home lighting and battery charging station, and small biogas systems. In the case of Sitio Paang Bundok, the hybrid solar-wind system was utilized to provide electric power to the pumping station.

Obviously, the utilization of renewable energy to power up any water system for small communities will, even in small amount, mitigate carbon emission that have been scientifically proven as one of the main cause of climate change. Commercial power utilities are still at the peak of utilizing industrial coal (producing carbon emission) to produce electricity for large-scale use. Thus, it is noteworthy that employing environmentally safe power source such as solar-wind system is a proven alternative to carbon-emitting power system.

Another positive environmental effect of the water system project is the preservation of the Paliparan spring. Since the spring is the water source of the project, SPBB will, at all cost, protect its natural landscape to maintain its watershed purpose along with the thriving biodiversity in the area.

In the future, the natural water system where the spring traces its source will need to be protected also. The natural water system source includes the Marquez and Malilit rivers up to the headwater from Mt. Malarayat.