PEOPLE'S PARTICIPATION IN RESOURCES MANAGEMENT

A CASE STUDY FROM UPPER NILWALA WATERSHED

The paper submitted by Eng. D Wijenayake which won the first prize of the Anton Award 1996 On "Water Related Infrastructure".

Abstract

This paper describes how a small village community in the Upper Nilwala watershed mobilized their collective wisdom and resources to develop micro hydro-power to meet their domestic energy needs. This case study highlights a number of key lessons that can be adopted and replicated elsewhere, particularly in respect of obtaining peoples participation in similar development and resources management intervention. This is a success story in which the government, people and a Non-governmental organization (NGO) joined hands together through a catalytic effort of an another external NGO to make a dream of a poor community in a remote village come true. It illustrates how the wisdom, enthusiasm, collective participation, and financial and human resources of the villagers were augmented with the financial resources available in government development programmes and the technical expertise available with a non-governmental organization.

The intervention began with entry of Shared Control of Natural Resources (SCOR) Project(See box) into the watershed. This case study is a specific instance which justifies the feasibility of striking a balance between production and protection with people's participation in managing land and water.

1.0 Location

Ilukpitiya is a small low country wet zone village situated in the Upper Nilwala watershed. The village falls within the Divisional secretary's division of Kotapola in Matara district of the Southern province of Sri Lanka. The village lies in the subwatershed of Bovitiya dola, which is a small tributary of the River Nilwala (Nilwala ganga). This village consists of 90 small farm families whose main source of income is derived from tea and paddy cultivation, the former being the major source of income. Figure 1 shows the location of the watershed and the village.

2.0 Resources Base of the watershed.

The Bovitiya dola subwatershed is 177.0 ha in size. The land and water in the watershed are the two prime resources that ensure the existence and livelihood of the villagers. The villagers are the major users of these resources. With respect to resources use, land is comparatively in a degraded state. Few decades ago, a major portion of the subwatershed had been covered with forest. But according to the participatory land use mapping conducted by the SCOR team, the present land use in the watershed is as follows.

2.1 Land use January 1994

Forest cover	-	10%	high forest(confined to hill tops)
	-	07%	degraded forest(hill slopes)
	-	08%	fern & shrub(degraded forest)
	-	05%	degraded stream & road reservations
Tea & Homegardens	-	70%	poorly managed lands(private lands & encroachments)

2.2 Planned change of land use under SCOR

Forest cover	-	25%	high forest
	-	05%	well conserved stream & road reservations
Tea & Homegardens	-	70%	well managed lands

The resources users were endowed with a potential for generating hydropower making use of an abrupt fall of water at Bovitiya dola. The story begins with the first meeting the team had with the resources users immediately after the commencement of the activities of SCOR in the watershed. These meetings were conducted as a strategy to develop the activity plan of the team for the two year duration of the first phase of the

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project. The purpose of the meeting was to have the users expressed the constraints faced by them in utilizing and managing the land and water resources, and obtain their opinion on how the resources can be used to improve their income as well as to protect and conserve the resources.

3.0 Identification of needs

The SCOR team had discussions with the villagers of Ilukpitiya to assess their needs and to identify required SCOR interventions based on their needs. During these discussions, the villagers expressed deep concern for harnessing the Bovitiya dola waterfall for generating electricity for both domestic consumption and small scale industrial development within the village. At the same time, they showed greater concern about the need for protecting the waterfall for their sustainable use as a sources of power. The villagers requested SCOR to assist them to construct micro hydro power plant tapping the waterfall with external technical and financial assistance.

3.1 Constraints faced by the users for realizing their dream

- Less attention by government officials to the remote village due to very poor accessibility.
- Less avenues available to the resources users to have contact with the government departments and development projects which were in operation within the district.
- Although the users had knowledge on the potential for hydropower development, they had no knowledge on how to obtain the support from other NGOs and government agencies.
- There was no government agency responsible for undertaking hydropower development at local level.
- Belief of the people that hydropower development would compete for water with the existing irrigation supply which uses the water from the same source.
- Also, all the users were interested in receiving electricity supply from the proposed micro-hydropower plant, but the users living far away more than 0.8 km (0.5 miles) from the point of generation (power house) are not benefitted because of technical difficulties in doing so.

4.0 Formation of the User's Society

At the casual meetings, consensus was reached among the villagers that they should;

i. Organize themselves into a cohesive group to develop and use the waterfall as source of electricity without hindering existing minor irrigation deliveries.

ii. Take measures collectively to conserve and look after the upper forest and other lands to protect the watersource with ensured sustainable use.

iii. Share a considerable portion of capital cost of construction in the form of voluntary and organized labour and capital contribution with any external donor who would provide technical and financial assistance to them for their felt need.

iv. Establish a battery charging centre for the benefit of users of accumulators for house lighting.

v. Take over the responsibility for post-construction operation and maintenance of hydropower plant using the revenues that would be collected from the sale of power generated to the consumers.

vi. Undertake necessary rehabilitation and improvements in the future at their own cost using the revenue generated.

The existing Tea smallholder society took initiative and summoned a general meeting of householders identified at the survey conducted by them as direct users of electricity from hydropower plant. Office bearers of the Bovitiya dola micro hydropower users society were elected and the responsibilities of chairman, vice chairman, secretary, vice secretary, treasurer and committee members were defined. A nine member committee was established to take immediate decisions. Each member of the committee represented a small group of users. Total membership of the society was forty eight. The society discussed with the farmer group, who have been irrigating their paddy tract under the minor irrigation system which tapped part of water at Bovitiya dola waterfall, regarding the use of excess water for power generation based on the agreement that priority will always be for irrigation issues.

The constitution of the society comprises of the following objectives and rules and regulations.

1. Construction of hydropower project & supply electricity for 48 households as agreed.

2. Charging of accumulator batteries utilized by far away users of the subwatershed.

3. Conservationof forest, tea lands, home gardens & stream and road reservations.

4. Operation and maintenance of the hydropower plant.

Rules and regulations.

1. Electricity is generated from the water in excess of irrigation requirement.

2. Each household is supplied with only 100w.

3. Every member should contribute Rs. 1500.00 in cash and supply construction materials & labour equitably for the construction of the project.

4. Every member should pay a monthly tariff of Rs. 0.25 per watt. to carry out operation and maintenance.

A resolution was passed to pay their cash contribution in monthly installments of Rs. 300.00 for five months. Cash contribution collected by the society was found to be insufficient to purchase transmission wire requirement as planned because the prices had increased at the time of construction. The society borrowed Rs. 110000.00 at 2% annual interest rate from Horagala Service Farmer Organization (SFO) which is the apex organization coordinating all the production-protection activities in the subwatershed. The SCOR has granted this money for SFO to be used as a revolving fund. The society agreed to recover the loan in two years after commissioning the project.

5.0 People's participation in design

5.1 Rainfall distribution

Table 2. Average monthly rainfall of Ilukpitiya

Month		Rainfall (mm)
January	-	166
February	-	90
March	-	206
April	-	259
May	-	353
June	-	303
July	-	171
August	-	167
September	-	262
October	-	338
November	-	365
December	-	164

Source : Records kept at tea estates

5.2 Hydrological Computation

The flow of the stream was computed measuring the stream flow during dry months of the year and studying the variations in the rest of the months. The design flow of the stream is 35 lit./sec.

Villagers specially the old people proved that Bovitiya dola is a perennial stream and they had experienced an average continuous flow throughout the year before destruction of major forest cover a few decades ago.

The SCOR officials assisted the society to establish contacts with Intermediate Technology Development Group (ITDB) which is a well known NGO providing consultanantcy for micro hydropower generation. ITDG visited the site on our invitation and the team comprised of ITDG, myself and villagers,inspected the waterfall and the location of diversion weir, inlet canals, forebay tank, penstock and power house were decided collectively.

I was able to convince the team about required structural components. The concrete diversion weir was decided to be built on rock foundation with steel anchors. A low level spillway incorporated with a regulating device was also provided in the diversion weir close to leftbank respecting villagers' opinion to protect collapsing rightbanks of the stream. A decision was made to keep the sill level of the irrigation pipe outlet at two inch below the sill level of hydropower conduit outlet to ensure priority for irrigation issues. The team decided to build a conduit made of concrete pipes as the inlet canal to lead the water flow into the foebay tank which was to be erected on a rock.The construction of concrete or rubble masonry inlet canal over the undulating rock would obstruct the flood flow. The forebay tank was located on a rock considering gently sloping land started form this place which facilitate laying of the penstock. The team decided to erect concrete columns at 7 ft intervals to support 30 ft. Span of penstock. The users society was advised to provide supports wherever possible using stone abundant in the area and the penstock made of PVC was advised to be covered to protect it from sunshine. The users intended to cover the penstock with gutters made of kitul palm available in the area. The team decided to provide silt exclusion devices at the diversion weir and forebay tank to protect turbine vanes from impacts of silt particles. Complying with the requirement laid down by the Central Environment Authority and forest department, users society was convinced to build a stone terraced leader drain to discharge outflow of the turbine back to same stream to minimize damages to environment.. The components of the project are shown in figure 2.

At the second visit, ITDG selected a place to construct the powerhouse which would not be affected by flood levels downstream. Feasibility report was prepared by ITDG after carrying out detailed investigations and design of structural components jointly.According to that the capacity of the hydropower plant was found to be 5 kW.

6.0 Implementation

The inhabitants of the subwatershed carried out a bamboo planting program along the stream reservations and tree planting in forest lands under Participatory Forest Project. Conservation and Production oriented activities have been adopted in their degraded homestead and tea lands too.

Watershed Resources Management Team (WRMT) is a forum established for SCOR Project implementation, comprising the representatives of the principal line agencies responsible for irrigation, forestry, land, agriculture, tea planation and agrarian services ,Non-government organizations (NGOs) donor agencies, private sector entities and organization of resources users. The functions of WRMT are ;

1. Provision of Professional expertise for watershed development,
2. Preparation of workplan for the development at the watershed level.
3. Recommendation of projects for funding.
4. Project review,monitoring and evaluation.

The proposal for hydropower development at Ilukpitiya was presented and discussed at WRMT meeting. The Forest Department officer gave special recommendation to the Project because the users have motivated to conserve the forest. The Agrarian Services department also gave due consideration and allowed the construction as the project is not going to curtail irrigation issues and there were no conflicts between the society and Farmer Organization. WRMT considered the proximity to CEB Grid which is about km and it was found that there was no approved electrification scheme to be implemented for this village in near future. WRMT granted recommendation to go ahead and decided to link with District Integrated Rural Development Project (IRDP) Matara to get funds mainly for electromechanical equipment.

Provincial Steering Committee (PSC) accepted the project proposal presented by WRMT and Director , IRDP consented to fund the hydropower project. The contract of procurement of electromechanical equipment was awarded to ITDG. In addition to the consultancy service provided , ITDG volunteered to supply a battery charger free of charge to be used for charging accumulators from electricity generated.

Supplying & services connected with electromechanical works have been arranged though a private suppliers under the supervision of ITDG.The society prepared a list of material and labour required to complete the whole job using my analysis. I provided expertise in resource allocation. The society planned to complete the construction of diversion weir during February and March which are the dry months of the year. The membership was informed the methodology planned to be adopted in carrying out construction works in a general assembly. They accepted unanimously the procedure planned to implement the project.

The members agreed to supply the quantity of material ordered in time and promised to attend Sramadana at anytime. The society was able to mobilize resources and members consensus was obtained to assign the secretary for allocation of people for the work each day and maintain material supply and labour attendance records. The women also participated in Sramadanas carrying bags of sand and serving tea for workers. The skilled members such as masons and carpenters took the leadership of the workforce. The courageous members reported for work early morning and departed late in the evening. The MPCS (Kotapola) supplies the materials to the society through Horagala SFO using IRDP funds. Technical officer attached to DS office, Kotapola assisted providing technical guidance. Fixing steel anchors, cleaning rock surface for concreting, fixing shuttering, and mixing and placing concrete was done very satisfactorily. The society was able to complete the construction of weir, inlet conduit, forebay tank and powerhouse systematically and qualitatively with the corporation of all members by the end of september 1995.

A lot of labour was involved in laying of PVC penstock and installation of electromechanical equipments. ITDG tested the plant on completion of the installations.The Rural Development Society and hydropower society got together and built the proposed community centre building close to the powerhouse.The Samurdhi Niyamaka coordinated the program and a separate portion of this building was allocated to accommodate the battery charging centre.

A part of this building was planned to be utilized for their fertilizer store and the meeting hall will be used to hold monthly meetings of the society.

The secretary of the society costed each members' material and labour contributions and presented at the committee meeting held at the end of the month. Disciplinary actions, such as imposing fines against those who broke the rules and regulations were taken to maintain the solidarity among the membership.The villagers of Illukpitiya were very this during last 7 month working till late night and treating the guests visiting the remote village.The most of the day to day problems arising out of the work could be solved summoning emergency meetings and arriving at democratic decisions.

The wires required for transmission were purchased and the society took steps to stretch them laying four main supply lines getting the service of an experienced technician.Electricity connections were given to the members on completion of their house wiring. **Based on religious and cultural believes the community had made a vow for The God of Getabaru Rajjurubandara at the temple of Kotapola and they fulfilled the vow after completion of the project.Eventually the project was commissioned on 14th December 1995 by Honorable Chief Minister for southern province and other government department officers on the invitation of the chairman,Micro Hydropower society.**

7.0 Operation and Maintenance

Consensus was reached in a general meeting of the society that each member should pay Rs. 100.00 per month to the society so that the society can pay Rs. 4800.00 monthly to SFO to recover the loan.It was decided that the consumers have to pay Rs. 0.25 per Watt(25.00 per household) monthly as tariff charges in addition to the above. The society hope to generate funds by charging accumulator at rate of Rs. 20.00 per each. The monthly revenue of the society will be Rs. 1600.00. This money will be utilized to carry out O & M improvement. The society has deployed a member trained by ITDG on O & M works of the Power plant paying a small wage. The SCOR has planned to train 3 members on leadership and financial management as well.The villagers intend to start small industries such as setting up a grain milling machine as an end use of the project.

8.0 Conclusion

The key lessons learnt indicated the replicability and importance of the following interventions.

- Micro-hydropower is an incentive for user to adopt production -protection related interventions.
- Micro-hydropower lessens the strain on the National grid while maximizing water productivity
- It creates an environment where user contribute for development activities by means of money, material and labour. The total users contribution is 41%(See table 1).
- This gives an opportunity for a viable approach in the absence of state organization to handle this type of resource development at local level.
- Although the National policy is to develop micro hydropower, no institutional arrangements exists to do so. Under such circumstances this approach has become a viable alternative.
- This is a venture which ensures people's collective efforts, their unity and integrity in the village concerning the-long-term development and sustainablity of natural resources..
- This is an approach which enhance people's autonomy in managing their resources with production and protection balance while relieving the government of its caretaker role.
- This involves fund generation to meet cost of operation and maintenance, cost of replacement of plant components in the distant future, while enhancing agricultural productivity.
- As mean of generation of employment to rural youth
- This provides an opportunity for conflict resolution regarding the issues such as irrigation versus power, as water will be used for both purposes without interfering with either users;
- Benefits will not only be limited to direct users around the hydro power plant but to those far away through charging their batteries used for house illumination

9.0 Reference

MICRO-HYDRO DESIGN MANUAL;Adam Harvey,April 1993 A guide to small scale water power schemes.

10.0 Acknowledgement

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11.0 Appendix I

Introduction of SCOR

The purpose of SCOR Project is to assist Sri Lanka to intensify sustainable productivity of land and water resources within selected watersheds. The Upper Nilwala watershed was selected as a pilot area for trying out this concept, approaches and strategies on experimental basis and to learn lessons for further refinement of the concepts and strategies with a view to expand and replicate them on a larger scale elsewhere. In essence, it adopted an approach that had a dynamic balance between production and protection as the key to managing land and water on sustainable basis through people's participation. The SCOR Project is a collaborative effort of the Government of Sri Lanka,The United States Agency for International Development(USAID) and International Irrigation Management Institute (IIMI).

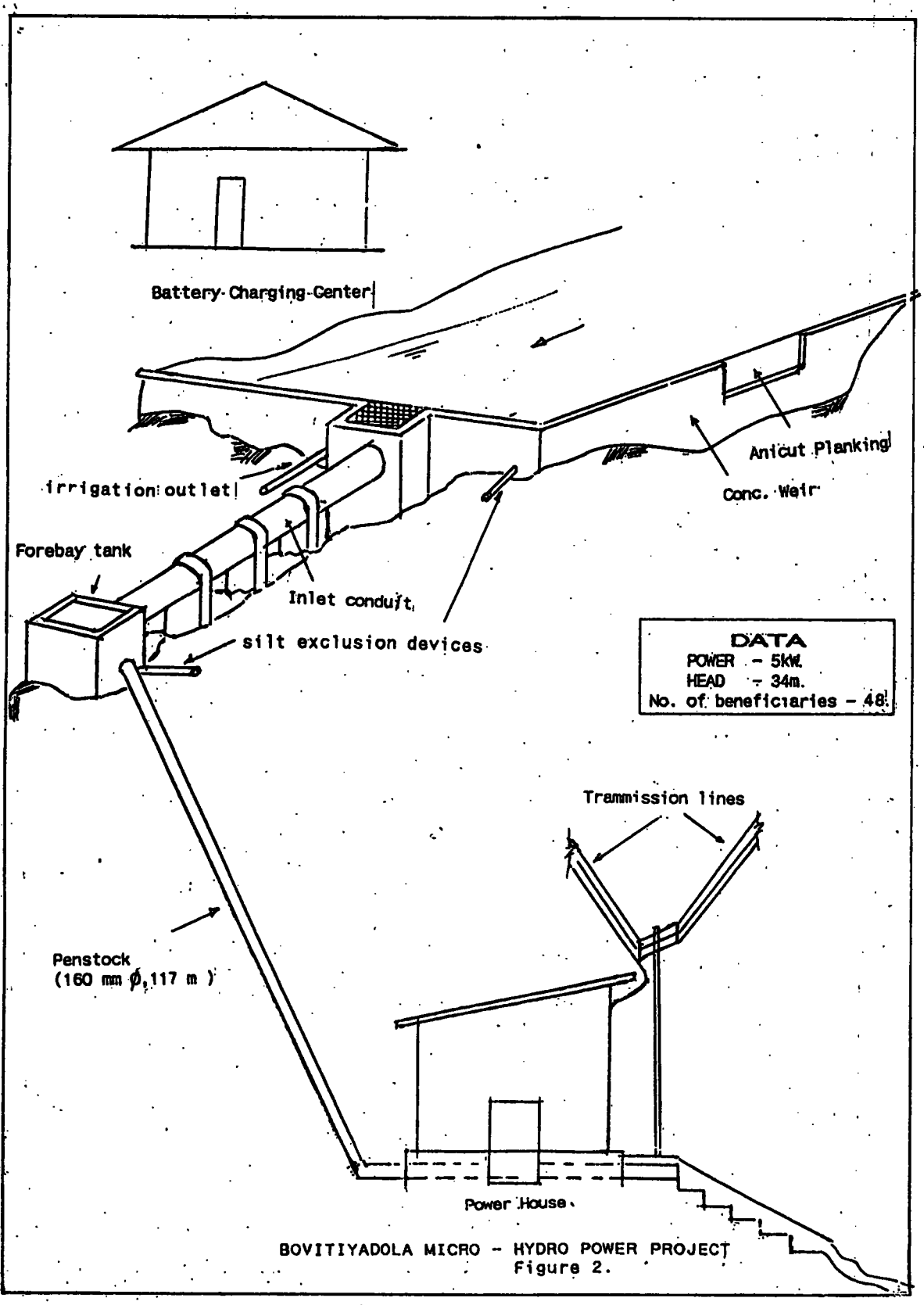
Table 1. Cost of the Project and Donor and User Contributions

Description	Cost Rs.	Agency Contributions
1. Cost of materials for civil work. (Cement,steel,bricks, conc.pipes, roofing materials, doors,windows and gates)	68,010.50	IRDP
2. Cost of locally supplied materials. (rubble,metal,sand shuttering and etc.)	18,350.00	User Society
3. Cost of Labour. (Skilled and unskilled)	64,750.00	User society
4. Cost of electiomechanical equipment and connected services.	295,850.00	IRDP
5. Cost of battery charger.	15,000.00	ITDG
6. Cost of transmission. (wires and Cost of stretching)	143,586.00	User society
7. Cost of transmission posts.	6,600.00	User society
8. Cost of local transport and miscellaneous expenditure	30,000.00	User society
Total	642,146.50	

Total Users contribution = Rs. 263,286.00

Total Donor agency contribution = Rs. 378,860.50

Users Contribution/Total Cost = 41%



BOVITIYADOLA MICRO - HYDRO POWER PROJECT
Figure 2.