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# SHARED CONTROL OF NATURAL RESOURCES (SCOR)

## SCOR ACHIEVEMENTS IN PHASE I AND WORK PLAN FOR PHASE II

### Part II

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In the sub-watershed, participatory appraisal of the characteristics of resource uses and users as well as mapping of **current** resource use are done by groups comprising of resource users/farmers, local officials of government agencies such as Tea Small Holdings Authority, Agriculture, Forestry and Agrarian Services departments, IIMI-SCOR professional and catalysts. The SCOR catalysts take the lead role in preparing the resource use maps and recording information.

A participatory resource management "mini projects" are formulated for each pilot sub watershed. The "mini projects" aim at changing the present *land and water use pattern to a more profitable and diversified resource use combining production and conservation using appropriate technologies/ techniques, novel shared control arrangements and resource augmentation*. New commercial enterprises and conservation practices in a typical sub-watershed in the Huruluwewa Watershed include: integrated wet and dry season water management in command areas (eg: water saving techniques to improve cropping intensity and introducing short duration commercial crops in the dry season, cultivation of medicinal plants, fruits and vegetables in *chena* (shifting cultivation areas), processing industry for medicinal plants, stabilized cropping patterns for *chena* (shifting cultivation) and highlands, contour bunds to cover the entire area, water harvesting techniques, etc. This means that such pilot sub-watersheds have "action plans" that guide them along a path to the planned future from the current status of resource use.

### **Special Research Studies**

SCOR, in its totality, is a Participatory Action-Research Project. However, a series of special studies are built into the SCOR process to assist the **planning, monitoring and evaluation** process. The subject areas of research include :

- Integrated Water Management in Watershed
- Conservation farming in underutilized highlands
- Production and conservation in paddy, tea and other croplands
- Integrated planning and coordination in watershed
- Organizational development and shared control.

### **SCOR Implementation**

SCOR is implemented in two Phases. The Phase I commenced in October 1993 and ended in October 1995. SCOR Phase II began in November 1995 and is expected to be completed in October 1999.

### **Organization of this Special Report**

**This is a Special Report prepared for the members of the SCOR National Steering Committee for discussion only.** It is organized in 4 Sections. Section I is a summary of SCOR achievements in Phase 1. Section II presents the Work Plan for SCOR interventions in Phase II. Section 3 summarizes the Work Plan for M & E and Research and Section IV outlines some selected SCOR research outputs.

## SECTION I

### Achievements During Phase I

#### 1.1 HURULUWEWA WATERSHED

##### 1.1.1 INTEGRATED PLANNING AND COORDINATION

Integrated approach adopted in the management of watershed resources at sub-watershed level produced experience in mobilizing stakeholders for collaboration. Collaboration by the resources users, line agencies, NGOs and private sector agencies and individuals is a necessary condition to effect the synergy as the outcome of integration. Sub-watershed level planning and interventions have evolved mechanisms and institutions as Watershed Resource Management Committees (WRMT), working groups and Provincial Steering committees to mobilize individual efforts in a collaborative way to make watershed resource management decisions and implement them.

In the participatory planning process, "mini projects" have been prepared for each pilot sub-watershed (in Huruluwewa as well as Nilwala) focussing on the **integration of conservation and production activities**. This process, however, is not discussed in this section. (Please refer Section II for planning process).

**Collaborative efforts were made in 28 sub-watersheds covering 8256 ha of land with 6780 participating farm families and 32 user groups, 29 organizations, and two farmer companies, 20 government agencies, 7 NGOs and private sector agencies by the end of December 1995. Task forces of Multi-disciplinary teams** working to accomplish specific tasks sharing resources have become a useful vehicle for further collective action in future.

**Inter-agency collaboration** resulted in the offering of support by the government agencies to implement practices agreed for increased production and conservation. The Forest Department linked participatory forestry program to the open forest areas of the sub-watersheds while Several other agencies including the departments of agriculture, irrigation, agrarian services, coconut development, animal production and health, divisional secretariat and the irrigation management division linked their programs to other sub-systems of the sub-watersheds to adopt sustainable production and conservation practices.

Thriposha Ltd., a **private company** purchased Rs. 15.4 million worth of Soya from Huruluwewa **Federated farmer Organization** on prior agreement and Colombo Trade Chamber, another Colombo based private company helped form Habarana Green Path Company, a farmer company to collect, process and market agricultural produce such as Sesame, Mee, Neem, Tamarind, and Mustard with **forward contracts**. Several other companies are involved in business activities with farmer organizations in the watershed.

**Banks** supported farmer organizations to help finance their economic ventures of their sub-watershed action plans. Peoples Bank issued the single largest credit of Rs. 4 million to Huruluwewa Federated Farmer Organization which obtained another Rs. 4 million from the Agricultural Fund of the Ministry of Agriculture.

**Integration by beneficiaries themselves** could be seen by the decision-making of the representatives of the Feeder Canal, Catchment and command area farmer organizations on the use of water from the feeder canal allowing the flow of about 6000 acre feet of water to Huruluwewa. Such initiatives, although much hard to come by, were possible due to the **collective vision** and efforts made by the relevant individuals and agencies.

### 1.1.2 POLICY INTERVENTIONS

Several policy interventions were initiated for adoption including the granting of a temporary permit until legislation is completed or **user rights** where possible to users who protect state lands/reserves with a production conservation plan. A **Cabinet decision** has been made to reorient the functions of the Irrigation Management Division to include watershed management tasks in their program of work.

The ability to promote policy initiatives to originate from farmer organization level was demonstrated in the deliberations made by the 13 farmer organizations in the Mahaweli Feeder Canal area in making land and water use decisions. Farmer organizations discussed the need for each organization to adopt a policy by themselves not to allow any encroachments on the hillsides of the feeder canal to protect the common interest. Once adhered it is this type of policy decisions that should be formalized by the provincial and higher level authorities. Decisions have been made to treat this area as a special project area of Mahaweli to support such initiatives.

### 1.1.3 INSTITUTIONAL DEVELOPMENT

As mentioned under **Integrated Planning and Coordination**, the current project effects realized are the result of the inputs from institutional development which produced, through SCOR catalyzing process, the functioning of resource user groups, organizations, and companies having interactions with large number of government agencies and several **NGOS and private sector agencies**. The functioning of the working groups, **WRMT, PSC and NSC** indicated strong need for their being institutionalized to continue to give the type of leadership to the resources management decision-making process. The emergence of the volunteer catalyst, **mini-project** (Sub-watershed Action Plan), links with Banks, Private sector companies and NGOs and networking among farmer organizations **sharing financial resources** are signs of an economic and social organization and institutional arrangement to respond to the need of **new mode of production, marketing and exchange**.

#### 1.1.4 RESOURCE USER SUPPORT SERVICES

The institutional development and integrated efforts were supported by creating **8556 training opportunities** to resource users in organization and technology adoption in most cases in the field, in less formal arrangements. Such support included 117 training opportunities to government officers with **20 opportunities abroad** to learn resources management practices in similar and different conditions.

**Fifty four user grants** were given to resources user groups and organizations to the value of Rs. 3.9 million for income earning and resource augmenting practices. Most of these grants are used as **revolving funds** by the organizations. Investments were on a range of activities such as start-up activity as planting of trees of fruit and timber value on the feeder canal reservation, and funding pre-planned components of sub-watershed action plans (mini projects). **Farmer organizations working with commercial banks** use the grant money as collateral and draw credit to support implementing of their plans.

**Women's groups** in tract 6 of the Huruluwewa command which is the most under-privileged area demonstrated ability to respond well to the production incentives and support services through links to various programs. They demonstrated the feasibility to transform farm lands and homesteads which had been once devastated through exploitative tobacco cultivation to productive croplands with their resource base conserved. They also demonstrated the ability to gain access to resources by obtaining 25 acres of state lands for **common pasture** and the ability to **integrate livestock** components to their homestead development work by acquiring cattle, goats and related services.

#### 1.1.5 SHARED MANAGEMENT OF NATURAL RESOURCES

The ability to offer **technologies** and practices for adoption in the typical sub-systems of sub-watersheds is a noteworthy achievement of SCOR during the first phase. Although it takes more time to establish resource use patterns there are signs of satisfactory adaptation of those practices in the sub-watersheds.

**Integrated water management** has 10 components to practice. Huruluwewa command and many small tanks such as Meegaswewa and Puwakpitiya demonstrated the promising effects of practicing those components that saved water for a second dry season Bethma crop under proper management. **Huruluwewa recorded the lowest "water duty"** among all the major schemes of the country in 1994/95. Maha and tanks under interventions had adequate storage of water saved at the time of harvest. The possibilities of efficient water use was well demonstrated and the problems and limitations in the use of water under dry conditions were recognized which is an important achievement for discovering options.

The achievements of **conservation farming practices** are first seen as its direct output of adoption by way of stabilized contour bunds and properly maintained drains and other



components helping better nutrient management and water harvesting techniques demonstrated by resources users. some of the immediate effects have been measured and the information generated was shared locally and abroad.

**Homestead development** models were demonstrated with production and conservation practices with the involvement of especially **women and youth groups**.

### 1.1.6 LESSONS LEARNT

1. Different types of sub-watersheds including cascade dependent sub-watersheds have been identified as pilot or sample areas for planned interventions. To assess the total impact in a selected sub-watershed the interventions be implemented to cover the entire area,. Hence, the sub-watersheds should be taken as contiguous blocks of land and interventions should be planned to cover the total extent. In cascade based sub-watersheds the major components are catchment, command, tank and drainage.
2. participatory approach to reach agreement between the experts, officials and resources users in implementing the interventions proved successful.
3. Benefits from the line agencies in the form of materials, extension services or subsidiaries and also direct involvement in interventions are possible through successful coordination between the user and line agency.
4. Implementation of a few identified activities is possible while planning process is going on so that the farmers would response positively.

The lessons learnt during the phase I following participatory processes were used to prepare plans and implement activities in sub watershed in the Second Phase.

1. Selection of critical Sub-watershed. Criteria for selection.
  - a. Degraded resources
  - b. Available man power
  - c. Potential for improvement
  - f. Low income levels.
2. Preliminary survey and awareness creation.
  - a. Minimum possible data collection and create awareness among resource users and officials.
3. Participatory-Rapid Mapping survey and database development.
  - a. Maximum Participation of resource users, officials and also school children.

- b. Creation of updated and relevant database for watershed management.
- 4. Participatory Planning.
  - a. Preparation of resource users' plan before the Planning Workshop.
  - b. Involvement of experts, officials and resource users to adjust the plan in a workshop
  - c. Form task force for implementation.
- 5. Preparation of Project Proposal
- 6. Implementation.

#### **1.1.7 THE SPECIFIC (SELECTED) ACHIEVEMENTS DURING THE FIRST PHASE**

- 1. Formation of farmer federation by merging the command and feeder canal (catchment) farmer organization.
- 2. Awareness among users on the importance of reservation restoration such as forest, stream and eco-systems through active participation in tree growing and involving reforestation programs.
- 3. Identification of the timeliness of cultivation as a water saving method in small tanks, for a second crop to grow in Yala.
- 4. Conservation farming if implemented as recommended the moisture or soil fertility levels could be improved and a successful crop growth could be achieved under lowland and upland conditions. Moisture stress in uplands could be reduced.
- 5. Enterprise Development and other economic activities as "key" towards conservation. This was an integral component in sub-watershed "mini projects" and helped motivate users.

## 1.2.5 SHARED MANAGEMENT OF NATURAL RESOURCES

### 1.2.5.1 Micro-hydro Electric Power Generation

SCOR facilitated and linked Intermediate Technology Development Group (ITDG), IRDP and group of farmers at Illukpitiya to undertake the Bovitiyadola micro-hydropower generating project. In this connection, a power house with a 5 kW- capacity generator was completed and 48 direct beneficiaries of this project have installed transmission lines to their homes from the plant. Also 22 houses within the sub-watershed are provided electricity through batteries charged from this installation. The total expenditure was Rs. 635,727.00 and IRDP has granted Rs 388,951.00. Bovitiyadola Micro-Hydropower Users' Society has taken a credit amounting to Rs. 115,000.00 at an annual interest rate of 2% from the Horagala Service Farmer Organization (SFO) to purchase transmission wires on the agreement to pay back the loan in two years. Rs. 72,000.00 was collected from the users and they further contributed Rs. 174,876.00 in the form of labor and material. Government sponsored **Samurdhi Program of Ilukpitiya village joined hands** with the hydro power society for the construction of the **community center** together with a fertilizer store and the battery changing center. Micro hydropower project is linked to **conservation of its hydro-catchment** for sustained power generation and one hectare of denuded forests were enriched under conservation forestry component of the PFP by a farmer group.

For the Talbandi Dola micro hydroelectric power generation project at Uduhupitiya, following the initial preliminary investigations by SCOR, feasibility study was completed by the ITDG and the Southern Area Development Authority has already allocated money. The already formed users organization has collected Rs. 22,000 from its 44 members as an initial working capital.

SCOR and ITDG has carried out investigation for development of micro-hydro electric projects jointly and produced feasibility report for Andaradeniya Micro-hydro projects.

### 1.2.5.2 Forestry and Agro-forestry

Arrangements have been made to **grant user rights to 27 users** engaged in reforestation of 12 ha in Morawak-kanda in Milla-Ela area under participatory forestry project (PFP). In this respect, agreements have already been signed between the Forest Department and the users. One hectare of degraded forest in Horagala and 4 ha in Milla- Ela were reforested under PFP and the users have planted 5,493 seedlings obtained from their own nurseries. One hectare of degraded forest at Bataandura and two hectare forest at Aninkanda were reforested with participation of people.

Six **nurseries operated by user groups** and registered with the Forest Department continued to supply plants for the enrichment planting, agro-forestry, homesteads, and stream and roadside reservation planting in the four sub-watersheds. Already they have issued about 40000 plants in this respect.

**Planting of 12,000 seedlings** of different species of trees, both forest and fruit plants, in the Dothalugala forest (5 ha) was completed by the Dothalugala Heritage- a NGO, and the **maintenance of the plants** is attended by the same organization at three month intervals.

Establishment of agro-forestry systems was initiated in 91 ha, mainly in tea lands encroached into forest reserves and unsuitable for a tea monocrop without intensive conservation measures due to their location on steep terrain. In these lands, 17,000 forest/fruit plants were established while encouraging the users to adopt appropriate soil conservation practices.

**Training programs** for resources users were held in collaboration with line agencies to make them aware of the importance of reforesting the degraded forest reserves and to provide field demonstrations on proper techniques of reforestation.

#### **1.2.5.3 Stream and Road Reservation Planting**

About **72.5 km of stream reservations** were enriched by planting 12,300 forest and fruit plants. Plants numbering 9,300 were established on a 28 Km length of roadside.

#### **1.2.5.4 Usufructual Rights**

There were 115 users who have applied for rights to collect six different **non-wood forest products** from the forest reserves and the Forest Department has agreed to investigate the feasibility for such a venture. The FD agreed to grant the **rights for harvesting** of bees' honey, sap of Kitul, Beraliya and Goraka. However, prior to giving user rights for exploitation of Rattan, Weniwel, etc a prerequisite of resources inventories was pointed out.

An arrangement between **Lanka Pinus Industries Ltd.**, and **Shramashakthi** non-wood forest product organization was made for an **oleo-resin tapping** project covering 111.2 ha benefitting 40 members. Tapping of trees was started by Aninakanda Pinus resin tapping organization and 5,000 Kg of oleo-resin have been sold by 42 user members to the company at the end of 1995. In January the highest income earned by a member was Rs 4300.00.

#### **1.2.5.5 Improvements in Tea Sector**

An extent of 936 ha of tea small holdings and 138 ha of estate tea lands have been brought under enhanced production and protection practices in the four sub-watersheds with continued catalytic functions for wider adoption. **Tea small holders and estate owners/managers** have accepted **vegetative hedgerows** as an effective conservation practice. As at end March 1996, about 90,536 ft of **Vetiver hedgerows**, 30,106 ft of **SALT hedgerows** and 55,400 shade trees have been established in tea estates and small holdings. These practices seem to have a wide spread effect within and outside of the project area.

Under the **IRDP-Matara**, people of low income group were provided with 6,000 tea plants. Five user organizations have engaged in input supply for tea and they have supplied

110,000 kg of fertilizer and 36,500 kg of dolomite to their members. Two organization have entered into the green leaf marketing activity in Horagala and Morawaka.

**A tea nursery of 50,000 plant capacity** was commenced at Milla Ela and already about 10,000 cuttings have been established. These plants are produced for the infilling program planned under the Ihala Millawa production and protection project formulated by the Ihala Millawa farmer organization with the facilitation role played by SCOR. In addition to tea plants, 2,000 pepper plants are also expected to be produced in this nursery.

By end of March 1996, **more than 3,000 tea small holders were trained** on proper techniques and methodologies regarding soil conservation and regular maintenance of conservation measures; shade management; application of fertilizer and organic manure; pruning and plucking; and maintenance of a plucking table and a good ground cover through a good canopy cover. These training programs were arranged through Tea Small Holders Development Authority and Tea Research Institute. These programs included lectures, field demonstrations and video presentations. In addition, Tea extension officers regularly visited some of the selected tea lands in the watershed to enable surrounding farmers to participate in the field training. Also, 10 tea land holders were trained at TRI on nursery management.

Apart from group training, SCOR catalysts attended to individual resources users to promote conservation practices by convincing the importance. Also, discussions were initiated with some owners of remote controlled degraded tea lands, who are not resident in the area, to ascertain the possibilities of improving their lands with alternate management arrangements.

#### **1.2.5.6 Improvements in Paddy Sector**

Interventions, such as **renovation of anicuts**, improvements in **irrigation and drainage channels**, have enhanced the production potential of 64.5 ha of paddy lands under minor irrigation schemes.

In Potuwila Yaya paddy tract with money allocated by the Provincial Ministry on Farmers' request, improvements in irrigation and drainage facilities were completed at Rs 266,000.00 including the users contribution. Renovation of a diversion weir (anicut) at Annasidola, Milla-Ela was completed at Rs 25,000.00 including 19% contribution from the users with SCOR interventions. This was a breakthrough because even the 10% contribution from users required under NIRP is a problem in the wet zone.

Under the **land consolidation effort**, surveying and blocking out of paddy lands were completed in 5 acres among 30 owners of Pahala-Egoda Kumbura; 3.5 acres among 20 owners in Pahala-Mulana-Amuna Yaya; 3.53 acres among 29 owners in Potuwil-Yaya as the initial step.

### 1.2.5.7 Improvement of Homesteads

Under the **homestead development** program, interventions were initiated to motivate resources users for **production and protection in 218.3** ha of homesteads. Service farmer organizations and resource user groups have supplied 39,320 plants to 2,540 homesteads (including those adjacent tea lands accounting for 224.3 ha) by making use of their revolving funds as well as the free plants issued by the Forest Department, Department of Export Agriculture and Coconut Cultivation Board.

In Horagala, 17 farmers have **planted banana** plants under the **IRDP subsidy scheme** which provided Rs. 250.00 for 25 plants and 25 kg basic fertilizer to each farmer. The fencing was completed using revolving funds from the Bovitiya-dola mini-project.

SCOR facilitated **Anthurium growers** by providing 4,000 improved plants. The cumulative total production of flowers at the end of 1st quarter 1996 is 3,600.

The Hingurupanagala nursery managed by a women group has raised 3,000 plants to meet the requirement of villagers interested in homestead planting.

Iddagala **Goat rearing** Group has already purchased 4 male and 10 female animals and this was facilitated by a Rs. 15,000.00 loan obtained from the Anninkanda Service Farmer Organization.

SCOR facilitated to establish **64 bee colonies** and some of them were failures due to lack of technical know-how and training. However, bee keeping project under the Kalana NGO is now in progress and in Milla-Ela and Diyadawa- Thenipita 55 bee colonies have already been established by them. Bee boxes and technical know-how is provided by the NGO free of charge.

For **promotion of inland fisheries**, 4800 fingerlings of four species were introduced to the Maramba Wewa in the Digili-Ela new sub-watershed, which is considered for interventions during the Phase II.

Many training programs were held in collaboration with line agency officials on bee keeping; coconut cultivation; growing, harvesting, **processing and grading** of export agricultural crops; nursery management; growing of grass species (*Bracharia* & N.B. 21) on road and **stream reservations**; etc. Practical training classes were conducted for resources users even in places outside of the watershed. For instance, 27 *Anthurium* growers were trained at the Peradeniya Botanical Garden. **Grafting/budding** techniques were provided at Labuduwa Agricultural Training Center.

## SECTION 2

### PHASE II WORK PLAN

#### 2.1 SCOR VISION FOR PHASE II

SCOR visualizes that by the end of the planned period,( 1999) the project will have produced the following:

1. Manuals with guidelines and procedures for,
  - (a) the identification and characterization of watersheds and their resources,
  - (b) the assessment of resource use constraints,
  - (c) the formulation of action plans for
    - (i) the use of technology appropriate to increase efficiency of resource use in sub-systems of sub-watersheds,
    - (ii) the mobilization of resources through government, commercial and non-government sources,
    - (iii) the adoption of organizational mechanisms to develop and maintain necessary linkages (production and marketing),
    - (iv) the increased and sustainable productivity of resources, increased welfare and equity,
  - (d) the design of information systems which would provide information for watershed resource management planning and implementation at sub-watershed and watershed levels, and mechanisms for monitoring and evaluation, and
  - (e) integrated, collaborative planning for watersheds with defined roles for the government, NGOs, private sector agencies and individuals and research institutes.
2. By the end of the planned period, SCOR will have demonstrated the applicability of a combination of technologies and organizational arrangements for replication in the two pilot watersheds and several other watersheds through spread effects.
3. By the end of the fourth year of operation, SCOR jointly with the WRMTs, Provincial Steering Committees and the National Steering Committee will have adequate information to deliberate,

- (a) whether participating farmer/user organizations, federations, companies, NGOs, private sector agencies/individuals and the government agencies have developed, adequately, capacities to play the role of strong stakeholders to safeguard their share of control of resources, mobilize resources for action plans and influence decisions for watershed resource management,
  - (b) whether WRMTs have got institutionalized for managing diverse interests of resources use with conflict resolution, negotiation and collaboration by participating NGOs, farmer/user organizations, federations and companies, private sector representatives and government agency representatives, and prepare/update watershed resources management plans giving leadership that is provided now by SCOR watershed office in the watersheds,
  - (c) whether provincial Steering Committees got institutionalized to support WRMTs by channelling state services and resources where appropriate to plan/update and coordinate watershed resource management plans within the province and give leadership that SCOR Colombo Office provides at provincial level,
  - (d) whether the National Steering Committee is institutionalized as a formal committee if desired backed by a unit in the host ministry to ensure initiating/ effecting policy/procedural changes that are made necessary as SCOR outcomes, ensure collaboration of government agencies to provincial and divisional level to watershed management activities, and if and when necessary, initiate action to mobilize external resources for watershed management plans fulfilling the role of IIMI at national level, and
  - (e) whether an appropriate research institute such as AR&TI or RD&TRI could function as an agency to provide the training of catalysts for an expanded watershed resource management programme covering a larger number of river basins in the country.
4. By the end of the fourth year, SCOR will have produced research output with,
- (a) objective analyses of effects and impact of interventions in the watersheds,
  - (b) Assessments of capacity building, awareness and adaptation of technologies by resources users, and
  - (c) analysis of conditions under which interventions are most likely to produce desired outcomes of optimal resources use with production and conservation.
5. The fifth year could be used for the phasing out activities depending on the deliberations upon reviewing the above information so that SCOR watershed



management planning and implementation process could be adapted in other watersheds in the country in a sustainable way through collaborative efforts of the state, NGOs, farmer organizations/federations/farmer companies and private sector agencies and individuals.

## 2.2 SPECIFIC OBJECTIVES OF PHASE II

As mentioned in the SCOR Technical Proposal (November 1995), phase II of the project will:

- (a) Further develop, test, establish and strengthen models for increasing the sustainable productivity of natural resources (land and water) in sub-watersheds in the present areas of operation;
- (b) Apply and experiment on the models in other locations within the present watersheds (Huruluwewa and Nilwala) and in other selected watersheds which offer potential for replication with due consideration to the varying hydrological, land and socio-economic interventions.
- (c) Extend and apply the models to above areas in simultaneous operations, internalize SCOR concepts, approaches and strategies, technologies and techniques, and management and organizational capacities primarily within Watershed Resources Management Teams (WRMTs), comprising the representatives of the principal line agencies responsible for irrigation, agriculture, forestry, land, and agrarian services and Non-governmental organizations (NGOs), private sector entities and organizations of resources users. This will be achieved through further strengthening of the Steering Committees, Working Groups, WRMTs and sub-WRMTs, and collaborative linkages and inter-institutional sharing of knowledge and skills, in all the above areas of operation. **These efforts will lead to a gradual withdrawal of IIMI-SCOR professional staff in favour of increased responsibilities being undertaken on a shared basis by the above governmental and non-governmental organizations.**
- (d) Facilitate changes in policies/procedures relating to land and water resources utilization and management by highlighting all issues and the directions for policy initiatives based on experimentation and lessons learned by SCOR in the field.

## **2.3 SCOR COVERAGE AND TARGETS IN PHASE II**

### **2.3.1 Huruluwewa watershed**

For the purpose of SCOR, the Huruluwewa watershed is defined as the area covered by the catchment of Huruluwewa Tank up to Habarana Wewa, water-spread area of Huruluwewa reservoir and the area between Huruluwewa dam and the point of confluence of Adappan Oya with Yan Oya. The latter area includes the command area under Huruluwewa reservoir, highlands and drainage area. The watershed consists of the upper part of Yan Oya and Huruluwewa Irrigation system and a large number of minor tanks. This area falls within the Divisional Secretaries areas of Galenbindunuwewa, Palugaswewa, Kekirawa, and Kahataghasdigiliya. In addition to the above area, SCOR interventions covered a stretch of land and the feeder canal conveying Mahaweli water to the Huruluwewa tank. This area does not strictly fall within the defined Huruluwewa watershed. However, this area has been included as the issues involved in the serious disruption to the inflow of water to the Huruluwewa are intimately connected with the problems of the Huruluwewa watershed. This area falls within the Divisional secretaries areas of Dambulla and Naula.

The important land use patterns are chena, irrigated agriculture, forests, homesteads and degraded shrub areas. The main problems are lack of water in the yala and weak management in Maha, degradation of the resource base and unorganized resource users.

#### **2.3.1.1 Interventions, areas covered, targets planned and time schedules.**

The following SCOR interventions formulated during Phase I, through a participatory planning workshop which included several visits to the watershed and meeting people and supported by preliminary studies of the land use pattern of the watershed conducted through the Land Use Policy Planning Division of the Ministry of lands (LUPPD) were implemented in 13 sub/micro watersheds in Huruluwewa:

1. Stabilized farming in chena lands and Encroached State Lands.
2. Regeneration of Tank Eco-system.
3. Integrated Water Management
4. Sharing Resources for Improving Homesteads.
5. Ground Water Development and Management.
6. Land Consolidation in Minor Tanks.
7. Integrated Planning and Coordination.
8. Organizing User Groups, User Organizations, Sub-user Councils for Production, Protection and related services.
9. Research.

SCOR interventions in the selected locations and sub-watershed plans formulated were not annual or inflexible exercises. Given the experimental nature of SCOR models being tested, SCOR planned that the full benefits or sustainability of the models could only be assured over time; at least during the full duration of the 6 year SCOR Project. Hence, the work started on the first set of watersheds need continued review, mid-course correction, adjustment and facilitation and support and strengthening by SCOR and involved participants. The Phase II Work Plan ,therefore, provides for continued attention to the areas already covered.

The sub-locations covered during Phase I and the new locations selected for Phase II are shown in **Map II-1**. **Table II-1** shows activities under each intervention, the targets of land extents to be covered, numbers of project tasks accomplished and farm families involved planned under each sub-watershed. The time schedule for implementation is shown in **Table II-2**. A summary of Phase II activities and targets are shown in **Table II-3**.

### **2.3.2. Nilwala Watershed.**

The Nilwala watershed is located in the low country wet zone of the Southern Province, covering an extent of 146,280 ha. It is distinguished in terms of the upper watershed area and the area covered under flood protection and drainage interventions. The area selected for SCOR interventions is the upper section of the watershed, approximately 10,000 ha. in extent and covering the Divisional secretaries' areas of Kotapola, Pasgoda, Neluwa and Pitabeddera. Initially SCOR interventions were confined to the sub-watersheds of Aninkanda, Millawaela, Diyadawa-Tenipita and Horagala comprising a land extent of approximately 5000 ha. and within the same DS divisions except Pitabeddera.

The main land use types within the upper watershed are protected forests, degraded forests, highlands and homesteads covered with tea, paddy, rubber, coconut and fruit trees. Tea is the dominant crop covering about 40% of the total land extent.

#### **2.3.2.1 Interventions, areas covered, targets planned and time schedules.**

The following SCOR interventions formulated during Phase I, through a participatory planning workshop which included several visits to the watershed and meeting people and supported by preliminary studies of the land use pattern of the watershed conducted through the LUPPD were implemented in 4 sub- watersheds in the Upper Nilwala watershed:

1. Sharing management of land and water resources.
2. Sharing resources for improving homesteads,
3. Improving tea/paddy culture;
4. Organizing groups for production, protection, and related services;
5. Integrated planning and co-ordination; and
6. Research.

The sub-locations covered during Phase I and the new locations selected for Phase II are shown in **Map II-2. Table II-4** shows activities under each intervention, locations, expected outputs, the targets achieved in Phase I and the time schedule for implementation.

It will be seen that during the phase II, in addition to consolidation of interventions in 4 pilot sub-watersheds, SCOR interventions will be further expanded into four more sub-watersheds. The new areas for interventions were selected since they represent different agro-climatic and physiographic regimes of the Upper Nilwala watershed.

## **2.4. PLANNING METHODOLOGY AND PROCESS**

### **2.4.1 The lessons learnt from Phase I incorporated in Phase II.**

The planning methodology and process being adopted in Phase II have been further refined on the basis of lessons learnt from Phase I. SCOR experienced valuable lessons in Phase I and some of these include -

1. A better managed watershed has a better managed interactions and linkages between the resource users and resource base. Managing the diverse interests of resources users in different sub-systems of a sub-watershed by themselves need organization, technology and resources with desired supportive policy back-up. Reinforcement of forces and action towards such a management should be the operational strategy in the watershed.
2. A deeper penetration to resource user community and a flow of information are necessary in the initial interactions with resources users in sub-watersheds in order to reduce the time taken for the informal groups to achieve status of maturity and become deeply involved with interventions and monitoring.
3. Information on probable economic gains from interventions are necessary at the time of suggesting them to the users.
4. Arrangements should be made to ensure monitoring by participants from the time of launching interventions.
5. Indicators for measuring change should be agreed upon at the time of launching interventions.
6. Mapping of baseline status of resource use should receive priority to produce information facilitating the characterizing of sub-systems of sub-watersheds for constraint analysis, action planning and sampling for evaluation research.

7. WRMT should represent a sample of sub-watersheds and representative number of government officials of task forces for monitoring interventions and their effects:
8. Requests for selection of areas for spread effects should be considered with due recognition of the required capacity strengthening and the final goal.

#### **2.4.2 Steps in planning and implementation**

The planning methodology and process being adopted for phase II is elaborated in this section. It involves the following steps.

- a. Selection of Sub-watersheds for interventions
- b. Preliminary survey, awareness creation and Technical workshops
- c. Participatory rapid mapping survey and database development
- d. Participatory planning exercises
- e. Preparation of project proposal
- f. Implementation, monitoring and evaluation

##### **a. Selection of Sub-watersheds for interventions**

During Phase I period, a number of micro/sub watersheds were selected for interventions. These were selected on the basis of criteria such as the level of degradation of resources; manpower availability; potential for improvement; and low income levels of the communities. The interventions in those sub/micro watersheds were spearheaded by catalysts under the guidance and assistance of the other team members and the resource users in those areas. Most of the areas selected for Phase II are neighboring sub/micro watersheds to the intervention areas of phase I. This would facilitate the consolidation of phase I intervention areas and gradual withdrawal of SCOR staff including the catalysts while intensifying and expanding the new intervention areas.

##### **b. Preliminary survey, awareness creation and Technical workshops**

The catalysts overseeing the sub/micro watershed conducted preliminary surveys of the base line status including the present status, use and management of the land and water resources and their social and economic status. These surveys were done with the involvement of key informants like village elders, community leaders and village level officials. Data and information collected included present land use pattern, status of land and water, and forests; seasonal farming /non-farming activities, cropping patterns and intensities, rain-fall patterns; indigenous soil and water conservation practices; community data such as number of households, population statistics, household income, sources of income of the community, and; the village level community organizations.

This initial data collection exercises facilitated the establishment of rapport initially built up between the catalysts and the community leaders and village level officials, during Phase I. They became the key informants in this preliminary survey for phase II. SCOR project goals, objectives, approaches and strategies were discussed among the participants during the data collection process. This created an awareness among the participants about the present status of the resources and socio-economic base, the causative factors, ways and means of improving the baseline status and possible interventions for remedying the situation.

This process provides the catalysts a valuable opportunity to learn and practice how to initiate watershed plans more in response to the needs and aspirations of the community and the associated government and non-government officials. It serves as a preparatory step for the participatory planning workshops to be conducted later.

### **c. Participatory rapid mapping survey and database development**

The main outcome of this step is the development of a map of the sub/micro watershed. The map shows the details of resource use and status of each individual homestead and irrigated command as well as the forest and chena cultivated areas.

Participatory mapping exercises were carried out by catalysts with the participation of a wide section of the community, Grama Niladharis and field level officials of the Department of Agriculture, Irrigation Department, Agrarian Services Department, Land Development Department and the Forest Department. The participants identified the individual plots, plot boundaries, their extent, ownership and tenurial status associated with such individual plots, land use pattern and sources of water for the particular land parcel etc. Local School teachers as well as students too were also involved in this exercise at some locations. In places where there were community organizations for natural resource management and other community needs, the members and key persons of such organizations too involved in the exercise. When such organizations did not exist, attempts were made by the catalysts to get the involvement of the community leaders and the members in this exercise.

### **d. Participatory planning exercises**

The objective of this step was to formulate a development plan for the selected sub/micro watershed based on the data and information gathered during the participatory mapping exercise. For this purpose, a number of small and large group meetings were held with the community members. The participants reviewed and assessed current resource use and its future implications by using data collected with their participation. These group meetings facilitated the formulation of future goals for the selected sub watershed, possible interventions and draft action plan to achieve the stated goals.

The plans prepared by the community members were further discussed at a workshop attended by the community members, relevant line agency staff and SCOR technical staff

members. Changes and modifications to the draft plans were effected and the draft plans were further improved in the process. Decisions regarding the roles and responsibilities of each party for the implementation, monitoring and evaluation were arrived at these workshops. At locations where no resource groups and organizations were existing, formation of the resources user groups were initiated in the process of planning exercise. In places where some user groups and organizations were existing, those were strengthened to enable them to manage resources at sub watershed levels. In addition task forces were formed to assist the efforts of resource management at sub watershed level and monitor and evaluate the implementation of the plans. The task forces including the field level officers of the relevant line agencies working in the respective sub watersheds or relevant Divisional Secretaries divisions were formed .

#### **e. Preparation of project proposal**

The objective of this step was to convert the development plan to the form of a project proposal taking into account the technical feasibility, economic viability and environmental soundness of the anticipated interventions. This step involved the identification of appropriate technology and techniques, strategies, resources requirements and organizational arrangements that were required to operationalize the development plan and achieve the anticipated goals, outputs and impacts of the development plan. The inputs of the professional staff of the SCOR team as well as Agency staff were obtained in working out the above details of the project proposals. These project proposals, which are usually called "mini project proposals", were considered for further development if they were found to be economically viable. Approval for the mini projects were obtained from the Water Resource Management Teams (WRMT) which included the above task force members and the relevant Divisional Secretary. Once the project was approved by the WRMT, it was scheduled for implementation.

#### **f. Implementation, monitoring and evaluation**

The implementation of the mini project is done by the resource user groups and organizations formed for the purpose under the guidance and assistance of task forces and WRMT. Regular meetings of the resources users are held and the problems associated with implementation are discussed and solutions sought by the members at the user levels. Task force which play a facilitating role comes to their assistance in case the community members cannot find solutions to certain problems at their level. In such cases assistance of the WRMT and other higher level committees like Provincial Steering committee, National steering committee is sought.

Progress monitoring and evaluations are done at various levels such as user levels, task force level, WRMT level, Provincial and National Steering Committee levels. In addition, effects and impacts of the project are evaluated scientifically by SCOR researchers with the collaboration of the relevant line agencies and users.

### **2.4.3 MODEL SUB-WATERSHED DEVELOPMENT PLANS**

Some examples of the application of different aspects of the SCOR sub-watershed planning methodology and the process explained above, are outlined below:

#### **2.4.3.1 Kokawewa Sub-watershed Management Plan**

Kokawewa is a cascade system comprising several minor tanks. Minor tank systems in this cascade include Ratmalwetiya, Ihala-kokawewa (Nochchittotama) and Pahala-kokawewa. This cascade system drains into the canal which takes water from Kiulekada tank to Huruluwewa major command ( Map II-3 ). Tittellewa and Kokawewa old villages are located in this system. Kokawewa sub-watershed is situated at a higher elevation of the north end of the Right bank of Huruluwewa major command. This area includes Kokawewa and Palugollagama Grama Seva Divisions of Galenbidunuwewa Divisional Secretary's Division of Anuradhapura District.

Kokawewa sub-watershed gets about 1000 mm annual rainfall, 75% of which is received during the North-east monsoon season (mid october mid-January). The balance rainfall is received during two convectional rainy season ( April-May and September and October). A very low rainfall is received in the area during the South-west monsoon period. This period is also characterized by high temperature, high wind velocity and low humidity.

Maha which is the major agricultural season for the area starts in September and ends in April. Slash and burn (chena) cultivation starts in September, and paddy cultivation starts when the tank is filled with rain water in December. The most part of the sub-watershed is characterized by reddish-brown soils. Major part of paddy fields consists of low humic clay soils. Soil fertility has been drastically reduced due to inappropriate land management practices. Primary vegetation of this watershed has almost disappeared and the secondary shrub is the predominant vegetation in catchment areas at present. The composition of plant species is also poorer than that of natural vegetation.

The village areas of Tittellewa and old Kokawewa falling within the Kokawewa sub-watershed were selected for Phase I watershed planning This area with 374 acres of highland is inhabited by 44 families.

The Catalyst assigned to the area facilitated the selection of the area in consultation with the resource users and with support and advice from the SCOR professional staff and Line Agency officials at different levels. An awareness was created within the community through close interaction about the problems of the area including resource degradation and possible consequence. The constraints and potentials for management improvement of the resources were identified under the selected SCOR themes and interventions. Preparation for participatory mapping and collection of data were initiated with the full participation of field level officials.



Field level officials such as the Grama Sevaka, Agricultural Instructor, school teachers and geography students and the resource users of the area actively participated in mapping and data collection. A workshop was held in Palugollagama school with the participation of all concerned. At this workshop the data gathered and the maps prepared were modified on the basis of the feed back received from the participants. The final base map demarcating in the farm plots and the database were prepared.

The baseline map indicating the natural resource status and management level was computerized using GIS tools (see map II-3).

On the basis of the information collected further awareness and understanding were created among the community towards the preparation of a future plan or vision for the sub watershed. At subsequent workshops the development plans for the sub-watershed were finalized as shown in map II-4. A comprehensive mini project proposal for two years was prepared and approved by the Water Shed Resource Management Team of the area. The total cost of the project amounted to Rs. 3,988,184.86. The farmers contribution was estimated at Rs 2,133,440.00 while a bank loan amount and Rs. 1,498,100.00. Line Agency and SCOR contributions were Rs. 49,980.00 and Rs. 306,644.86 respectively.

Establishment of Forests, Development of homegardens and introduction of better water management practices in paddy fields, adoption of conservation farming techniques, Tank Eco-system establishment, formation of a farmer sub-councils, establishment of a farmer marketing center are the achievements made through the implementation of this project proposal. The rest of the total Watershed Management Programme is included in the work schedule of the second Phase work plan under Kokawewa Sub-watershed.

#### **2.4.3.2 Kelenikawewa Sub-watershed Management Plan**

This is a sub-watershed selected for second phase implementation programme. Kelenikawewa Sub-watershed is a cascade system with 8 small tanks. It drains into Yan Oya from the left bank side below the Huruluwewa. Major Command located in the Galenbidunuwewa DS Division of Anuradhapura District. Environmental degradation and socio-economic conditions in Kelenikawewa are the same as in Kokawewa. A larger area comprising shrubs show evidence of forest clearing and chena cultivation. Kelenikawewa Tank catchment including its chena shrub and homegarden areas and command area have been selected for second phase management programme. In this location selected for Phase II, planning was done with the use of participatory planning techniques such as PRA. The base line situation and the situation indicating the status of natural resources after introducing sustainable land management practices are shown in Maps II-4, and II-5). Work schedules and responsibilities in the implementation plan are shown in the Table II-5. At present, the mini Project Proposal for Kelenikawewa Management Programme is being prepared.

#### **2.4.3.3 A Case Study of Land Use Changes Achieved in Dothalugala Contiguous Area in the Aninkanda Sub-Watershed**

Aninkanda was the first Sub-Watershed identified by the SCOR team for interventions in the Upper Nilwala Basin during the Phase I. Aninkanda Sub-Watershed comprises of 1200 ha of land located at elevation ranging from 350 to 880 m with the peak at Dothalugala kanda.

SCOR activities were initiated in Aninkanda Sub-Watershed in October 1993. First, the members of the SCOR team visited the area and met the key personnel, namely village incumbent Priest, Farmer Leaders, Gramodaya Chairman, and several others in the village. This activity paved the way to gain first hand information on the problems pertaining to land and water resources and other related issues. Moreover, this process facilitated to make the key personals in the village aware of the SCOR approach and concepts. Subsequently, with the blessing of key persons, SCOR team approached Resource Users and an awareness of SCOR concepts was created among them at several meetings conducted by the SCOR Team. These meetings gave an ample opportunity for the resource users to express their opinions, views and problems regarding the utilization of resources.

The major focus during the situation analysis was on the following three questions.

- (1) What is the current resource use pattern?
- (2) How such patterns evolved?
- (3) What will be the implications if the current use continues in five years time?

The major issues raised by the resource users included the following:

- i. Soil degradation due to erosion resulting in declined productivity of the major crop, tea, and therefore reduction in income.
- ii. Dotalugala, the peak hill in the sub-watershed, had been subjected to heavy deforestation and the people believed that the exposed Dothalugala rock would come down one day to devastate the village located below, if deforestation continues at the same rate. The already experienced adverse impacts of this deforestation were the dried up streams, scarcity of drinking water immediately after short dry spells, flash floods, and heavy silting in paddy fields and irrigation canals of the valleys.
- iii. Due to expanding population, the available private land holdings were inadequate to cater to the full demand of people. As a result the forests have been encroached for housing and land use, particularly, for tea cultivation.
- iv. There had been a serious set back in the timely supply of inputs such as seed paddy, fertilizer and planting material in adequate quantities.

- v. The involvement of line agencies in production and protection/conservation activities was not satisfactory, particularly with respect to technology transfer.
- vi. People were not organized as groups or organizations for production and protection activities. Also there was a lack of leadership in the village.

Following this data gathering, the access of the SCOR team to introduce production and protection interventions to villages was through introducing small scale and highly relevant interventions such as Anthurium growing, establishment of seed paddy farms and plant nurseries, etc., at the beginning. As an incentive, small grants were also provided by the SCOR Team to obtain seed/planting materials, tools, etc. This approach was successful and the villagers appreciated SCOR concepts, interventions and the work of the SCOR catalyst, and other team members.

As a preliminary step, a contiguous area covering a total of 250 ha was selected for participatory mapping exercise. The process included identification of the existing land use pattern, extent and nature of natural resources degradation, existing management levels at individual land holdings, etc. The plot level map prepared on completion of this initial participatory mapping exercise is annexed (Map II-7).

SCOR facilitated a process of preparing an integrated plan based on mini-projects in order to enhance and sustain the productivity of natural resources of the watershed while conserving them. For this process, Sub-Task forces for the sub-watershed were formed with relevant line agency officials. These Task Forces engaged in activities such as transfer of appropriate technology to the resources users, providing various resources needed and developing the organizational structures to achieve the set objectives.

Training programs were planned by the task forces with respect to interventions in the sectors of tea, paddy, homesteads and forestry, and they were completed as scheduled in mini-projects. SCOR also facilitated to conduct regular meetings at the sub-watershed level, chaired by Divisional Secretary in order to monitor and review the progress of planned activities.

Field officers of Line Agencies such as Coconut Development Authority, Export Agriculture Department, Forest Department, Agrarian Service Department, and Tea Small Holdings Development Authority, all being the members of sub-task forces, were able to integrate their agency programs such as subsidy schemes, participatory forestry projects, NIRP project, IRDP projects into the SCOR project activities for successful achievements.

Appropriate groups were formed to address their common problems in a collective manner. Following group were identified representing the sub-systems from the hills to the streams of the sub-watershed and strengthened with awareness programs, technology transfer and other appropriate programs:

- Anthurium growers groups;
- Plant nursery groups;

- Seed Paddy growing organizations;
- Stream bed reservation planting groups;
- Tree Conservation groups;
- Agro- forestry Group;
- Homestead Development groups; and
- Forest protection groups;

New organizations as well as existing organizations and NGOs were federated into a service organization. The mini-projects were developed by the above groups and organizations through participatory activities to cater to the interests of the individual resource users as well as the natural resources base of the Aninkanda sub-watershed as a whole. The planned changes in the land use and management are given in the annexed Map II-8.

The Dothalugala forest, which falls within the Anninkanda is of steep terrain and the peak is a rock, from where the entire Upper watershed of Nilwala could be seen. As the memory of people reveals, Dotalugala had its scenic beauty till about the year 1970. After that period, severe deforestation has occurred extracting almost all the valuable timber trees resulting in heavy soil erosion and loss of bio-diversity. However, some resources users, who realized the environmental hazard caused by deforestation, had attempted to plant trees in this area in many instances but many such attempts had been unsuccessful due to unplanned and non- participatory approach. This was taken as a lesson in group formation for SCOR interventions such as conservation planting, stream reservation planing, etc. All these groups ultimately formed an NGO named by the resource users as "Dothalugala Heritage".

The mini-projects for Dothalugala Heritage were prepared with SCOR guidance through a participatory process. A grant was awarded to the Dothalugala Heritage to implement their activities successfully. As a large number of plants were required to reforest the degraded hill slopes, resource users formed groups to establish plant nurseries. The resource users living adjacent to the stream formed themselves in to groups to attend the task of planting in stream reservations.

The nursery groups were linked to the Forest Department (FD) which gave them training in nursery and planting techniques. They also trained the users in aligning and staking by using the A-frame. Identification of trees and plants available in the forest was also carried out to decide on suitable species to be used in reforestation program and also to serve as an education exercise. The nurseries were linked to the Participatory Forestry Program of the Forest Department, and that enabled the free issue of polythene bags by the FD, and created opportunity to sell their plants to the FD. The Forest Department in turn gave the plants for rehabilitation of the Dothalugala Kanda State Forest.

Dothalugala forest, being an "other state forest", is vested in the Divisional Secretary. Therefore, the DS was interested in rehabilitating the degraded area of this forest and in controlling the encroachments to the forest. The Divisional Secretary- Pasgoda together with his Land Officers attended discussions with the user groups. At these meetings facilitated by SCOR,

awareness was created regarding the legal status of the forest, benefits and environmental services provided by the forest, etc.

Planting was carried out on a Sharamadana basis by the members of the Dothalugala Heritage together with the School Children of the area for protection of the forest. The Dotalugala Heritage formed there vigilant committees and the names of these committee members were given to the Police and the Forest Department by the Divisional Secretary of the area. Since then no illicit felling has been reported in the area.

The Dothalugala Heritage, at their periodic meetings monitored the success of the operation and vacancy planting was also carried out after one year. Altogether, 10,000 plants had been planted in an area of 7 ha. The SCOR catalyst played the role of a facilitator from the inception of the program and regularly monitored the program.

Seven stream reservations were identified in the Aninkanda contiguous area. Dothalugala forest was the source of water for these stream. Many streams had dried up. Originally two groups were formed to plant stream reservation, however, the number of groups increased to seven by end of Phase I. Enrichment of these stream reservations was attempted by resource user groups by planting 2730 plants which were obtained from the village nurseries. Trees planted were those identified by the users. Rambutan, Durian, Mango, Aricanut, etc., were planted in addition to forest species. This was an exercise aimed at balancing production and protection in resource management in watershed context.

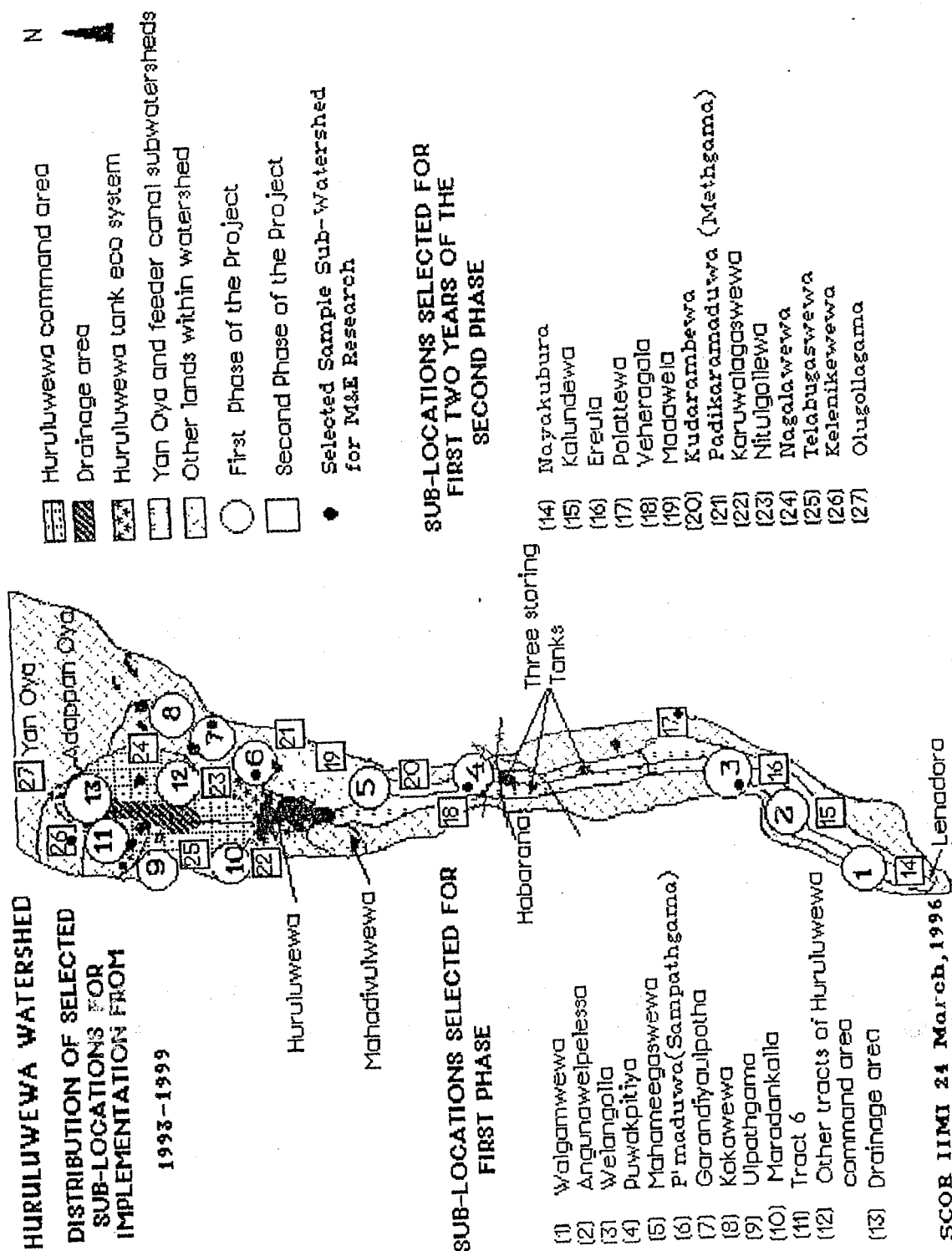
The Chief Secretary - Southern province gave directions to the Divisional Secretary - Pasgoda to issue usufructuary rights (temporary permits till the issue is finalized at national level) to those who planted trees on such reservations. Similarly, resource users grouped themselves to plant road reservations with same benefits accruing to them as in the stream reservations. This project resulted in planting 3520 plants during the Phase I. Catalytic functions were initiated to motivate tea small holders for wider adoption of production and protection activities in their small holdings. The promoted technologies in these lands included soil conservation through vegetative and mechanical measures. Farmers were made aware of the present management level of their holdings and economics were worked out to show the difference between the present income level and potential achievable income that they could gain if proper practices are adopted. The required interventions to reach ideal model of individual holdings were discussed with the farmers by the Tea Extension Officers. The promoted technologies included soil conservation through vegetative and mechanical means, planting of Mana grass in vacant patches prior to infilling of degraded lands, infilling with tea under suitable soil conditions, planting of shade trees for both high and low shades, improvement in pruning methods, introduction of proper fertilizing practices, dolomite and zinc sulphate application and promotion of high plucking standards. The actual achievements in respect to changing land use and management levels are given in the annexed maps II-7, II-8, II-9, and II-10.

Villagers in the area have concentrated their activities mainly on tea plantations, neglecting their home-gardens or expanding the tea area by moving on to home-gardens. Villagers paid little

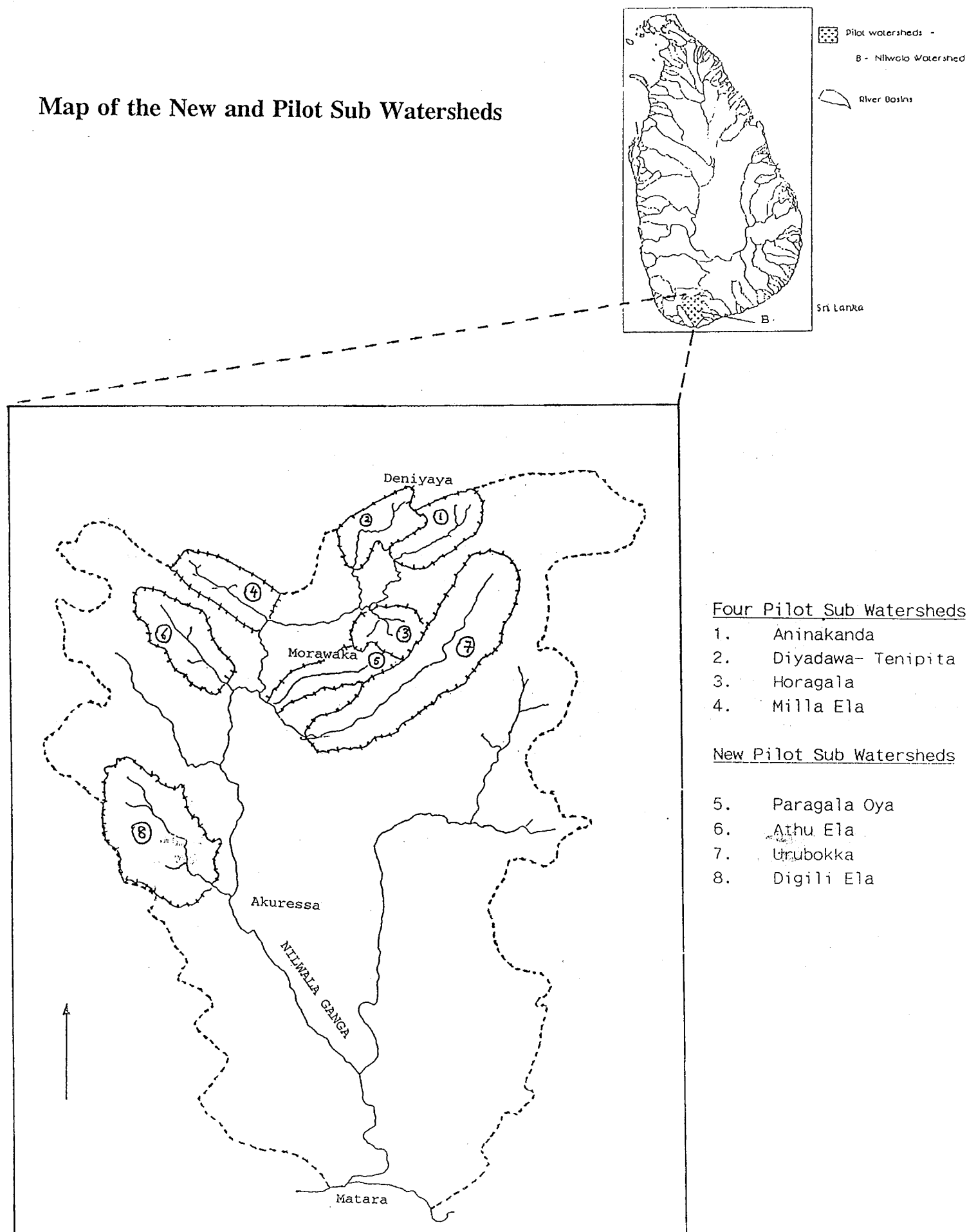
or no attention to the home-gardens because of heavy involvement of labor in the tea sector, though there was a great potential and possibility for intensification of the existing home-gardens in the sub watershed towards economically viable production and protection system. As a result, home gardens were not generating extra income to house holders. The promoted technologies focused on intensification of the composition of home gardens through introducing market- valued fruit, export agriculture crops, coconut, cut flower- Anthurium, vegetables and timber trees. Also the soil conservation practices through vegetative and mechanical measures: were introduced. Homestead based commercial activities such as bee keeping, animal husbandry (goat and cattle rearing) helped to create an interest among farmers to pay attention in homestead development activities. Farmers were made aware of the present management levels of their holdings and economics of intensification.

The required interventions to reach ideal model of individual holdings were discussed with the farmers by the Agricultural instructors and Extension Officers of relevant agencies. Many training programs were held in collaboration with line agency officials on various areas of interest. Users interested in Anthurium growing were trained at the Peradeniya Botanical Gardens. Skill for Grafting/budding were developed by training at Labuduwa Agricultural Center. Service farmer organizations and RUOs assisted in supplying planting materials of improved varieties to accelerate the program.

Block of paddy- about 4 acre in extent- available in Aninkanda contiguous area was producing at a much low level of its potential mainly due to damages brought about by soil erosion in adjacent highlands and land ownership disputes arisen from the practices such as Thattumaru and Kattimaru system of rotational utilization by different individuals. As a result of a series of discussions carried out by the Batandura (North) Farmer Organization, consensus of all the farmers of Pothuwila Yaya were obtained for re-allocation of holdings to eliminate rotational land use and each farmer's entitlement (ownership of his portion) was clearly decided. Following these agreements, the whole paddy tract was surveyed and re-blocked out while giving provisions for necessary irrigation and drainage facilities. Southern Provincial Ministry provided the required funds to construct the infrastructure.

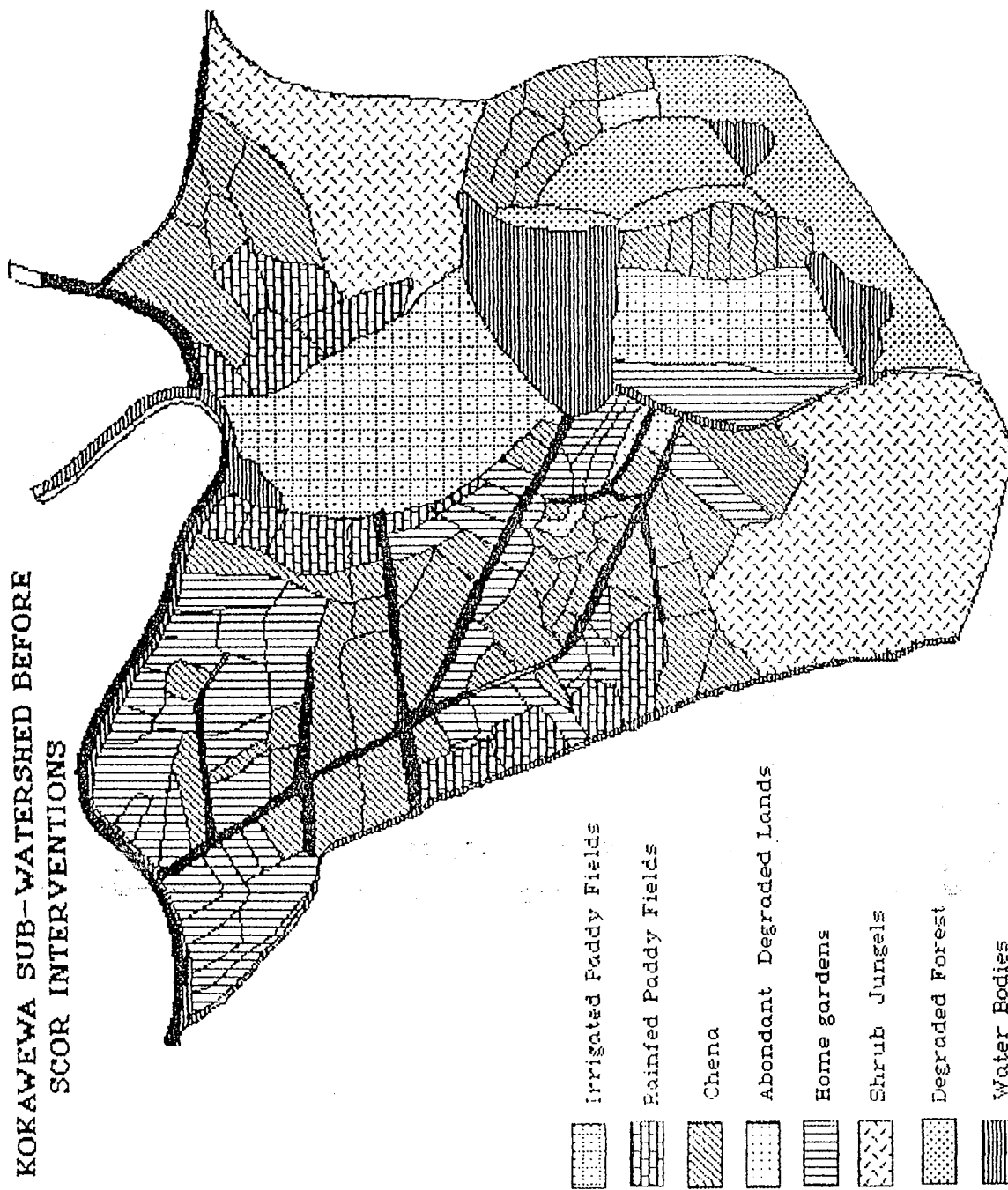


# Map of the New and Pilot Sub Watersheds

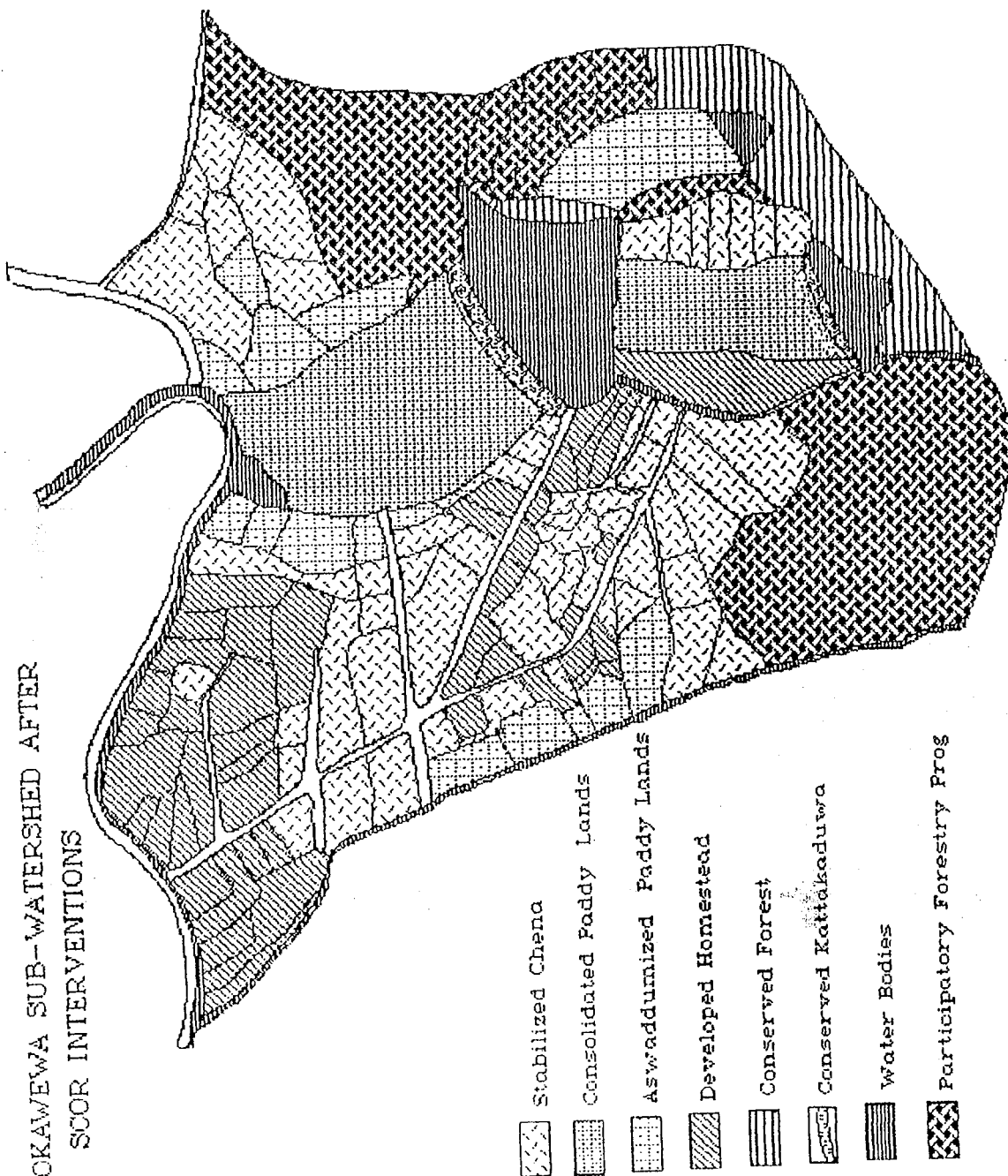


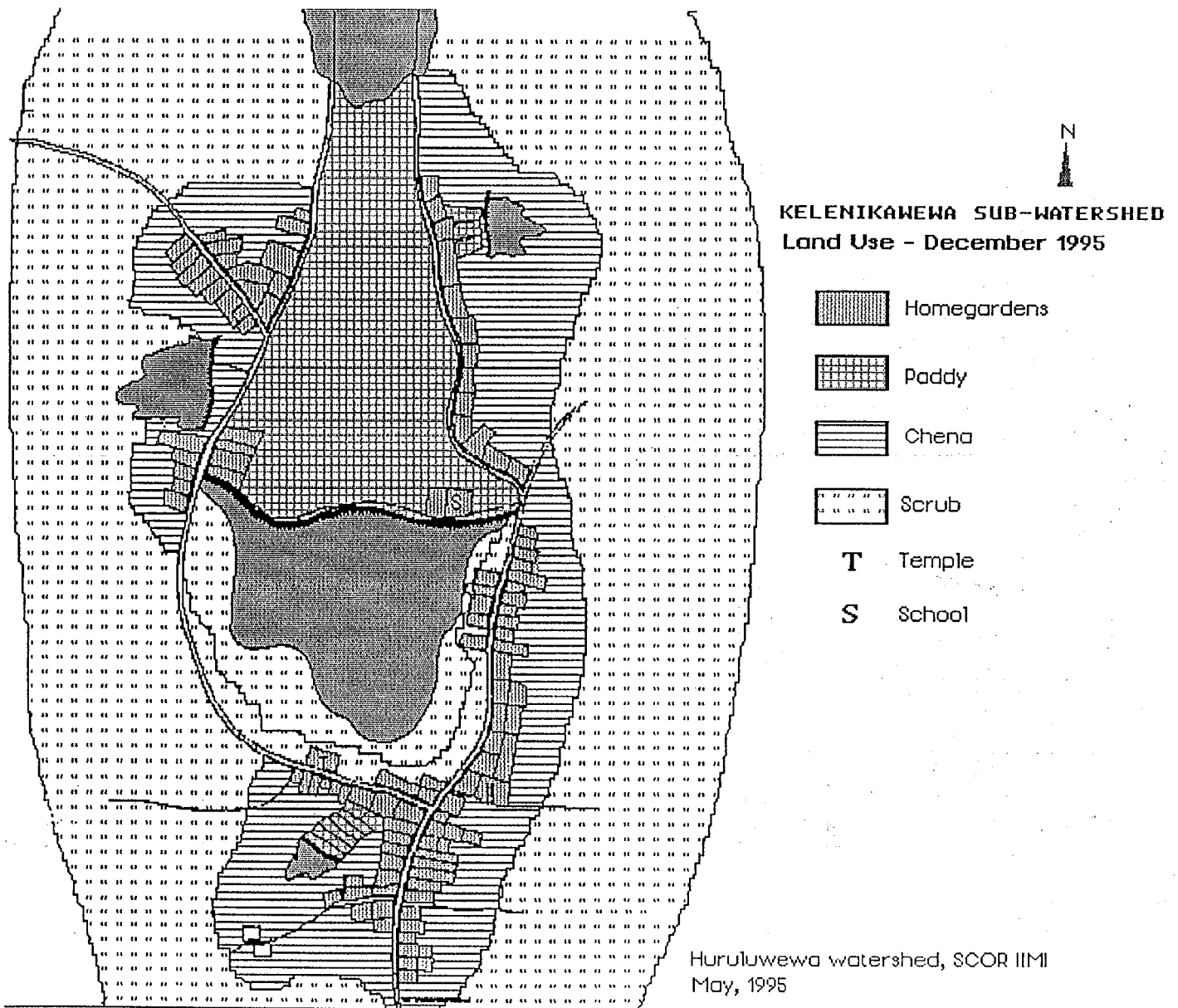


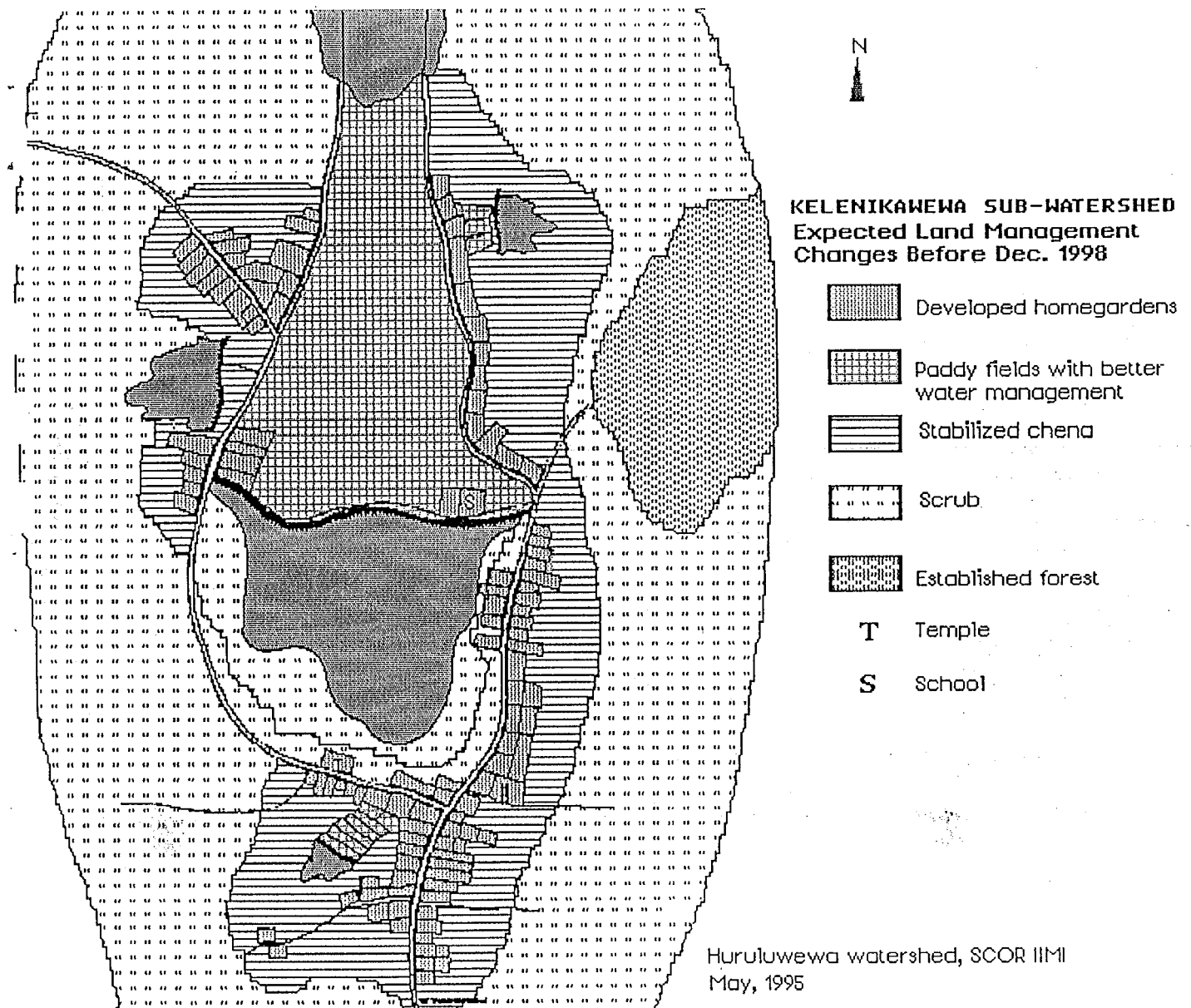
# KOKAWEWA SUB-WATERSHED BEFORE SCOR INTERVENTIONS



# KOKAWEWA SUB-WATERSHED AFTER SCOR INTERVENTIONS

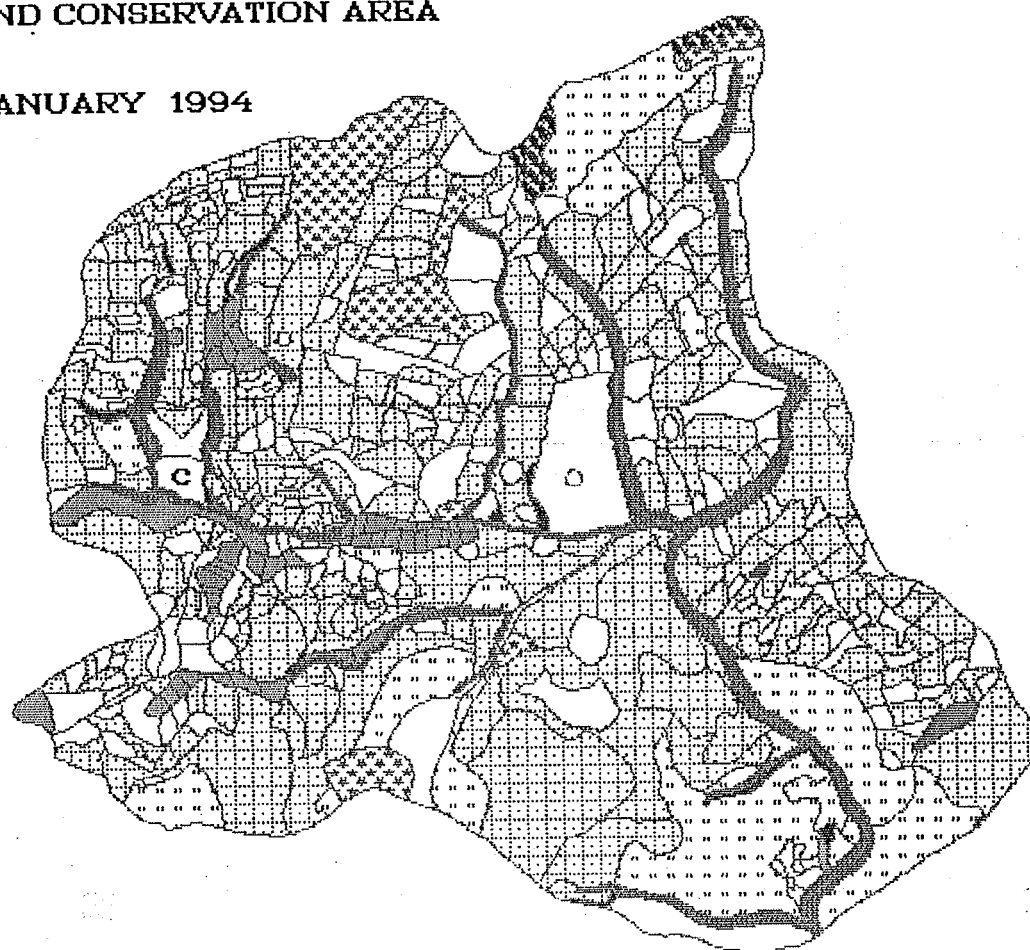














# LAND USE - ANINKANDA MODEL PRODUCTION AND CONSERVATION AREA

JANUARY 1994



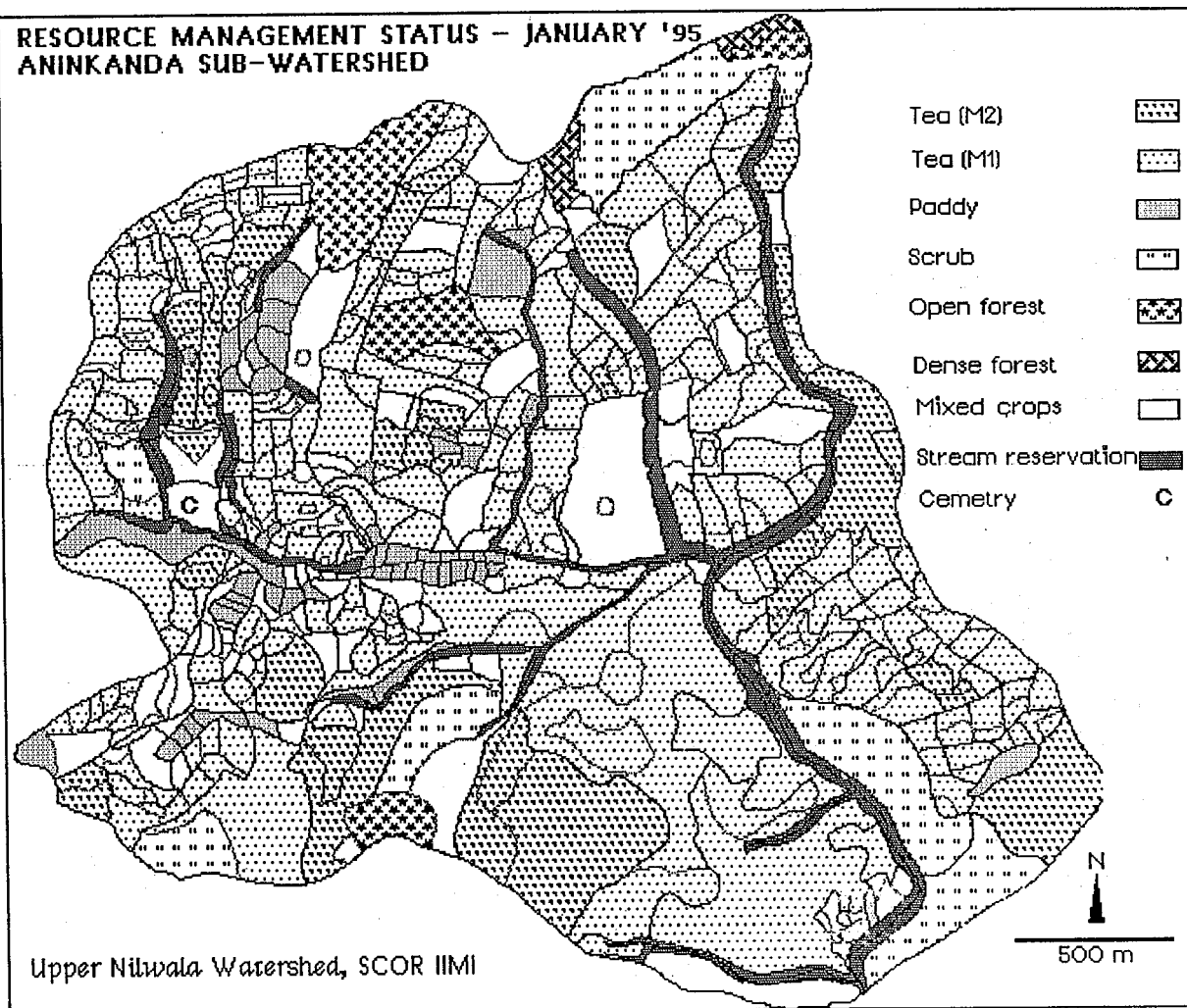
- Tea (57%) 
- Paddy (5%) 
- Open forest (5%) 
- Dense forest (1%) 
- Scrub (15%) 
- Stream reservation 
- Mixed crops (5%) 
- Cemetery 

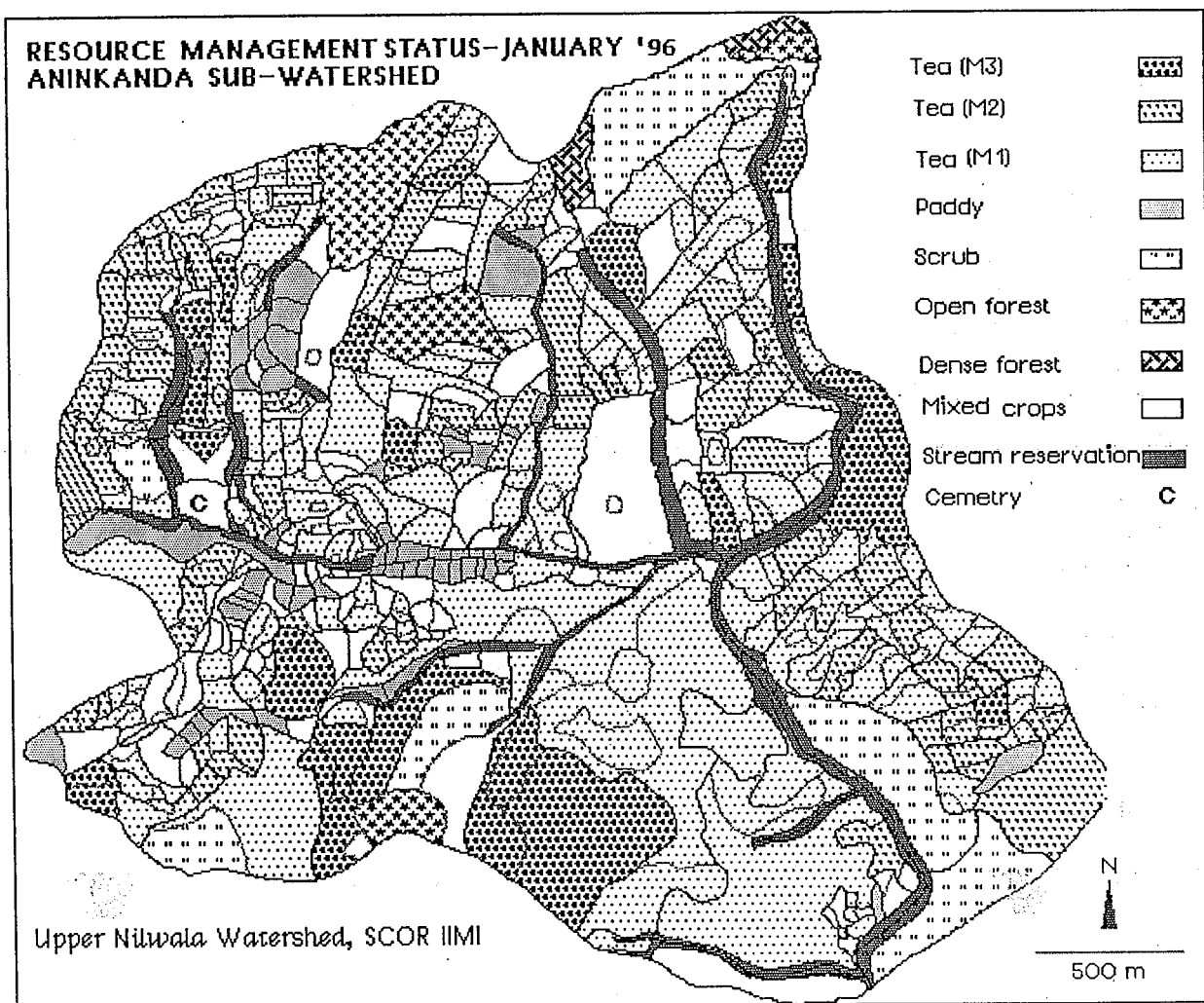


meters  
500

Upper Nilawala Watershed, SCOR IIMI









**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

**Table II–1**

ACTIVITY	Unit	Sub Watersheds – 1 & 14			
		Walgam– wewa	Naya– kumbura	Feeder Canal	Total
(1) Integrated Water Management and Regeneration of Tank Eco–System					
1.1 Integrated Water Management	ha.	176.0	16.8	173.6	366.4
1.2 Regeneration of Tank Eco–System	ha.	2.0		4.5	6.5
1.3 Inland Fisheries	Tanks/ Ponds	5		2	7
1.4 Land Consolidation	Minor Irrig.	1			1
(2) Highland Development and Conservation Farming					
2.1 Concervation Farming undr Chenas	ha.		2.0		2
2.2 Conservation farming under Homegarden	ha.	15.0	29.5	26.0	70.5
2.3 Forest					
2.3.1 Reforestration	ha.		25.0	20.0	45
2.3.2 Protection of existing Forest	ha.		45.0	41.0	86
2.3.3 Establishment of Reservations	ha.		36.0		36
3 Market for Agricultural Produce					
3.1 Commercial Activities	Units	5	3	3	11
3.2 Agro–based Industries	No	1			1
3.3 Divisional Collecting Centres	No				0
3.4 Production Companies	No				0
4. Integrated Planning, Participatory Dev.					
4.1 Formation of New Groups	No	2	2	2	6
4.2 Strengthening of Existing Groups	No				0
4.3 Formation of New Farmer Organisations	No	1	1	1	3
4.4 Formation of Sub– Councils	No		1		1
4.5 Councils	No				0
4.6 Formation of Farmer Federations	No				0
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.					
– Representatives of User groups	No	20	15	25	60
– Representatives of Organisations	No	200	20	130	350
– Representatives of User Sub Councils/Councils	No		15		15
4.8 No. of user organisations conferred with legal Status and Powers	No	1	1	3	5
4.9 No. of small grants madr to Land & Water user groups and invested into common user group assets.	No				0
5 Land Leasing/Usufructury Processes					
5.1 No. of hectares of targeted area covred by agreements between GSL & Local user groups–ownership	ha.		150	150	300
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.		10.5	8.0	18.5
5.3 No. Farme families involved					
– to ( 5.1)	No.		175	175	350
– to ( 5.2)	No.		50		50
Farm families involved	No	248	107	213	568

**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds – 2 & 15			
		Angunawel-pelessa	Kalundewa	Feeder Canal	Total
(1) Integrated Water Management and Regeneration of Tank Eco-System	ha.	60.0	140.0	150.0	350.0
1.1 Integrated Water Management	ha.	2.0	2.0	2.8	6.8
1.2 Regeneration of Tank Eco-System	Tanks/Ponds	2	2	2	6.0
1.3 Inland Fisheries	Minor Irrig.				0.0
1.4 Land Consolidation					
(2) Highland Development and Conservation Farming	ha.	15.0	20.0	10.0	45.0
2.1 Concervation Farming undr Chenas	ha.	30.0	80.0	90.0	200.0
2.2 Conservation farming under Homegarden					
2.3 Forest	ha.	10.0			10.0
2.3.1 Reforestration	ha.		10.0	10.0	20.0
2.3.2 Protection of existing Forest	ha.	16.0	12.0	10.0	38.0
2.3.3 Establishment of Reservations					
3 Market for Agricultural Produce	Units	4	6	5	15.0
3.1 Commercial Activities	No	2	1	2	5.0
3.2 Agro-based Industries	No				0.0
3.3 Divisional Collecting Centres	No				0.0
3.4 Production Companies					
4. Integrated Planning, Participatory Dev.	No	1	2	1	4.0
4.1 Formation of New Groups	No				0.0
4.2 Strengthening of Existing Groups	No				0.0
4.3 Formation of New Farmer Organisations	No	1			1.0
4.4 Formation of Sub-Councils	No				0.0
4.5 Councils	No			1	1.0
4.6 Formation of Farmer Federations					
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.	No	20	30	30	80.0
– Representatives of User groups	No	60	80	70	210.0
– Representatives of Organisations	No	10			10.0
– Representatives of User Sub Councils/Councils					0.0
4.8 No. of user organisations conferred with legal Status and Powers	No	1	1	1	3.0
4.9 No. of small grants madr to Land & Water user groups and invested into common user group assets.	No		3	1	4.0
5 Land Leasing/Usufructury Processes	ha.	50	200		250.0
5.1 No. of hectares of targeted area covred by agreements between GSL & Local user groups-ownership	ha.	10	16		26.0
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	No.				0.0
5.3 No. Farme families involved	No.	20	40		60.0
– to (5.1)					
– to (5.2)					
Farm families involved	No	76	188	165	429.0

**PHASE II WORK PLAN – HURULUWEWA WATERSHED.**  
**ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds – 3 & 16			
		Welan– golla	Eruwala	Feeder Canal	Total
(1) Integrated Water Management and Regeneration of Tank Eco–System					
1.1 Integrated Water Management	ha.	42.0	224.0	91.0	357.0
1.2 Regeneration of Tank Eco–System	ha.	1.0	4.0	1.0	6.0
1.3 Inland Fisheries	Tanks/ Ponds	1	4	4	9.0
1.4 Land Consolidation	Minor Irrig.				0.0
(2) Highland Development and Conservation Farming					
2.1 Concervation Farming undr Chenas	ha.				0.0
2.2 Conservation farming under Homegarden	ha.	13.0	175.6	38.0	226.6
2.3 Forest					
2.3.1 Reforestration	ha.			10.0	10.0
2.3.2 Protection of existing Forest	ha.	10.0	10.0	5.0	25.0
2.3.3 Establishment of Reservations	ha.	8.0	20.0		28.0
3 Market for Agricultural Produce					
3.1 Commercial Activities	Units	7	8	6	21.0
3.2 Agro–based Industries	No	1	1		2.0
3.3 Divisional Collecting Centres	No				0.0
3.4 Production Companies	No				0.0
4. Integrated Planning, Participatory Dev.					
4.1 Formation of New Groups	No	1	3	2	6.0
4.2 Strengthening of Existing Groups	No				0.0
4.3 Formation of New Farmer Organisations	No		1		1.0
4.4 Formation of Sub– Councils	No		1		1.0
4.5 Councils	No				0.0
4.6 Formation of Farmer Federations	No				0.0
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.					
– Representatives of User groups	No	10	24	20	54.0
– Representatives of Organisations	No	25	20	20	65.0
– Representatives of User Sub Councils/Councils	No	10			10.0
4.8 No. of user organisations conferred with legal Status and Powers	No	1	1	1	3.0
4.9 No. of small grants madr to Land & Water user groups and invested into common user group assets.	No				0.0
5 Land Leasing/Usufructury Processes					
5.1 No. of hectares of targeted area covred by agreements between GSL & Local user groups– ownership	ha.	50	120	125	295.0
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.	4	14	52	70.0
5.3 No. Farme families involved					
– to ( 5.1)	No.				0.0
– to ( 5.2)	No.	8	67	148	223.0
Farm families involved	No	168	225	186	579.0

**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds – 4 & 20			
		Puwak – pitiya	Kudaram – bewewa	Others	Total
(1) Integrated Water Management and Regeneration of Tank Eco-System					
1.1 Integrated Water Management	ha.	22.0	106.0		128.0
1.2 Regeneration of Tank Eco-System	ha.	5.5	10.0		15.5
1.3 Inland Fisheries	Tanks/ Ponds	1	2		3.0
1.4 Land Consolidation	Minor Irrig.				0.0
(2) Highland Development and Conservation Farming					
2.1 Concervation Farming undr Chenas	ha.	100.0	195.0		295.0
2.2 Conservation farming under Homegarden	ha.	26.0	50.0	22	98.0
2.3 Forest					
2.3.1 Reforestration	ha.		30.0		30.0
2.3.2 Protection of existing Forest	ha.	20.0			20.0
2.3.3 Establishment of Reservations	ha.		10.0		10.0
3 Market for Agricultural Produce					
3.1 Commercial Activities	Units				0.0
3.2 Agro – based Industries	No				0.0
3.3 Divisional Collecting Centres	No	1			1.0
3.4 Production Companies	No				0.0
4. Integrated Planning, Participatory Dev.					
4.1 Formation of New Groups	No		4		4.0
4.2 Strengthening of Existing Groups	No				0.0
4.3 Formation of New Farmer Organisations	No				0.0
4.4 Formation of Sub – Councils	No	1			1.0
4.5 Councils	No				0.0
4.6 Formation of Farmer Federations	No			1	1.0
4.7 Training opportunities provided to representatives of user organi. NGOs & other private sector org. in participatory natural resource Mgt.					
– Representatives of User groups	No		50		50.0
– Representatives of Organisations	No		15		15.0
– Representatives of User Sub Councils/Councils	No		6		6.0
4.8 No. of user organisations conferred with legal Status and Powers	No		2		2.0
4.9 No. of small grants made to Land & Water user groups and invested into common user group assets.	No		1		1.0
5 Land Leasing/Usufructury Processes					
5.1 No. of hectares of targeted area covered by agreements between GSL & Local user groups – ownership	ha.				0.0
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.		40		40.0
5.3 No. Farm families involved					
– to (5.1)	No.				0.0
– to (5.2)	No.		80		80.0
Farm families involved	No	65	130	53	248.0

**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds – 5 & 19			
		Meegas– wewa	Madawala	Others	Total
(1) Integrated Water Management and Regeneration of Tank Eco–System					
1.1 Integrated Water Management	ha.	24.0	79.0	50	153
1.2 Regeneration of Tank Eco–System	ha.	1.0	11.0		12
1.3 Inland Fisheries	Tanks/ Ponds	1	4		5
1.4 Land Consolidation	Minor Irrig.				0
(2) Highland Development and Conservation Farming					
2.1 Concervation Farming undr Chenas	ha.	200.0	320.0		520
2.2 Conservation farming under Homegarden	ha.	20.0	52.0	8	80
2.3 Forest					
2.3.1 Reforestration	ha.	10.0	10.0	20	40
2.3.2 Protection of existing Forest	ha.				0
2.3.3 Establishment of Reservations	ha.	6.0	8.0		14
3 Market for Agricultural Produce					
3.1 Commercial Activities	Units	8	8		16
3.2 Agro–based Industries	No		1		1
3.3 Divisional Collecting Centres	No				0
3.4 Production Companies	No				0
4. Integrated Planning, Participatory Dev.					
4.1 Formation of New Groups	No	5	10	2	17
4.2 Strengthening of Existing Groups	No				0
4.3 Formation of New Farmer Organisations	No				0
4.4 Formation of Sub– Councils	No		1		1
4.5 Councils	No				0
4.6 Formation of Farmer Federations	No				0
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.					
– Representatives of User groups	No	40	100	20	160
– Representatives of Organisations	No	64	25	110	199
– Representatives of User Sub Councils/Councils	No		12		12
4.8 No. of user organisations conferred with legal Status and Powers	No				0
4.9 No. of small grants made to Land & Water user groups and invested into common user group assets.	No				0
5 Land Leasing/Usufructury Processes					
5.1 No. of hectares of targeted area covered by agreements between GSL & Local user groups – ownership	ha.	24	10.8		34.8
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.	22	37.4	20	79.4
5.3 No. Farme families involved					
– to ( 5.1)	No.	60	27		87
– to ( 5.2)	No.	50	62	40	152
Farm families involved	No	64	152	110	326

**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds– 6 & 21				
		Mahasen– gama	Meth– gama	(C.A)	Others	Total
(1) Integrated Water Management and Regeneration of Tank Eco–System						
1.1 Integrated Water Management	ha.		24.0	364.0	35.0	423
1.2 Regeneration of Tank Eco–System	ha.		8.0		4.0	12
1.3 Inland Fisheries	Tanks/ Ponds		1		1	2
1.4 Land Consolidation	Minor Irrig.				1	1
(2) Highland Development and Conservation Farming						
2.1 Concervation Farming undr Chenas	ha.	5.0	60.0		98.0	163
2.2 Conservation farming under Homegarden	ha.	10.0	78.0		72.0	160
2.3 Forest						
2.3.1 Reforestration	ha.		10.0			10
2.3.2 Protection of existing Forest	ha.		10.0		10.0	20
2.3.3 Establishment of Reservations	ha.					0
3 Market for Agricultural Produce						
3.1 Commercial Activities	Units	4	1			5
3.2 Agro–based Industries	No			1		1
3.3 Divisional Collecting Centres	No	1				1
3.4 Production Companies	No					0
4. Integrated Planning, Participatory Dev.						
4.1 Formation of New Groups	No		5		2	7
4.2 Strengthening of Existing Groups	No	4				4
4.3 Formation of New Farmer Organisations	No		1		1	2
4.4 Formation of Sub– Councils	No		1		1	2
4.5 Councils	No					0
4.6 Formation of Farmer Federations	No					0
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.						
– Representatives of User groups	No	48	73	497	182	800
– Representatives of Organisations	No	8	10	30	14	62
– Representatives of User Sub Councils/Councils	No				30	30
4.8 No. of user organisations conferred with legal Status and Powers	No	1	1		2	4
4.9 No. of small grants madr to Land & Water user groups and invested into common user group assets.	No		5	2	1	8
5 Land Leasing/Usufructury Processes						
5.1 No. of hectares of targeted area covred by agreements between GSL & Local user groups– ownership	ha.	52	8			60
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.	20	10	20		50
5.3 No. Farme families involved						
– to (5.1)	No.	44	16			60
– to (5.2)	No.	54	25	56		135
Farm families involved	No	63	76	340	174	653

**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds – 7 & 23		
		Gerendiy- aulpotha	Nitulgollewa	(C.A)
(1) Integrated Water Management and Regeneration of Tank Eco-System				
1.1 Integrated Water Management	ha.		1.2	910.2
1.2 Regeneration of Tank Eco-System	ha.		1.0	
1.3 Inland Fisheries	Tanks/ Ponds			
1.4 Land Consolidation	Minor Irrig.			
(2) Highland Development and Conservation Farming				
2.1 Concervation Farming undr Chenas	ha.	20.0	23.0	
2.2 Conservation farming under Homegarden	ha.		54.4	
2.3 Forest				
2.3.1 Reforestration	ha.		20.0	
2.3.2 Protection of existing Forest	ha.		80.0	
2.3.3 Establishment of Reservations	ha.			
3 Market for Agricultural Produce				
3.1 Commercial Activities	Units		2	
3.2 Agro-based Industries	No			
3.3 Divisional Collecting Centres	No		1	
3.4 Production Companies	No		1	
4. Integrated Planning, Participatory Dev.				
4.1 Formation of New Groups	No		1	3
4.2 Strengthening of Existing Groups	No			
4.3 Formation of New Farmer Organisations	No			
4.4 Formation of Sub-Councils	No		1	
4.5 Councils	No			
4.6 Formation of Farmer Federations	No			
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.				1500
– Representatives of User groups	No	139	165	
– Representatives of Organisations	No	3	3	
– Representatives of User Sub Councils/Councils	No			29
4.8 No. of user organisations conferred with legal Status and Powers	No			
4.9 No. of small grants madr to Land & Water user groups and invested into common user group assets.	No	1	4	3
5 Land Leasing/Usufructury Processes				
5.1 No. of hectares of targeted area covred by agreements between GSL & Local user groups-ownership	ha.	8.2	25	4
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.	20	20	
5.3 No. Farme families involved				
– to (5.1)	No.	14	53	10
– to (5.2)	No.	71	50	
Farm families involved	No	100	165	844

**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds– 8 & 24				
		Kokawewa	Nagala–wewa	(C.A)	Others	Total
(1)Integrated Water Management and Regeneration of Tank Eco–System						
1.1 Integrated Water Management	ha.	24.3	22.6	253.2	55.2	355.3
1.2 Regeneration of Tank Eco–System	ha.	2.5	5.6			8.1
1.3 Inland Fisheries	Tanks/ Ponds		1			1
1.4 Land Consolidation	Minor Irrig.					0
(2)Highland Development and Conservation Farming						
2.1 Concervation Farming undr Chenas	ha.	74.8	23.9			98.7
2.2 Conservation farming under Homegarden	ha.	24.1	68.4			92.5
2.3 Forest						
2.3.1 Reforestration	ha.		10.0			10
2.3.2 Protection of existing Forest	ha.	43.6				43.6
2.3.3 Establishment of Reservations	ha.					0
3 Market for Agricultural Produce						
3.1 Commercial Activities	Units	3	3	3		9
3.2 Agro–based Industries	No		1			1
3.3 Divisional Collecting Centres	No		1			1
3.4 Production Companies	No					0
4. Integrated Planning, Participatory Dev.						
4.1 Formation of New Groups	No		3			3
4.2 Strengthening of Existing Groups	No			16		16
4.3 Formation of New Farmer Organisations	No	1				1
4.4 Formation of Sub– Councils	No					0
4.5 Councils	No					0
4.6 Formation of Farmer Federations	No					0
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.						
– Representatives of User groups	No	131	241	256	276	904
– Representatives of Organisations	No	9	3	16	3	31
– Representatives of User Sub Councils/Councils	No	27				27
4.8 No. of user organisations conferred with legal Status and Powers	No					0
4.9 No. of small grants made to Land & Water user groups and invested into common user group assets.	No	1				1
5 Land Leasing/Usufructury Processes						
5.1 No. of hectares of targeted area covered by agreements between GSL & Local user groups–ownership	ha.	20	10			30
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.		10			10
5.3 No. Farme families involved						
– to ( 5.1)	No.	32	20			52
– to ( 5.2)	No.		25			25
Farm families involved	No	131	242	256	276	905



**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds-- 9 & 25		
		Ulpathgama	Telabugaswew	(C.A)
(1)Integrated Water Management and Regeneration of Tank Eco-System				
1.1 Integrated Water Management	ha.	183.0	40.0	383
1.2 Regeneration of Tank Eco-System	ha.		30.0	
1.3 Inland Fisheries	Tanks/ Ponds		3	
1.4 Land Consolidation	Minor Irrig.			
(2)Highland Development and Conservation Farming				
2.1 Concervation Farming undr Chenas	ha.	5.0	15.0	25
2.2 Conservation farming under Homegarden	ha.	10.0	15.0	15
2.3 Forest				
2.3.1 Reforestration	ha.		15.0	25
2.3.2 Protection of existing Forest	ha.	20.0	7.0	
2.3.3 Establishment of Reservations	ha.	5.0	13.0	10
3 Market for Agricultural Produce				
3.1 Commercial Activities	Units			
3.2 Agro-based Industries	No		1	
3.3 Divisional Collecting Centres	No		1	
3.4 Production Companies	No	1		
4. Integrated Planning, Participatory Dev.				
4.1 Formation of New Groups	No		5	
4.2 Strengthening of Existing Groups	No			
4.3 Formation of New Farmer Organisations	No		1	
4.4 Formation of Sub-Councils	No		1	
4.5 Councils	No			
4.6 Formation of Farmer Federations	No			
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.				
– Representatives of User groups	No	80	60	200
– Representatives of Organisations	No	25	10	15
– Representatives of User Sub Councils/Councils	No	40		
4.8 No. of user organisations conferred with legal Status and Powers	No		1	
4.9 No. of small grants made to Land & Water user groups and invested into common user group assets.	No	3	2	2
5 Land Leasing/Usufructury Processes				
5.1 No. of hectares of targeted area covered by agreements between GSL & Local user groups-ownership	ha.		30	20
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.	8	45	30
5.3 No. Farme families involved				
– to (5.1)	No.		28	30
– to (5.2)	No.	10	50	47
Farm families involved	No	150	22	199

**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds – 10 & 22				
		Total	Maradan – Kalla	Karuwala – gaswewa	(C.A)	Total
(1) Integrated Water Management and Regeneration of Tank Eco-System						
1.1 Integrated Water Management	ha.	606	48.3	31.0	476.0	555.33
1.2 Regeneration of Tank Eco-System	ha.	30	2.5	2.5		5
1.3 Inland Fisheries	Tanks/ Ponds	3				0
1.4 Land Consolidation	Minor Irrig.	0				0
(2) Highland Development and Conservation Farming						
2.1 Conservation Farming undr Chenas	ha.	45	41.7	57.0		98.667
2.2 Conservation farming under Home garden	ha.	40	42.9	57.0	54.2	154.08
2.3 Forest						
2.3.1 Reforestation	ha.	40	41.7	30.0		71.667
2.3.2 Protection of existing Forest	ha.	27	16.7	10.0	20.8	47.5
2.3.3 Establishment of Reservations	ha.	28	10.4	12.0		22.417
3 Market for Agricultural Produce						
3.1 Commercial Activities	Units					
3.2 Agro-based Industries	No	1	1	1		2
3.3 Divisional Collecting Centres	No	1				0
3.4 Production Companies	No	1				0
4. Integrated Planning, Participatory Dev.						
4.1 Formation of New Groups	No	5	2	6		8
4.2 Strengthening of Existing Groups	No	0			14	14
4.3 Formation of New Farmer Organisations	No	1		1		1
4.4 Formation of Sub-Councils	No	1	1			1
4.5 Councils	No	0				0
4.6 Formation of Farmer Federations	No	0			1	1
4.7 Training opportunities provided to representatives of user organi. NGOs & other private sector org. in participatory natural resource Mgt.						
– Representatives of User groups	No	340	6	6	14	26
– Representatives of Organisations	No	50	12	10	30	52
– Representatives of User Sub Councils/Councils	No	40				0
4.8 No. of user organisations conferred with legal Status and Powers	No	1		1		1
4.9 No. of small grants made to Land & Water user groups and invested into common user group assets.	No	0				0
		7	3	3	5	11
5 Land Leasing/Usufructuary Processes						
5.1 No. of hectares of targeted area covered by agreements between GSL & Local user groups – ownership	ha.	50	20	25		45
5.2 No. of hectares Land leasing/Usufructuary Process facilitating commercial activities	ha.	83			24	24
5.3 No. Farm families involved						
– to ( 5.1)	No.	58	39	45		84
– to ( 5.2)	No.	107			55	55
Farm families involved	No	371	78	74	263	415

**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds– 11 & 26			
		TRACT 6 (CA)	Kelenika – wewa	Others	Total
(1) Integrated Water Management and Regeneration of Tank Eco–System					
1.1 Integrated Water Management	ha.	210.0	42.0	187.0	439
1.2 Regeneration of Tank Eco–System	ha.		6.0	2.0	8
1.3 Inland Fisheries	Tanks/ Ponds				0
1.4 Land Consolidation	Minor Irrig.		1		1
(2) Highland Development and Conservation Farming					
2.1 Concervation Farming undr Chenas	ha.	25.0	112.6	50.0	187.6
2.2 Conservation farming under Homegarden	ha.	10.0	45.8	60.0	115.8
2.3 Forest					
2.3.1 Reforestration	ha.		62.5		62.5
2.3.2 Protection of existing Forest	ha.	10.0	83.3		93.3
2.3.3 Establishment of Reservations	ha.	10.0			10
3 Market for Agricultural Produce					
3.1 Commercial Activities	Units				
3.2 Agro–based Industries	No	1	1		2
3.3 Divisional Collecting Centres	No	1	1		2
3.4 Production Companies	No				0
4. Integrated Planning, Participatory Dev.					
4.1 Formation of New Groups	No	5	5	5	15
4.2 Strengthening of Existing Groups	No	1	1		2
4.3 Formation of New Farmer Organisations	No	1			1
4.4 Formation of Sub–Councils	No	1			1
4.5 Councils	No				0
4.6 Formation of Farmer Federations	No				0
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.					
– Representatives of User groups	No	15	15	8	38
– Representatives of Organisations	No	15	8	11	34
– Representatives of User Sub Councils/Councils	No				0
4.8 No. of user organisations conferred with legal Status and Powers	No	30	1	2	33
4.9 No. of small grants made to Land & Water user groups and invested into common user group assets.	No	2	2		4
5 Land Leasing/Usufructury Processes					
5.1 No. of hectares of targeted area covered by agreements between GSL & Local user groups– ownership	ha.		112.6		112.6
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.	10	35		45
5.3 No. Farme families involved					
– to (5.1)	No.		76		76
– to (5.2)	No.	25	96		121
Farm families involved	No	168	115	141	424

**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds – 17		
		Polattewa	Feeder Canal	Total
(1) Integrated Water Management and Regeneration of Tank Eco-System				
1.1 Integrated Water Management	ha.	45.0	193.0	238.0
1.2 Regeneration of Tank Eco-System	ha.	11.0		11.0
1.3 Inland Fisheries	Tanks/ Ponds	9		9.0
1.4 Land Consolidation	Minor Irrig.			0.0
(2) Highland Development and Conservation Farming				
2.1 Concervation Farming undr Chenas	ha.	32.0		32.0
2.2 Conservation farming under Homegarden	ha.	48.0		48.0
2.3 Forest				
2.3.1 Reforestration	ha.	34.0	25.0	59.0
2.3.2 Protection of existing Forest	ha.	285.0		285.0
2.3.3 Establishment of Reservations	ha.	28.0	32.0	60.0
3 Market for Agricultural Produce				
3.1 Commercial Activities	Units			0.0
3.2 Agro-based Industries	No			0.0
3.3 Divisional Collecting Centres	No			0.0
3.4 Production Companies	No		1	1.0
4. Integrated Planning, Participatory Dev.				
4.1 Formation of New Groups	No	6	8	14.0
4.2 Strengthening of Existing Groups	No			0.0
4.3 Formation of New Farmer Organisations	No			0.0
4.4 Formation of Sub-Councils	No	1		1.0
4.5 Councils	No			0.0
4.6 Formation of Farmer Federations	No			0.0
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.				
– Representatives of User groups	No	15	20	35.0
– Representatives of Organisations	No	80	200	280.0
– Representatives of User Sub-Councils/Councils	No			0.0
4.8 No. of user organisations conferred with legal Status and Powers	No	8	5	13.0
4.9 No. of small grants made to Land & Water user groups and invested into common user group assets.	No	3	4	7.0
5 Land Leasing/Usufructury Processes				
5.1 No. of hectares of targeted area covered by agreements between GSL & Local user groups-ownership	ha.	30		30.0
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.		32	32.0
5.3 No. Farme families involved				
– to ( 5.1)	No.	60		60.0
– to ( 5.2)	No.		100	100.0
Farm families involved	No	106	459	565.0

**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watersheds – 18		
		Weheragala	Others	Total
(1) Integrated Water Management and Regeneration of Tank Eco-System				
1.1 Integrated Water Management	ha.	42.0	24	66
1.2 Regeneration of Tank Eco-System	ha.	12.0		12
1.3 Inland Fisheries	Tanks/ Ponds	3		3
1.4 Land Consolidation	Minor Irrig.			0
(2) Highland Development and Conservation Farming				
2.1 Concervation Farming undr Chenas	ha.	11.0		11
2.2 Conservation farming under Homegarden	ha.	31.0		31
2.3 Forest				
2.3.1 Reforestration	ha.	20.0		20
2.3.2 Protection of existing Forest	ha.	25.0		25
2.3.3 Establishment of Reservations	ha.	12.0		12
3 Market for Agricultural Produce				
3.1 Commercial Activities	Units	6		6
3.2 Agro-based Industries	No	1		1
3.3 Divisional Collecting Centres	No			0
3.4 Production Companies	No	1		1
4. Integrated Planning, Participatory Dev.				
4.1 Formation of New Groups	No	10		10
4.2 Strengthening of Existing Groups	No			0
4.3 Formation of New Farmer Organisations	No	1		1
4.4 Formation of Sub-Councils	No	1		1
4.5 Councils	No			0
4.6 Formation of Farmer Federations	No			0
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.				
– Representatives of User groups	No	158		158
– Representatives of Organisations	No	158		158
– Representatives of User Sub Councils/Councils	No	3		3
4.8 No. of user organisations conferred with legal Status and Powers	No	2		2
4.9 No. of small grants made to Land & Water user groups and invested into common user group assets.	No			0
5 Land Leasing/Usufructury Processes				
5.1 No. of hectares of targeted area covered by agreements between GSL & Local user groups-ownership	ha.	10		10
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.	10		10
5.3 No. Farm families involved				
– to ( 5.1)	No.	52		52
– to ( 5.2)	No.	25		25
Farm families involved	No	158	32	190

**PHASE II WORK PLAN – HURULUWEWA WATERSHED  
ACTIVITIES AND THE TARGETS OF THE SUB WATERSHEDS**

ACTIVITY	Unit	Sub Watershed – 27			
		Olugolla– gama	(C,A)	Others	Total
(1)Integrated Water Management and Regeneration of Tank Eco–System					
1.1 Integrated Water Management	ha.	45.9	429.0	40.0	514.88
1.2 Regeneration of Tank Eco–System	ha.	4.0		1.0	5
1.3 Inland Fisheries	Tanks/ Ponds	2		1	3
1.4 Land Consolidation	Minor Irrig.				0
(2)Highland Development and Conservation Farming					
2.1 Concervation Farming undr Chenas	ha.	21.0		11.0	32
2.2 Conservation farming under Homegarden	ha.	122.0		6.5	128.45
2.3 Forest					
2.3.1 Reforestration	ha.	18.0		8.0	26
2.3.2 Protection of existing Forest	ha.	5.0		4.0	9
2.3.3 Establishment of Reservations	ha.				0
3 Market for Agricultural Produce					
3.1 Commercial Activities	Units	2		1	3
3.2 Agro–based Industries	No	2			2
3.3 Divisional Collecting Centres	No	1		1	2
3.4 Production Companies	No				0
4.Integrated Planning, Participatory Dev.					
4.1 Formation of New Groups	No	4		1	5
4.2 Strengthening of Existing Groups	No	4	2	1	7
4.3 Formation of New Farmer Organisations	No			1	1
4.4 Formation of Sub– Councils	No	1			1
4.5 Councils	No				0
4.6 Formation of Farmer Federations	No				0
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.					
– Representatives of User groups	No	280	240	180	700
– Representatives of Organisations	No	120	22	18	160
– Representatives of User Sub Councils/Councils	No	20	2	2	24
4.8 No. of user organisations conferred with legal Status and Powers	No				0
4.9 No. of small grants madr to Land & Water user groups and invested into common user group assets.	No				0
5 Land Leasing/Usufructury Processes					
5.1 No. of hectares of targeted area covred by agreements between GSL &Local user groups–ownership	ha.	3.0			3
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.	10.0		4.0	14
5.3 No. Farme families involved					
– to ( 5.1)	No.	3			3
– to ( 5.2)	No.	50		20	70
Farm families involved	No	286	369	150	805

Table II-2

PHASE II WORK PLAN - IMPLEMENTATION TIME SCHEDULE OF  
THE TARGETS - HURULUWEWA WATERSHED

ACTIVITY	Unit	Grand Total	Time Schedule											
			1996				1997				1998			
			1	2	3	4	1	2	3	4	1	2	3	4
(1) Integrated Water Management and Regeneration of Tank Eco-System	ha.	5463.3	875	490	---	---	875	490	---	---	875	490	---	---
1.1 Integrated Water Management	ha.	138.9	22	---	---	17	22	---	---	17	22	---	---	---
1.2 Regeneration of Tank Eco-System	Tanks/ Ponds	51	12	---	---	---	15	---	---	---	15	---	---	---
1.3 Inland Fisheries	Minor Irrig.	3	---	---	---	---	---	---	---	---	1	---	---	1
1.4 Land Consolidation														
(2) Highland Development and Conservation Farming	ha.	1573.0	---	---	---	---	---	---	---	---	---	---	---	---
2.1 Conservation Farming under Chenas	ha.	1499.3	188	---	---	---	188	---	---	---	188	---	---	---
2.2 Conservation farming under Homegarden														
2.3 Forest	ha.	454.2	---	---	---	152	---	---	---	152	---	---	---	---
2.3.1 Reforestation	ha.	781.4	782	---	---	---	---	---	---	---	---	---	---	---
2.3.2 Protection of existing Forest	ha.	258.4	10	---	---	50	33	---	---	50	33	---	---	---
2.3.3 Establishment of Reservations														
3 Market for Agricultural Produce	Units	88	6	6	5	3	5	10	4	5	3	10	4	2
3.1 Commercial Activities	No	19	2	1	1	1	1	2	1	1	1	2	1	1
3.2 Agro-based Industries	No	9	---	---	---	---	---	---	---	---	---	---	---	---
3.3 Divisional Collecting Centres	No	4	---	---	---	---	---	---	---	---	---	---	---	---
3.4 Production Companies	No	4	---	---	---	---	---	---	---	---	---	---	---	---
4 Integrated Planning, Participatory Dev.														
4.1 Formation of New Groups	No	105	2	8	4	4	4	8	12	7	9	10	15	3
4.2 Strengthening of Existing Groups	No	43	3	4	---	---	---	5	6	---	---	3	11	---
4.3 Formation of New Farmer Organisations	No	15	---	1	1	1	1	3	2	---	1	2	2	---
4.4 Formation of Sub-Councils	No	14	---	---	---	2	---	2	2	---	2	2	2	---
4.5 Councils	No	0	---	---	---	---	---	---	---	---	---	---	---	---
4.6 Formation of Farmer Federations	No	3	---	1	---	---	---	---	1	---	---	---	---	---
4.7 Training opportunities provided to representatives of user organi. NGOs & other private sector org. in participatory natural resource Mgt.														
- Representatives of User groups	No	5209	675	---	---	---	---	650	650	---	---	650	650	---
- Representatives of Organisations	No	1701	150	---	---	---	---	300	300	---	---	250	250	---
- Representatives of User Sub Councils/Councils	No	177	5	2	---	---	---	28	28	---	---	28	28	---
4.8 No. of user organisations conferred with legal Status and Powers	No	67	2	2	4	6	6	6	3	2	5	6	10	3
4.9 No. of small grants made to Land & Water user groups and invested into common user group assets.	No	51	---	8	---	---	---	8	8	---	---	10	10	---
5 Land Leasing/Usufructuary Processes														
5.1 No. of hectares of targeted area covered by agreements between GSL & Local user groups - ownership	ha.	1253.6	---	---	154	---	---	100	100	200	---	100	100	200
5.2 No. of hectares Land leasing/Usufructuary Process facilitating commercial activities	ha.	545.9	---	---	---	---	---	75	75	75	---	100	25	25
5.3 No. Farm families involved	No.	949	---	---	150	150	---	---	125	124	---	---	---	---
- to (5.1)	No.	1334	---	---	100	80	---	---	200	200	---	---	---	---
- to (5.2)	No.	7587	---	---	---	---	---	---	---	---	---	---	---	---
Farm families involved														

Table II-3

PHASE II – WORK PLAN  
(ACTIVITIES AND TARGETS)

ACTIVITY	Unit	Grand Total
(1) Integrated Water Management and Regeneration of Tank Eco-System		
1.1 Integrated Water Management	ha.	5463.3
1.2 Regeneration of Tank Eco-System	ha.	138.9
1.3 Inland Fisheries	Tanks/Ponds	51
1.4 Land Consolidation	Minor Irrig.	3
(2) Highland Development and Conservation Farming		
2.1 Concervation Farming undr Chenas	ha.	1573.0
2.2 Conservation farming under Homegarden	ha.	1499.3
2.3 Forest		
2.3.1 Reforestration	ha.	454.2
2.3.2 Protection of existing Forest	ha.	781.4
2.3.3 Establishment of Reservations	ha.	258.4
3 Market for Agricultural Produce		
3.1 Commercial Activities	Units	88
3.2 Agro-based Industries	No	19
3.3 Divisional Collecting Centres	No	9
3.4 Production Companies	No	4
4. Integrated Planning, Participatory Dev.		
4.1 Formation of New Groups	No	105
4.2 Strengthening of Existing Groups	No	43
4.3 Formation of New Farmer Organisations	No	15
4.4 Formation of Sub-Councils	No	14
4.5 Councils	No	0
4.6 Formation of Farmer Federations	No	3
4.7 Training opportunities provided to representatives of user organi. NGOs& other private sector org. in participatory natural resource Mgt.		
– Representatives of User groups	No	5209
– Representatives of Organisations	No	1701
– Representatives of User Sub Councils/Councils	No	177
4.8 No. of user organisations conferred with legal Status and Powers	No	0
4.9 No. of small grants made to Land & Water user groups and invested into common user group assets.	No	67
5 Land Leasing/Usufructury Processes		
5.1 No. of hectares of targeted area covered by agreements between GSL & Local user groups – ownership	ha.	1253.6
5.2 No. of hectares Land leasing/Usufructury Process facilitating commercial activities	ha.	545.9
5.3 No. Farme families involved		
– to ( 5.1)	No.	949
– to ( 5.2)	No.	1334
Farm families involved	No	7587



# SCOR PROJECT

## Work Plan for Upper Nilwala Watershed 1995 November - 1999 October

Work Plan for Upper Nilwara watershed 1995 November - 1999 October											
Theme / Major Activities	Locations	Expected Outputs Phase II	Achievement in Phase I	Time Schedule					Remarks		
				1995 / 1996				96 / 97		97 / 98	98 / 99
				Q1	Q2	Q3	Q4				
1 Preliminary Planning (Net workings)											
1.1 New Sub Watersheds	Athu Ela Digili Ela Paragala Oya Urubokku Oya										
1.1.1 Meeting with PSC Members		Meeting already held		1							
1.1.2 Simulation Planning workshop With SCOR Team		Workshop held		1							
1.1.3 Visit to proposed new SWs		potentials identified		1							
1.1.4 Informal discussions with RUOs in new SWs		problems sensitised		1							
1.1.5 Preparation of tentative workplan		Plan prepared		1							
1.1.6 Meeting with line agency provincial heads		Meeting held		1							
1.1.7 Meeting with Divisional Secretaries of new SWs		Involve new DSs in SCOR activities									
1.1.8 Arrange planning workshops with line agencies		5 workshops		2		3					
1.1.9 Introduction of SCOR concepts to community leaders, local officials		4 Meetings		2		2					
1.1.1 Identification of change agents working in new SWs					*						
1.1.1 Identification of RUONGO operating in the watersheds					*						
1.1.1 Identification of micro watersheds for initial activities		4 SWs		2		2					
1.1.1 Arrange participatory planning work in identified micro watersheds		8 Planning workshops				8					
1.1.1 Form Sub Task Forces for planning and implementation of detailed activities		20 Sub Task Forces				10	10				
1.1.1 Planning/technical workshops		2 workshops				1	1				

## SCOR PROJECT

### Work Plan for Upper Nilwala Watershed 1995 November - 1999 October

Work Plan for Upper Nilwala Watershed 1995 November - 1999 October												
Theme / Major Activities	Locations	Expected Outputs Phase II	Achievement in Phase I	Time Schedule								Remarks
				1995 / 1996				96 / 97	97 / 98	98 / 99		
				Q1	Q2	Q3	Q4					
1.2 <u>Pilot Watersheds</u> 1.2.1 Meeting with WRM/T/PSC Officials 1.2.2 Simulation planning workshop with SCOR Team 1.2.3 Sectorial planning workshop with line agencies 1.2.4 SWS level participatory planning workshops 1.2.5 Preparation of detailed activity plans 1.2.6 Finalize mini projects	4 SW/s  4 SW/s 4 SW/s 4 SW/s	Meeting held Workshop held  5 Workshops 4 Workshops held 4 details plans 20 Mini projects	   32	1 1  8	5  4 4 8	2   2						
2.0 <u>Shared Management of Land and Water Resources</u> 2.1 Establish user rights for limited use of Natural forests	Pilot watersheds Horagala Milla Ela Aninkanda Diyadawa/Tenipita New SW/s	  84 ha. 200 ha. 1000 ha.	  4 ha. 12 ha. 127 ha. 01 ha.		24  50	30  50	30  100 100	300 300	300			
2.2 Enrichment planting in reserved forests	Pilot watersheds Horagala Milla Ela Aninkanda Diyadawa/Tenipita New SW/s	5.5 ha. 9 ha. 11 ha. 5 ha. 250 ha.	1 ha. 4 ha. 7 ha. 1 ha.		7	5.5 2 11 5			50 150	50		
2.3 Introduction of agro Forestry	Pilot watersheds Horagala Milla Ela Aninkanda Diyadawa/Tenipita New SW/s	- ha. 12 ha. - ha. - ha. 500 ha.	11 0 40 34			12				100 200	200	
2.4 Conservation of stream reservations	Pilot watersheds Horagala Milla Ela Aninkanda Diyadawa/Tenipita New SW/s	48 ha. 124 ha. 120 ha. 60 ha. 500 ha.	24 ha. 42 ha. 32 ha. 84 ha.		18 24 40 30	30 100 80 30			120 120	120		

# SCOR PROJECT

## Work Plan for Upper Nilwala Watershed 1995 November - 1999 October

Theme / Major Activities	Locations	Expected Outputs Phase II	Achievement in Phase I	Time Schedule								Remarks
				1995 / 1996				96 / 97	97 / 98	98 / 99		
				Q1	Q2	Q3	Q4					
2.5 Conservation of Road Reservation	Pilot watersheds Horagala Milla Ela Aninkanda Diyadawa/Tenipita New SWs	28 ha. 62 ha. 26 ha. 46 ha. 300 ha.	8 ha. 24 ha. 12 ha. 12 ha.		8 20 10 10	10 20 10 16	10 32 6 10			100	100	
2.6 Enhancing watershed protection by providing production incentives for setting up - Pinus resin, Kiul, Bambo, Bata, Bee, honey medicinal, herbs, rattan mineral water, battery charging	Pilot SWs  New SWs	3 Nos.  10 Nos	2 Nos.	1	1		1		3	4	3	
2.7 Facilitation of mini hydro power generation through shared capital investment to promote conservation in catchment areas.	Pilot SWs  New SWs	2 hydropower units (30 ha)  4 hydropower units (100 ha)	Minihydro power plant at Bovitiyadola established 01 ha 26 ha. in catchment area conserved.					10	20			
2.8 Facilitate user groups to establish plant nurseries	Pilot watersheds Horagala Milla Ela Aninkanda Diyadawa/Tenipita New SWs	2 Nos. 3 Nos. 5 Nos. 4 Nos. 30 Nos	2 Nos. 1 Nos. 2 Nos. 2 Nos.			1 1 2 1	1 2 3 2			10	10	10
3.0 Productivity improvement in tea, rubber & cinnamon lands												
3.1 Productivity improvement in tea lands												
3.1.1 Promote conservation oriented productivity improvement measures in Tea Small Holdings/estates	Pilot watersheds Horagala Milla Ela Aninkanda Diyadawa/Tenipita New SWs	270 ha. 210 ha. 244 ha. 360 ha. 2000 ha.	110 ha. 178 ha. 323 ha. 293 ha.	70 60 60 90	100 50 60 90	50 50 64 90	50 50 60 90 100			900	500	500

# SCOR PROJECT

## Work Plan for Upper Nilwala Watershed 1995 November - 1999 October

Work Plan for Upper Nilwala Watershed 1995 November - 1999 October											
Theme / Major Activities	Locations	Expected Outputs Phase II	Achievement in Phase I	Time Schedule							Remarks
				1995 / 1996				96 / 97	97 / 98	98 / 99	
				Q1	Q2	Q3	Q4				
3.1.2 Promote conservation oriented productivity improvement in agency managed Tea plantations	Pilot watersheds Aninakanda Diyadawa / Tenipita New SWs	45 ha. 100 ha. 300 ha	54 ha.		20 50		25 50	100	100	100	
3.1.3 Raise tea nurseries	Pilot SWs	75 Nos. ( 750000 plants)	10 Nos (100000 plants)				75				
3.1.4 Strengthen Marketing links	New SWs	150 Nos.						75	75		
	Pilot SWs	06 Orgs.	04 Orgs.	4	2						
	New SWs	20 Orgs.						5	10	5	
3.1.5 Organize input supply	Pilot SWs	10 Orgs.	10 Orgs.	4	4		2				
	New SWs	20 Orgs.						5	10	5	
3.1.6 Initiate capital building to establish a tea farmer bank	Pilot SWs	3000 farmers		500	500	1000	1000	4000	4000		
3.1.7 Introduce crop diversification in marginal tea lands	Pilot SWs	175 ha.	34 ha								
3.1.8 Plan strategies to improve productivity in absentee land lords	New SWs	205 ha.	5 ha.		50	50	100	50	50	75	
3.2 Productivity improvement in Rubber lands	New SWs	500 ha.						200	200	100	
3.2.1 Promote conservation oriented productivity improvement in rubber lands	New SWs	100 ha.						25	50	25	
3.2.2 Introduce under planting with economically viable fruit crops	New SWs	2 organisations						2			
3.2.3 Arrange market linkages and input supply	New SWs	50 ha.						25	25		
3.3 Promote conservation oriented productivity improvement in cinnamon lands	New SWs										
4 <u>Sharing Resource for Improving homesteads</u>											
4.1 Improve Production base through promoting apiculture, floriculture, livestock, horticulture, medicinal herbs and conservation measures	Horagala Milla Ela Aninakanda Diyadawa/ Tenipita New SWs	29 ha. 75 ha. 87 ha. 65 ha. 500 ha.	11 ha. 17 ha. 53 ha. 87 ha.	9 25 27 15	10 25 25 25			150	200	150	

# SCOR PROJECT

## Work Plan for Upper Nilwala Watershed 1995 November - 1999 October

WORK PLAN FOR UPPER NIWADA WATERSHED 1995/NOVEMBER - 1999/SEPTEMBER											
Theme / Major Activities	Locations	Expected Outputs Phase II	Achievement in Phase I	Time Schedule							Remarks
				1995 / 1996				96 / 97	97 / 98	98 / 99	
				Q1	Q2	Q3	Q4				
4.2 Establish model cluster homesteads	Pilot SWs New SWs	22 50	2			10	12	20	20	10	
4.3 Arrange market linkages input planting material supply for homestead based enterprises	Pilot SWs New SWs	1300 units 2500 units	840 units	300	400	400	200	500	1000	1000	
5.0 <u>Productivity improvement in Paddy Lands</u>											
5.1 Improve Management practices in paddy lands	Pilot SWs Horagala Milla Ela Aninkanda Diyadawa/Tenipita New SWs	45 ha. 87 ha. 86 ha. 33 ha. 400 ha.	16 ha. 25 ha. 10 ha. 14 ha.		20 40 40 13		25 47 46 20			150	
5.2 Establish seed paddy farms	Pilot SWs New SWs	15 ha. 25 ha.	18.8 ha.				15	10	10	5	
5.3 Adopt measures to solve problem in minor irrigation schemes	Pilot SWs New SWs	100 ha. 200 ha.	64.5 ha.			50	50	50	100	50	
5.4 Adopt measures to solve ownership problems	Pilot SWs New SWs	15 ha. 100 ha.	8 ha.		5		10	25	50	25	
6.0 <u>Organize groups for improved production , Protection marketing and related services</u>											
6.1 Organize User groups to involve in ; Marketing and input supply Plant nurseries Homestead development/demonstration Floriculture, apiculture,livestock dev. Forestry / Stream conservation Value adding activities collection of NWFD Mini hydro, seed paddy Tea land conservation skilled activities	Pilot SWs New SWs	20 400	80		5 5	5	10		125	125	

# SCOR PROJECT

## Work Plan for Upper Nilwala Watershed 1995 November - 1999 October

WORK PLAN FOR UPPER NIWADA WATERSHED 1996/NOVEMBER 1996 - SEPTEMBER 1997											
Theme / Major Activities	Locations	Expected Outputs Phase II	Achievement in Phase I	Time Schedule							Remarks
				1995 / 1996				96 / 97	97 / 98	98 / 99	
				Q1	Q2	Q3	Q4				
6.2 Form mini watershed level multi activity/single activity based orgs. to implement mini projects	Pilot SWs New SWs		20								
6.3 Expand and strengthen existing user orgs. for improved watershed mgt.	Pilot SWs New SWs	6 20	6			3	2	6	12		
6.4 Form SWS level service organisations (Sub User Councils)	Pilot SWs New SWs	4	4						4		
6.5 Formation of User Councils	Pilot SWs New SWs	1 1	4 1								
6.6 Arrange Small Grants for user groups and invested into common user assets	Pilot SWs New SWs	20 60	32 6	8	8	2	2	20	20	18	
6.7 Facilitate user organisations to estb. links with lending institutions to obtain credit for commercial activities	Pilot SWs New SWs	4 60	4				2	20	20	20	
6.8 Establish new commercial enterprises through user groups	Pilot SWs New SWs	1 10	4	1				4	3	3	
6.9 Facilitate user groups to establish commercial activities and linked new market	Pilot SWs New SWs	5 100	24			2	3	25	45	30	
6.10 Facilitate user groups / orgs. to form a production companies	Pilot SWs New SWs	4	1						2	2	
7.0 Action Research											
7.1 Land Use maps for sub-watersheds	Pilot SWs New SWs	4 Maps 4 Maps	2	2				2	2		
7.2 Land Use studies											
7.3 Baseline and monitoring and evaluation studies for land and water conservation	Pilot SWs New SWs	Research Reports Research Reports									
7.4 Evaluation of SCOR interventions on resource mgt. profitability	Pilot SWs	Seasonal reports Working paper Annual research reports				1		1			This is covered under research contract with Prof. Weerasinghe
7.5 Potential for improving labour productivity	Pilot SWs	Seasonal reports Working paper Annual research reports									

# SCOR PROJECT

## Work Plan for Upper Nilwala Watershed 1995 November - 1999 October

PROJECT PLAN FOR UPPER NILWALA WATERSHED 1995-1999											
Theme / Major Activities	Locations	Expected Outputs Phase II	Achievement in Phase I	Time Schedule							Remarks
				1995 / 1996				96 / 97	97 / 98	98 / 99	
				Q1	Q2	Q3	Q4				
7.6 Adoption of technology	Pilot SWs	Seasonal reports Annual research reports									
7.7 Institutional support for projects of resource user organisations	Pilot SWs	Seasonal reports Annual research reports									
7.8 Impact of land tenure	Pilot SWs	Seasonal reports									
7.9 Study on changes in hydrological regimes, sediment yield and nutrient leaching in small watershed with SCOR interventions	Pilot SWs	Seasonal report Working paper ( Annual Report )			1	1	1	1			This is covered under research contract with Prof. Weerasinghe
7.10 Analysis of Agro-climatic data in the Upper Nilwala relation to soil and water conservation		Working paper Final Research Report			1	1					-do -
7.11 Evaluation of tree species used in forestry interventions in the Upper Nilwala watershed in relation to soil and water conservation	Pilot SWs	Working paper Annual Research report						1	1		
7.12 Study on biological diversity of forest reservation in the Upper Nilwala Watershed	Pilot SWs	Working paper Annual Research report						1	1		
7.13 Assessment of homestead gardens in the Upper Nilwala Watershed in relation to the potentials and possibilities of improving sustainable production & protection systems	Pilot SWs	Working paper Annual Research report						1	1		
7.14 Impacts of soil and water conservation at Upper Nilwala basin	Pilot SWs	Progress report Annual report ( Working paper ) Final research report					1	3	1		- do -

# SCOR PROJECT

## Work Plan for Upper Nilwala Watershed 1995 November - 1999 October

Work Plan for Upper Niwala watershed 1995 NOVEMBER - 1999 OCTOBER

Theme / Major Activities	Locations	Expected Outputs Phase II	Achievement in Phase I	Time Schedule							Remarks
				1995 / 1996				96 / 97	97 / 98	98 / 99	
				Q1	Q2	Q3	Q4				
8.0 Integrated Planning Provincial level, for problem and policy resolution	Galle	12 meetings	6		1	1	1				
8.1 Provincial Steering Committee (PSC)											
8.2 Agency based Task Forces meetings		48 meetings	8	3	3	3	3				
Watershed Level, for Project Programming											
8.3 Watershed resource management teams	SCOR Office	12 meetings	4	1	1	1	1				
8.4 Subwatershed working group	Relavent DS Office (5)	96 meetings	36	6	6	6	6				
8.5 Subwatershed participatory planning workshops	Relavent SWs (8)	32 Annual plans	8	4	4	4					
8.6 Workshops on agro-forestry in plantation sector	New SWs	Agro-forestry plan for forestry sector		1							
8.7 Seminar for presentation of success stories /case studies in natural resource mgt.	New SWs			4							
9.0 Training											
9.1 Training for Resource User Orgs.					500	250	250				
9.2 Institutional Dev. training for users		1000 trainees			100	100	80				
9.3 Institutional Dev. training for RUG reps.		280			70	50	50				
9.4 Institutional Dev. for RUO Office bearers		170				28	28				
9.5 Institutional Dev. Mini-projects assistants		56									
9.6 Institutional dev. training Service Farmer Org. Office bearers		30			21		30				
9.7 Institutional Dev. Training for Assit. catalysts		21									
9.8 Training for resource user support agencies											
9.9 Workshop on improving capacities in Participatory planning, Monitoring & Evaluation and Institutional dev. for watershed management		5		3		2					



Table 11-5

## TIME SCHEDULE OF IMPLEMENTATION OF TARGETS AND THE RESPONSIBILITIES OF ACTIVITIES.

[illegible]

Theme	Activity	Sub Activity	Target	Time Schedule																							
				1996												1997											
				Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
2. Highland Development and Conservation Farming	1 Development of Homestead 2 Usage of water conservation measures	1. Inspection of Lands	122.6 Ha.																								
		2. Marking contour bunds & drains	120 Ha.																								
		3. Usage of mulch	30 Ha.																								
		4. Pitcher Irrigation	5 Ha.																								
		5. Ally Cropping	6 Ha.																								
		6. Introducing improve water conservation measures.	4 Ha.																								
		7. Establishment of Pawatta & Gilricidia	120 Ha.																								
		8. Establishment of Live fence	20 Homestead																								
	2 Conversion of unferile homestead Uplands to fertile homestead	1. Apply organic Fertilizer	10 Ha.																								
		2. Crop Diversification	100 Ha.																								
		3. Incorporation of Animal waste to Soil	30 Farm Families																								
		1. Replacement of seasonal crops by high perennials crops.	65 Ha.																								
	3 Management of Homestead to generating income	2. Pruning and tree management	05 Ha.																								
		1. Small scale homestead cultivation for home consumption	25 Ha.																								
		2. Energy savings burners	25 homes																								
		3. Introduction model kitchen	30 No.																								
	5 Introduction of income generating activities	4. Preparation of Compost pits	25 No																								
		1. Animal husbandry Goat rearing	30 Families																								
		Poultry Farming	10 Families																								
		Cattle Farming	10 Families																								
	6 Introduction of improved sanitation methods 7 Conservation farming under chena	2. Establishment of small scale nurseries	10 Families																								
		3. Bee keeping	05 Families																								
		4. Development of Reed Industry.	5 Families																								
		1. Improvements of Sanitation Facilities	25 Families																								
		2. Encouraging Nutrition programme & child education.	30 Families																								
		1. Marking contour bunds & drains	122.6 Ha.																								
		2. Cultivation Pawatta & Gilicidia	197 Ha.																								
		3. OFC cultivation with mulch	100 Ha.																								

Theme	Activity	Sub Activity	Target	Time Schedule																							
				1996												1997											
				Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
3. Integrated planning & Farmer Org.	8 Using improved water conservation methods.	1. OFC cultivation with mulch	197 Ha.																								
		2. Cultivating perennial crops	100 Ha.																								
		3. Rainfed cultivation	100 Ha.																								
		4. Establishment of orchards	10 Ha.																								
	9 Reforestation	1. Selection of Farmers & sites	50 Farmers																								
		2. Establishment of nurseries.	5 Farmers																								
		3. Linking with subsidies program	50 Farmers																								
	10 Conservation of reservation	4. Marking & Establish contour bunds	50 Farmers																								
		5. Cultivating of seasonal crops	50 Ha.																								
		6. Agreements for usufructury rights	50 Farmers																								
4. Development of Marketing Facilities for Agricultural production and Agro based Industries	1 Strengthening of existing Groups/ 2 Formation of sub Councils	7. Marketing arrangements	50 Farmers																								
		1. Demarkation of Yan Oya reservation	3 Km																								
		1. Registration of groups.Organisations & Sub Councils	4																								
		2. Training of leaders of groups & Org	50 Farmers																								
	3 Formation of Task forces	3. Training of women in development exercises	1																								
		1. Task force for integrated planning & Implementation	12 meetings																								
	4 Coordination with NGOs	1. Working with Samadepa Social Org	1																								
		1. Establishment of Rice mill 2. Establishment of Center for Collecting Agricultural Produce inputs Supplies.	1																								
	5. Land Leasing/Usufructury Process	1. Land Leasing(Ownership)	1. Survey on current status	112.6 ha 76 farmers																							
			2. Coordination with relevent govt. Agencies																								
5. Land Leasing/Usufructury Process	2. Usufructury Process	3 Make arrangements to issue the permits																									
		1. Survey on current status	35 ha. 96 farmers																								
5. Land Leasing/Usufructury Process	2. Coordination with relevent Govt.Agencies	2. Coordination with relevent Govt.Agencies																									

TIME SCHEDULE OF IMPLEMENTATION OF TARGETS AND THE RESPONSIBILITIES OF ACTIVITIES.  
KELANIKAWA SUB-WATERSHED - HURULUWEWA WATERSHED

Theme	Activity	Sub Activity	1998												1999											
			Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1. Integrated water Management and Regeneration of Tank Eco System.	1 Crop Diversification during Yala Season, (Cultivation of cash crops in Paddy fields)	1. Pre Seasonal meeting																								
		2. Supply of inputs																								
		3. Kanna Meeting																								
		4. Land preparation And seeding																								
		5. Ratoon Cropping																								
		6. Mulching																								
		7. Implementation of On Farm Water Management Programme.																								
	2 Maha Cultivation with the optimum use of rainfall	1. Pre Seasonal meeting																								
		2. Supply of inputs																								
		3. Clearing of Bunds and other activities																								
3 Regeneration of Tank Eco-System in Minor Irrigation Schemes	4 Inland Fisheries Activities	4. Kanna meeting																								
		5. Sawing with the on set of Rain																								
		6. Land preparation and sawing																								
		7. Implementation of On Farm Water Management Programme.																								
		8. Implementation of Integrated pest Mgt. Prog.																								
		1. Perahana																								
		2. Gasommana																								
		3. Kattakaduwa																								
	5 Introduction high income cropping Pattern under Agro-wells	4. Maintenance Activities																								
		5. Nursery establishment																								
5 Introduction high income cropping Pattern under Agro-wells	Co-ordination with Inland fisheries Dept.	Co-ordination with Inland fisheries Dept.																								
		1.Preparation with cultivation plan																								
		2. Introduction of high income cropping pattern																								
		3. OFC cultivation with mulch (Introduction of water savings measures)																								
		4. Introducing high income crops in off season																								
	Marketing arrangements	5. Marketing arrangements																								

Theme	Activity	Sub-activity	1998												1999												
			Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	
2. Highland Development and Conservation Farming	1 Development of Homestead	1. Inspection of Lands																									
	2 Usage of water conservation measures	2. Marking contour bunds & drains																									
		3. Usage of mulch																									
		4. Pitcher Irrigation																									
		5. Alley Cropping																									
		6. Introducing Improve water conservation measures.																									
		7. Establishment of Pawatta & Gliricidia																									
		8. Establishment of Live fence																									
		1. Apply organic Fertilizer																									
	2 Conversion of uninfertile homestead Uplands to fertile homestead	2. Crop Diversification																									
3. Incorporation of Animal waste to Soil																											
3 Management of Homestead to generating income	1. Replacement of seasonal crops by high perennials crops.																										
	2. Pruning and tree management																										
4 Establishment of model homesteads	1. Small scale homestead cultivation for home consumption																										
	2. Energy savings burners																										
5 Introduction of income generating activities	3. introduction model kitchen																										
	4. Preparation of Compost pits																										
6 Introduction of improved sanitation methods	1. Animal husbandry	Goat rearing																									
		Poultry Farming																									
		Cattle Farming																									
		2. Establishment of small scale nurseries																									
	3. Bee keeping																										
		4. Development of Reed Industry.																									
	2. Improvements of Sanitation Facilities	1. Improvements of Sanitation Facilities																									
		2. Encouraging Nutrition programme & child education.																									
		1. Marking contour bunds & drains																									
			2. Cultivation Pawatta & Gliricidia																								
7 Conservation farming under chena	3. OFC cultivation with mulch																										

Theme	Activity	Sub Activity	1998												1999											
			Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
3. Integrated planning & Farmer Org.	8 Using improved water conservation methods.  9 Reforestation	1. OFC cultivation with mulch 2. Cultivating perennial crops 3. Rainfed cultivation 4. Establishment of orchards 1. Selection of Farmers & sites 2. Establishment of nurseries. 3. Linking with subsidies program 4. Marking & Establish contour bunds 5. Cultivating of seasonal crops 6. Agreements for usufructary rights 7. Marketing arrangements																								
		10 Conservation of reservation																								
		1 Strengthening of existing Groups/ Formation of new groups 2 Formation of sub Councils 3 Formation of Task forces 4 Coordination with NGOs																								
		1. Registration of groups Organisations & Sub Councils 2. Training of leaders of groups & Org 3. Training of women in development exercises 1. Task force for integrated planning & Implementation 1. Working with Samadepa Social Org																								
4. Development of Marketing Facilities for Agricultural production and Agro based Industries	1. Establishment of Rice mill 2. Establishment of Center for Collecting Agricultural Produce Inputs Supplies.	1. Collection of Maize, Chillies, Kurakkan Herbs 2. Establishment of Marketing Information Center																								
5. Land Leasing/Usufructury Process	1. Land Leasing(Ownership)	1. Survey on current status 2. Coordination with relevant govt. Agencies 3 Make arrangements to issue the permits																								
	2. Usufructury Process	1. Survey on current status 2. Coordination with relevant Govt. Agencies																								

TIME SCHEDULE OF IMPLEMENTATION OF TARGETS AND THE RESPONSIBILITIES OF ACTIVITIES.  
KELANKAWWA SUB-WATERSHED - HURULUWEWA WATERSHED

Theme	Activity	Sub Activity	Responsibility		
			Govt.	SCOR	Other
1 Integrated water Management and Regeneration of Tank Eco System.	1 Crop Diversification during Yala Season. (Cultivation of cash crops in Paddy fields)	1. Pre Seasonal meeting	DO/RPM/GN	IO	Farmer Leaders
		2. Supply of Inputs	DO/AI	IO/WMC	Farmer Rep.
		3. Kanna Meeting	DS/RPM/DO/GN	IO/WMC	Do
		4. Land preparation And seeding	AI	IO	Do
		5. Ratoon Cropping	AI	IO/R/A/O	Do
		6. Mulching	AI	IO/WLW/RO/R/A	Do
		7. Implementation of On Farm Water Management Programme.	AI	IO	Do
	2 Maha Cultivation with the optimum use of rainfall	1. Pre Seasonal meeting	DO/RPM/GN	IO	Farmer Leaders
		2. Supply of Inputs	DO/AI	IO/WMC	Farmer Rep.
		3. Clearing of Bunds and other activities			Do
		4. Kanna meeting	DS/RPM/DO/GN	IO/WMC	Do
		5. Sawing with the on set of Rain			Do
		6. Land preparation and sawing	AI		Do
	3 Regeneration of Tank Eco--System in Minor Irrigation Schemes	7. Implementation of On Farm Water Management Programme.	AI	IO	Do
		8. Implementation of Integrated pest Mgt. Prog.			
		1. Perahana	DO	IO/R/A	Farmer Rep.
		2. Gasgommana	DO	IO/R/A	Farmer Rep.
		3. Kattakaduwa	DO	IO/R/A	Farmer Rep.
	4 Inland Fisheries Activities	4. Maintenance Activities	TO/ra	IO/RO	Farmer Rep.
		5. Nursery establishment	AI	IO/WMC/YWO	Farmer Rep.
		Co--ordination with Inland fisheries Dept.	FEO	IO/WMC	Farmer Rep.
		1.Preparation with cultivation plan	AI	IO/WMC/RO	Farmer Leaders
		2. Introduction of high income cropping pattern	AI	IO/WMC/RO	Farmer Leaders
3. OFC cultivation with mulch (Introduction of water savings measures)		AI	IO/WMC/RO	Farmer Leaders	
4. Introducing high income crops in off season		AI	IO/WMC/RO	Farmer Leaders	
5. Marketing arrangements		DO	IO/WMC/MES	Farmer Leaders	

Theme	Activity	Sub Activity	Responsibility		
			Govt.	SCOR	Other
2. Highland Development and Conservation Farming	1 Development of Homestead 2 Usage of water conservation measures	1. Inspection of Lands 2. Marking contour bunds & drains 3. Usage of mulch 4. Pitcher Irrigation 5. Ally Cropping 6. Introducing improve water conservation measures. 7. Establishment of Pawatta & Gilicidia 8. Establishment of Live fence	AJGN	IO/CS/W/MC/WIO	Farmer Leaders & women
		1. Apply organic Fertilizer 2. Crop Diversification 3. Incorporation of Animal waste to Soil	AJGN	AJW/MC/WYO IO/HS/CS	
	2 Conversion of unferile homestead Uplands to fertile homestead	1. Replacement of seasonal crops by high perennials crops. 2. Pruning and tree management	WAI/AJRDO	WYO/IO	Farms
	3 Management of Homestead to generating income	1. Small scale home garden cultivation for home consumption 2. Energy savings burners 3. Introduction model kitchen 4. Preparation of Compost pits	AJW/AJRDO		
	4 Establishment of model homesteads	1. Animal husbandry Goat rearing Poultry Farming Cattle Farming	LD/NS/WAI	EDS/WYO/WMC	
	5 Introduction of income generating activities	2. Establishment of small scale nurseries 3. Bee keeping 4. Development of Reed Industry.			
	6 Introduction of improved sanitation methods 7 Conservation farming under chena	1. Improvements of Sanitation Facilities 2. Encouraging Nutrition programme & child education 1. Marking contour bunds & drains 2. Cultivation Pawatta & Gilicidia 3. OFC cultivation with mulch	RD/PHI OS/AG/AI	WYO/IO WMC/CS/IO/EDS	



Theme	Activity	Sub Activity	Responsibility		
			Govt.	SCOR	Other
	8 Using Improved water conservation methods.	1. OFC cultivation with mulch 2. Cultivating perennial crops 3. Rainfed cultivation 4. Establishment of orchards 1. Selection of Farmers & sites 2. Establishment of nurseries. 3. Linking with subsidies program 4. Marking & Establish contour bunds 5. Cultivating of seasonal crops 6. Agreements for usufructuary rights 7. Marketing arrangements			
	9 Reforestation				
	10 Conservation of reservation				
3. Integrated planning & Farmer Org.	1 Strengthening of existing Groups/ Formation of new groups 2 Formation of sub Councils	1. Registration of groups, Organisations & Sub Councils 2. Training of leaders of groups & Org 3. Training of women in development exercises 1. Task force for integrated planning & Implementation			
	3 Formation of Task forces				
	4 Coordination with NGOs	1. Working with Samadepa Social Org			
	4. Development of Marketing Facilities for Agricultural production and Agro based industries	1. Collection of Maize, Chillies, Kurakkan other Agricultural Produce and Medicinal Herbs 2. Establishment of Marketing Information Center 1. Survey on current status 2. Coordination with relevant govt. Agencies 3 Make arrangements to issue the permits 1. Survey on current status 2. Coordination with relevant Govt. Agencies	EDS	WYO/AGAPM	Farmer Leader
5. Land Leasing/Usufructury Process	1. Land Leasing (Ownership)				
	2. Usufructury Process				

## **SECTION III**

### **SHARED CONTROL OF NATURAL RESOURCES**

#### **3.1 INTER-DISCIPLINARY RESEARCH AND M&E MECHANISM**

SCOR is a PARTICIPATORY ACTION RESEARCH Project consisting of a large number of segments/components. To achieve SCOR goals and objectives, all such segments or components should be interwoven or blended intimately into a tightly-knit and integrated package. The segments/components are highly interdependent and inter-related.

SCOR interventions/action research adopts a learning process approach. Man/Land and Water interphase in a natural setting, that is the watershed, and the resultant on-going activity are looked at holistically from a real world perspective. The current status is assessed in a participatory mode. A future desired status, and interventions and activities that need to be implemented to get to that status are also agreed upon in a participatory manner based on the existing knowledge and availability of the technology, resources and organizational capacity. The interventions/activities are then linked to action research in an effort to learn from on going experiences to test the validity of the models and hypotheses researched upon. In the process not only the researchers, but also the resource users learn to realize the value of research and benefit from same.

A set of objectively verifiable indicators was formulated to check if the project targets are being approached (i.e. Monitoring) and in the end to check if the objectives have been really achieved and whether the practices are sustainable (i.e. effects and impacts). (For example, one of SCOR objectives is to increase the cropping intensity in a sample of small tank systems from the "pre-project" level of about 0.7 to 1.5. At the end of a few seasons, we have verified that the interventions have contributed to the realization of that target. Nevertheless, it would still be necessary to go further to establish that the farmers will have developed their capacity to sustain that progress over time on their own.)

For convenience, the objectively verifiable indicators are classified according to disciplines. The responsibility for the indicators of a particular discipline is then assigned to SCOR researchers according to their disciplines. (See Annex III-A2 at the end of this section.)

Depending on his/her disciplines, a particular researcher could analyze a selected set of indicators of his/her discipline and write research papers. While such research studies belonging to a particular discipline (for example local management of natural resources or water delivery) is of value to individual theme/discipline/programme objectives (and to the professional development of the researcher involved) what is more important from the SCOR standpoint is how that particular research area will be integrated with other relevant disciplines/researchers, in solving a real world problem or in achieving SCOR objectives. When such discipline components are put together as an integrated whole, their value is believed to be much higher than the value of the sum of a collection of individual and isolated research studies.

Certain key activity areas with general and specific objectives to be achieved, means to achieving these objectives and the targets to be realized are decided upon for operational purposes. The key activity areas are as follows:

1. Integrated Water Management (in Huruluwewa, for example, rainfall, tank water, ground water)
2. Conservation farming and stabilization of under utilized highlands
3. Production and conservation interventions in other areas (including paddy)
4. Integrated planning and coordination
5. Organizational development and shared control.

A research study within an activity area will, therefore need to involve multiple disciplines. (For example, a Research Study under the subject area of Integrated Water Management, will examine the impact of SCOR interventions on improvements in cropping intensity, land productivity and area irrigated. In order to achieve these objectives SCOR will have to use several means including improvements in water use efficiency which can be measured by distribution, improvements in non water inputs (e.g. fertilizer) etc. The improvements in water use efficiency and non water factors may result from improvements in organization which in turn may result from improvements in shared control mechanisms. Hence it is clear that if all these inter-related and interdependent issues are to be addressed, SCOR really will have no option but to follow the proposed approach and strategy.

In view of the inter-disciplinary and integrative nature of the research studies involved, SCOR adopts a team approach to its action research programme. The team consists of irrigation/water resources engineers, resource economists, conservation farming specialists, institutional development specialists and agro-forestry experts.

The SCOR research organization and its mode of operation provides a symbiotic relationship between discipline oriented research and applied inter disciplinary research adopting a holistic approach to solve watershed problems.

### **3.1.1 Special Functions of SCOR Research and M&E System**

- a. Understanding watershed characteristics, establishment of watershed database and monitoring system.
- b. Conduct participatory benchmark surveys to identify possible areas of interventions,
- c. Conduct diagnostic analysis to prioritized key constraints and choice of interventions. As indicated in Section II priority interventions will be identified through participatory planning processes.
- d. Monitoring and Evaluation Systems for interventions,

- e. Identifying of lessons learned, extending the learning to others as well as to other systems by local agencies and others (technology transfer).
- f. Special research studies to generate knowledge and evaluate impact.

### **3.1.2 SCOR Management Information System, and Monitoring and Evaluation**

A continuous flow of information is required to enrich the SCOR participatory process facilitating interaction, debate and resolution. The prudent use of information technology (IT) in the generation, process and analysis of information needed is crucial to support the planning, implementation and evaluation processes. For this, SCOR uses a Management Information System (MIS) and a rigorous monitoring and evaluation (M&E) activity through a participatory procedure involving user groups, government and other project participants. It reviews the progress and employs a feedback/correcting mechanism to ensure that project inputs, work schedules, targeted outputs and other related actions are proceeding according to plan. This mechanism also provides data for continuous and periodic evaluations to determine systematically and objectively the relevance, efficiencies, effectiveness (and impact) of project activities.

MIS and M&E of SCOR monitor and evaluate *project activities* or inputs as well as the *achievement of specific objectives of the project*. These two are related to each other and will eventually lead to *project's impacts*.

Figure III-1 lists the basic data requirements to gain knowledge on the watershed and Figure III-2 illustrates the SCOR M&E and Research "model" while Figure III-3 indicates the Operation of the Monitoring and Evaluation System of SCOR. (Please refer Annex III-A1 at the end of this section.)

It should be noted that SCOR M & E database is not separated from its research database. As much as possible, a common data collection program and a database is being used to compute M&E indicators as well as the indicators used for special research studies and indepth analyses.

The basic indicators and the corresponding data being collected by the SCOR research and M&E process is summarized in Annex III-A2 at the end of this chapter.

## **3.2 Outputs**

Major outputs of M&E and Research studies will be the assessment of SCOR Project based on specific indicators. Major indicators are listed below :

- Targeted hectares under improved production and protection techniques
- Value of targeted investment by the resource users in environmentally sound production practices
- Government policy decisions initiated

- Targeted land area covered by new agreements between GSL and user groups (Extent now under protection and production practices expecting user rights)
- Farm households using improved environmental techniques
- Number of Natural Resource Groups, Organizations and Companies operating
- farmer/user acceptance and participation
- Technology adoption
- User-agency relations
- extents irrigated
- Erosion coefficients
- vegetative cover by type of vegetation
- soil and water conservation improvements
- rainfall: run-off ratio
- cropping intensity improvements
- water use efficiency (macro/watershed and micro)
- water productivity
- land productivity
- income/investment levels by users
- equity
- profitability

### **3.2.1 Special Studies, Research Publications and Progress Reports**

The project is designed to innovate novel approaches to watershed management through participatory methods. Hence, proper documentation, dissemination of information and sharing of international experiences should be planned for. In addition, most of the special studies will be conducted directly by IIMI staff and, as indicated elsewhere, the data for most of these studies come from SCOR M&E program. Few studies are being conducted by other local research institutions (include. Universities and selected individuals).

A summary of research studies is included in Annex III-A3. In addition to these research papers and journal articles, SCOR research and M&E program produces newsletters (at different levels) brochures, manuals (training etc.), progress reports, project papers (include. mini projects) etc.

Figure III-1 - INDICATORS FOR MONITORING AND EVALUATION  
SCOR PROJECT

Number, Level of maturity, investments, turnover,  
Survival ratio of capital works of user groups,  
Organizations and councils

Ground water  
potential

Awareness level

Commercial activities, User grants

- Usufructuary rights
  - Soil loss
- Trees
  - Infiltration
  - Use rights
- Land cover
  - Runoff
  - Conservation practices
- Tank storage
- Sedimentation
- Water quality
- Surface and Ground
  - Water use efficiency
  - Income Cost of production, profits
- Plants Value
- Yield
- Cropping intensity

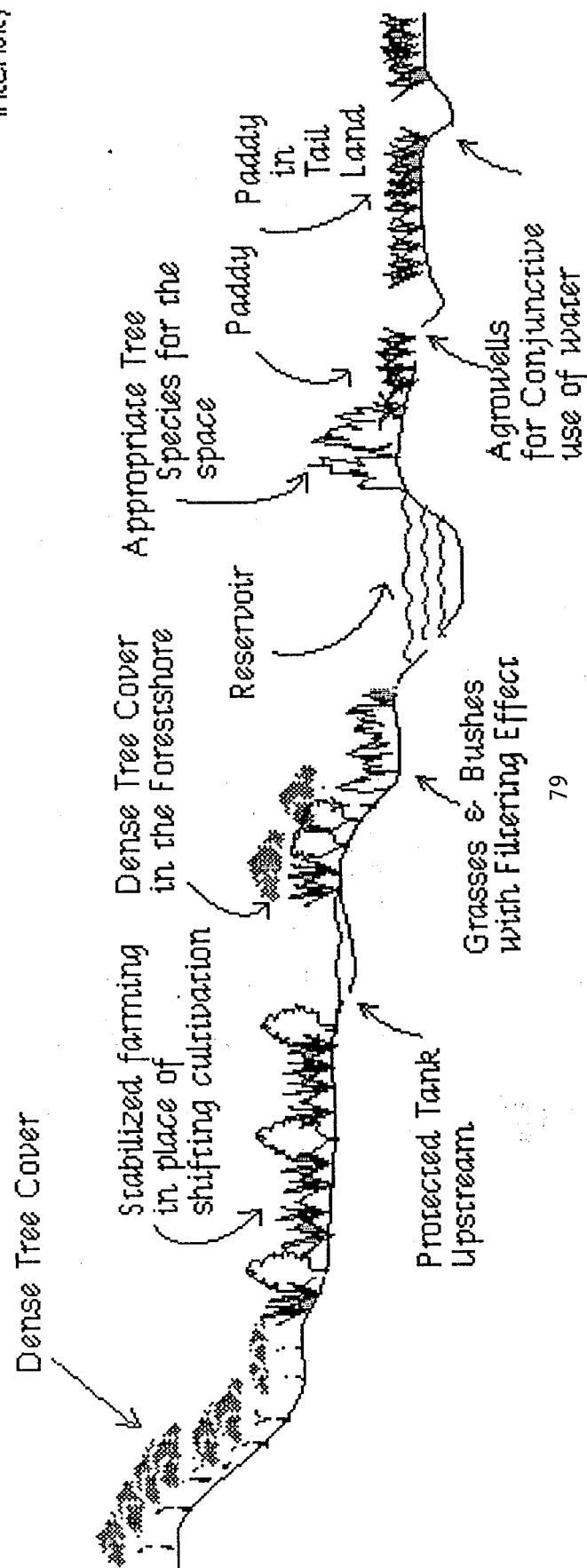


Figure iii-2 A PLANNING AND MONITORING & EVALUATION (M&E) MODEL

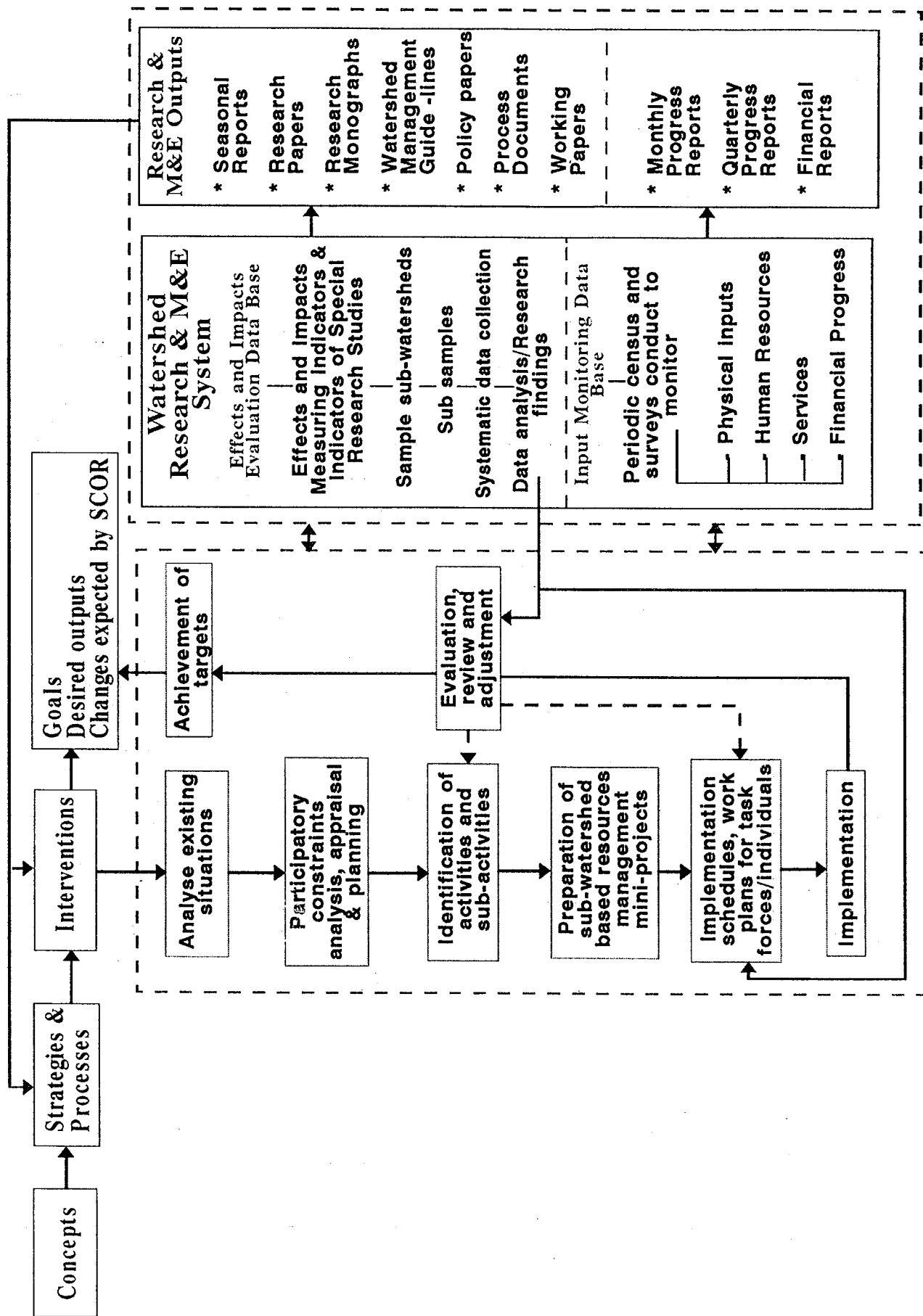


Fig. III-2





## Indicator Matrix of SCOR Action Research Program

## 1. Nilwala

## 1.1 Hydrological Indicators

Indicator	Sub Indicator/Indices	Parameters & Variables
1.1.1 sub – basin hydrology and water balance	1. Runoff/ Rainfall Ratio 2. Long term trends of runoff & rainfall variation 3. hydrological response to land use change – 3.1 high water characteristics (peak, duration, size) – 3.2 Low water characteristics (duration, stability) 1. Streamflow regimes 2. Flow duration curve 3. Storm hydrograph 4. Runoff/ Rainfall ratio	Riverflow at Bingama & Bopagoda Rainfall of the catchment Land use changes in catchment Consumptive water use – estimated from climatic data  Streamflow at SWS outlet Rainfall in the SWS
1.1.2 Sub – watershed water balance		
1.1.3 Water quality	1. Surface water quality (compared with FAO standards)	EC pH Nitrate content Turbidity

## 1.2 Conservation indicators

Indicator	Sub Indicator/Indices	Parameters & Variables
1.2.1 Soil & water conservation	1. Surface runoff generation (runoff/rainfall) at farm level 2. Soil loss at farm level 3. Pattern of past erosion 4. Soil moisture depletion rate 5. Conservation index (score: C1 – C4)	Runoff/ storm event  Sediment yield per storm event  Depths of sub – horizons at different slope positions  Soil moisture at various depths  Land area covered by various conservation practices (details annexed)

Indicator	Sub Indicator/Indices	Parameters & Variables
1.2.2 Degree of success of conservation practices	1. Adoption of conservation practices (score: 25% weak – > 75% very high)	Number of users adopted interventions Level of adoption
1.2.3 Optimum time of planting for minimum water stress days	1. Optimum cropping calendar/ planting time	Rainfall probabilities Evapotranspiration Soil moisture depletion Solar radiation
1.2.4 Protection & production of forest biome	2. Observed water stress days/ crop failures with currently adopted planting dates	Time of the year planting was practised No of days without standing water in rice fields/ failure of the crop established.
	1. Area of forest conserved (reforestation, enrichment and protection)	Extent of degraded forests enriched Extent of reforestation Extent of agroforestry/woodlot established Extent of stream/road reservations established/enriched No of pants established in each case & their source Extent of forest protected by voluntary groups/NGOs (& No of cases dealt with) Extent of forest conservation linked to micro – hydroelectric power projects
	2. Plant survival rate	No of plants surviving No of pants established
	3. Growth performance	Height & diameter (basal & breast height) No of leaves and internodes
	4. Plant density	Number of plants per unit area
	5. Canopy cover (score: 25% scanty – > 75% extensive)	% Ground covered by canopy structures
	6. No of canopy layers (vertical structure)	Number of different layers

Indicator	Sub Indicator/Indices	Parameters & Variables
	7. Biodiversity of forest reserves	<p>Number of flora &amp; fauna (Species, genera &amp; families)</p> <p>Density of economically harvested plant communities/ non – timber resources</p> <p>Horizontal &amp; vertical structures (height, relative basal area &amp; DBH)</p> <p>Endemic, threatened, endangered species</p> <p>Canopy cover</p> <p>Vertical structure (height, diameter &amp; overlapping of canopies)</p> <p>Species composition/ Density</p> <p>Input use, management &amp; income</p>
	8. Structure & Composition of home gardens (potentials for improvement of structure/ production)	

1.3 Socio-economic, production & Marketing indicators		
Indicator	Sub Indicator/Indices	Parameters & Variables
1.3.1 Efficiency of factors of production	1. Land productivity	<p>Extent newly planted with tea/ No of plants used and their source</p> <p>Extent vacancy filled in tea lands/ No of plants newly planted &amp; their source</p> <p>Type and No of trees introduced to home gardens &amp; their source</p> <p>Type &amp; No of animals introduced &amp; source</p> <p>No of bee colonies introduced &amp; their source</p> <p>No of fingerlings introduced &amp; no of locations</p> <p>Paddy land improvements (activities &amp; cost)</p> <p>Cropping intensity</p> <p>Yield</p>
	2. Labour productivity	No of labour days used (hired, family, child & female labour)

Indicator	Sub Indicator/Indices	Parameters & Variables
1.3.2 Economics	1. Cost of production/cost reduction  2. Net income/profitability	Amount & cost of labour and other inputs (purchased and own)  Gross income (amount and market price of produce) Profit enhanced by organized marketing (after involved cost) Cost of production Reduced input price due to organizations Non – farming income & sources
1.3.3 Management level	1. Resources allocation trend/ incremental labour demand  2. Management index (score: M1 – M4)	level of Input use  Level of management (Details annexed)
1.3.4 Value addition	1. Value added	Produce type & volume processed Value of raw product Total cost of value addition Market value of processed products Net profit
1.3.5 Other user benefits	1. Benefits of microhydroelectric power	benefits & No of beneficiaries Benefit/cost ratio; IRR

#### 1.4 Institutional Development and organizational strength indicators

Indicator	Sub Indicator/Indices	Parameters & Variables
1.4.1 Organizational framework	1. Organizational status	<ul style="list-style-type: none"> <li>No &amp; type of organizations</li> <li>Link between organizations</li> <li>Ranking of organizations (A – D)</li> <li>Purpose and amount of grants offered</li> </ul>
1.4.2 Sustainability of organizations	1. Organizational performance	<ul style="list-style-type: none"> <li>Total membership (% of population)</li> <li>Participation in meetings/ activities</li> <li>Record keeping &amp; M&amp;E activities</li> <li>Leadership quality</li> <li>Linkages with other organizations</li> <li>Legal/ constitutional recognition</li> <li>Good &amp; services offered (input supply, marketing of produce, credit, purchase of tractors/equipments, road maintenance etc.</li> </ul>
	2. Financial viability (of organizations)	<ul style="list-style-type: none"> <li>Collection of fees</li> <li>Savings/investments</li> <li>Credit disbursement/recovery</li> <li>Profit</li> <li>Establishment of tea bank (capital) etc.</li> </ul>
	3. Institutional Development	<ul style="list-style-type: none"> <li>No of training programs their objectives &amp; sponsors</li> <li>No participated</li> </ul>

## 1.5 Policy indicators

Major Indicator Category	Indices	Parameters & Variables
1.5.1 Participatory planning	1. Integrated/co-ordinated planning	Integration & coordination of planning at WRMT, planning workshops, etc. Linkages developed and services provided through other agencies (e.g. plant material, credit, insurance, training etc.) Host country contribution
1.5.2 Land use policy changes	1. Changes in right for land use/ harvesting products (e.g. usufructual rights, regularization of encroachments right for harnessing non-wood forest products) 2. Changes in land ownership practices (e.g. land consolidation, transfer of OCF lands to Forest Dpt)	Changes effected Extent covered  Changes effected Extent covered Cost involved
1.5.3 Other policy implications	1. Benefits to resources users 2. Impacts on natural resources	Changes brought about Impact & magnitude of change/benefit

## 2. Huruluwewa

### 2.1 Conservation

Indicator/Index	Variables/Parameters
1. In-situ soil loss	Average soil surface elevation changed with: <ul style="list-style-type: none"> <li>– Type of crop cultivated</li> <li>– Soil type</li> <li>– degree of slope</li> <li>– distance between two contour bunds &amp; height of contour bunds</li> <li>– Average rainfall intensity</li> <li>– Canopy cover</li> <li>– Method of land preparation</li> </ul>
2. Soil Moisture Index	Days reach to 50% field capacity after saturation (with conservation).  Days reach to 50% field capacity after saturation (without conservation).
3. Soil fertility Index	Changes in weed composition Earth worm counts and casts. O.M. content <ul style="list-style-type: none"> <li>– No. of O.M. sources incorporated.</li> <li>– amount of OM sources incorporated.</li> </ul>
4. Bio-diversity index	<ul style="list-style-type: none"> <li>– Species richness</li> <li>– species diversity</li> </ul>
5. Diversity of canopy structure	No of layers. Economic value of each layer.
6. Percentage vegetation cover	Area covered with vegetation. total planned extent.
7. Conservation adoption index	No., types and extent of conservation practices adopted. No., types and extent of conservation practices introduced.

## 2.2 Hydrology/Integrated Water Management & Water Balance

Indicator	Variables/ Parameters
Relative Water Supply (RWS)	<ol style="list-style-type: none"> <li>1. Rainfall</li> <li>2. Evaporation</li> <li>3. Seepage &amp; Percolation</li> <li>4. Irrigation Supply</li> </ol>
Staggering Index	<ol style="list-style-type: none"> <li>1. Progress of land preparation</li> <li>2. Rainfall</li> <li>3. Irrigation issues</li> </ol>
Augmentation Index	<ol style="list-style-type: none"> <li>1. Feeder canal supply at Bifurcation</li> <li>2. Feeder canal flow at Milaththawa</li> </ol>
Soil Moisture Depletion rate	<ol style="list-style-type: none"> <li>1. Variation of Soil moisture over time in different soil types and in different vegetation types.</li> <li>2. Rainfall</li> </ol>
Sub watershed water balance	<ol style="list-style-type: none"> <li>1. Rainfall</li> <li>2. Runoff</li> <li>3. infiltration</li> <li>4. Drainage</li> <li>5. Soil Moisture variation</li> <li>6. Interception</li> <li>7. Tank water balance</li> <li>8. Ground water fluctuation</li> </ol>
Water quality (Surface and ground water)	EC pH Turbidity Nitrate content



## 2.3 Production and Marketing

Indicator/Index	Variable/Parameters
1. Yield	Total physical production. Gross cropped extent.
2. Profitability	Cost of production (value of inputs) <ul style="list-style-type: none"> <li>– Amount of input used (purchased &amp; own including labour).</li> <li>– Market prices of inputs.</li> </ul> Value of outputs <ul style="list-style-type: none"> <li>– Physical production by crops/season.</li> <li>– Output market prices.</li> </ul>
3. Productivity (Water/land/Labour)	Amount of rainfall used. Amount of agro–well water used. Irrigation supply. Area cultivated. Area and amount harvested. No. of labour days used (including family labour).
4. Annual Total Income per House hold	Aggregate Farming income Aggregate Non–farming income
5. Economic Equivalent Ratio	Extent cultivated. Average yield of each crops as sole crops. Average yield of each crops as mix crops. Output prices of each crops.

## 2.3 Production and Marketing

Indicator/Index	Variable/Parameters
6. Input use efficiency	Technical efficiency Economic efficiency – amount of input used – price of input used – amount of out output produced – price of outputs
7. Cropping Intensity	Available area. Cultivated area. Harvested area.
8. Incremental labour Demand	Cropping intensity Increased. Crop area expansion. Change of cropping pattern. Labour requirement of operations & maintenance of cropping patterns. Opportunity cost of labour. Labour requirement for value addition Processes.
9. Value addition	No. and type of processed. Amount of products processed. Value of processed products. Cost of value addition (processing, packaging, storage). Price of raw materials.
10. Degree of output disposal	Composition of profit margin for agricultural & non – agricultural products. Cost and time involvement. Stages of market chain involved. Degree of processing, grading and storage. Composition and type of market. Price magnitude and stability. Forward contact.

## 2.4 Organizational and Institutional

Indicator	Variables
Organizational Performance Index	<ol style="list-style-type: none"> <li>1. Degree of population participation</li> <li>2. Degree of membership participation at meetings</li> <li>3. Degree of membership participation at organizational activities</li> <li>4. Record keeping</li> <li>5. M&amp;E of organizational activities</li> <li>6. Leadership quality</li> <li>7. Affiliation with other organizations</li> <li>8. Representation at higher level management bodies</li> <li>9. Institutional recognition</li> <li>10. Legal recognition</li> </ol>
Organizational Financial Viability Index	<ol style="list-style-type: none"> <li>1. Membership fee payment</li> <li>2. Membership savings (shares)</li> <li>3. Organizational credit recovery</li> <li>4. Investment and profit</li> <li>5. Bank credit recovery</li> </ol>
Membership Satisfaction Index	<ol style="list-style-type: none"> <li>1. Arrangements for credit</li> <li>2. Arrangement for input supply</li> <li>3. Arrangement for marketing</li> <li>4. Communication</li> <li>5. Decision making</li> <li>6. Conflict resolution</li> <li>7. profit</li> <li>8. Community welfare</li> </ol>
Organizational Sustainability Index	<ol style="list-style-type: none"> <li>1. Organizational performance</li> <li>2. Organizational financial viability</li> <li>3. Membership satisfaction</li> </ol>
Constitution (Qualitative)	<ol style="list-style-type: none"> <li>1. Organizational structure and functions</li> <li>2. Rules and regulations</li> <li>3. Conformity to regulations</li> </ol>

## 2.4 Organizational and Institutional

Indicator	Variables
Level of Involvement of organizations in key interventions (Qualitative)	1. Target settings and achievements in production and protection
Level of involvement in Marketing (Qualitative)	1. Linkages with Government sector 2. Linkages with private sector (local) 3. Linkages with private sector (national and international)
Arrangements for collaboration and integration	1. Sub watershed level arrangements 2. Divisional Secretary level arrangements 3. System Level arrangements 4. District level arrangements 5. Watershed level arrangements
Knowledge index of conservation farming	1. Farmers knowledge on recommended conservation technologies
Attitude index of conservation farming	1. Initial adoption rate (from adoption index) 2. Farmer view on usefulness after initial adoption
Sustainability index of conservation farming	1. knowledge of conservation farming 2. Attitude of conservation farming 3. trend towards continuation after initial adoption
Decrease in resource degrading practices index	1. Decrease in burning of recyclable matter 2. Decrease in pesticide use 3. Decrease in inorganic fertilizer use
Water use efficiency improving practices index	1. Use of rain water for land preparation 2. Implementation of water distribution schedules 3. Cultivation of crops requiring less water 4. Use of mulching and other water conserving practices

## SCOR RESEARCH PLANS

No	Research Titles	Objectives
1.	Improving Watershed-wide Water use Efficiencies Through Upstream-Downstream Linkages, Conservation Practices and Organizational Development	<ul style="list-style-type: none"> <li>Analyze the participatory water management process in the SCOR Huruluwewa watershed during 1994/95 wet and 1995 dry seasons.</li> <li>Quantify the costs and benefits and evaluate the physical as well as value product of land and water.</li> </ul>
2.	Impact of Land Tenure on Productivity and Conservation of Natural Resource.	<ul style="list-style-type: none"> <li>Examine and estimate the impact of various forms of Land Tenure on land productivity and soil and water conservation.</li> <li>Examine the relationships between land tenure and production and conservation oriented investments.</li> <li>Examine the attitudes and perception (in relation to production and conservation) of farmers of different tenurial categories.</li> <li>Explore the possibility of integrating production and conservation concerns by adjusting usufructuary rights and state-user partnerships.</li> </ul>
3.	Impact of Improvements in Technical and Allocative Efficiencies on Production and Conservation in Fragile Watersheds.	<ul style="list-style-type: none"> <li>To identify and quantify resource use pattern (labour, other inputs and land);</li> <li>To estimate an optimum allocation model;</li> <li>To estimate gaps in technical and allocative efficiencies;</li> <li>To study the potential for adjusting resource use patterns to reduce such gaps.</li> </ul>
4.	An Analysis of the Changes in Women's Role in Household Income Generation due to Participatory Watershed Management	<ul style="list-style-type: none"> <li>To examine the role of women in income generating activities.</li> <li>To estimate the women's contributions to increased productivity and income and improved natural resources conservation in different components of family farm (paddy areas, home gardens, other highlands, community forestry/agro-forestry etc).</li> <li>To estimate changes in women's division of labour between: own farm, wage labour, household activities, leisure and others.</li> </ul>

No	Research Titles	Objectives
5.	Impact of Watershed Management Interventions on the Demand for Labour	<ul style="list-style-type: none"> <li>• To estimate the changes in land use due to SCOR interventions;</li> <li>• To identify and quantify labour availability in pilot sub-watersheds;</li> <li>• To estimate the incremental labour demand generated by land use changes;</li> <li>• To estimate the incremental labour productivity due to SCOR interventions.</li> </ul>
6.	Ground water Management in a water-stressed watershed - Huruluwewa watershed in Sri Lanka	<p>The study will address the following key issues and concerns in relation to the exploitation, use and management of shallow ground water for agriculture with the use of agro-wells (dug wells) in Huruluwewa watershed.</p> <ul style="list-style-type: none"> <li>• What is the shallow ground water potential of the area?</li> <li>• What is the water balance of the Huruluwewa watershed? Does the rate of present annual ground water extraction exceed the rate of annual ground water recharge of the watershed?</li> <li>• Will further agro well development be possible in the Huruluwewa watershed?</li> <li>• What is the quality of shallow ground water? Has the ground water quality of the area been affected by the use of agro chemicals?</li> <li>• If the answer to issues a, b and c above are in the affirmative, how could the present agro wells be managed to strike a balance between agricultural production and protection of the environment and the resource itself?</li> <li>• Will there be adequate ground water potential for further development?</li> <li>• What are the possible technical, technological and organizational strategies and policy adjustments required for conjunctive use of surface and ground water?</li> </ul>

No	Research Titles	Objectives
7.	Tank Water Budgeting for Seasonal Cultivation Planning	<ul style="list-style-type: none"> <li>To illustrate the features of a tank water budgeting model and application of the model for seasonal cultivation planning for improving cropping intensity, water use efficiency and income to farmers.</li> </ul>
8.	Behavior of ground water table in hard rock terrain of Sri Lanka: Potential for sustainable development	<ul style="list-style-type: none"> <li>To illustrate the typical behavior of ground water table in hard rock terrains.</li> <li>To model the recession and advancing phase of the ground water table fluctuation.</li> <li>To evaluate the ground water potential for crop production and ground water balance of watershed based on the modelling.</li> </ul>
9.	Analysis of Water Deficit Periods in the Nilwala Watershed for Designing Cropping Patterns, Cultivation Schedules and Supplementary Irrigation	<ul style="list-style-type: none"> <li>Analysis agro-climatic data (time series);</li> <li>Identify water "rich" and "deficit" periods;</li> <li>Assess the potential for new crops, improving watershed-wide cropping patterns, improving cultivation and supplementary irrigation practices.</li> </ul>
10.	Participatory Appraisals and GIS for Planning, Monitoring and Evaluation of Watershed Management	<ul style="list-style-type: none"> <li>Develop, test and assess a methodology to integrate local knowledge/skills and GIS for planning, monitoring and evaluation of participatory watershed management.</li> </ul>
11.	Evaluation of Soil & Water Conservation Interventions of SCOR	<ul style="list-style-type: none"> <li>To monitor and evaluate the effects and impacts of land and moisture conservation measures introduced as SCOR interventions to Huruluwewa watershed.</li> </ul>

No	Research Titles	Objectives
12.	Evaluation of experiential/participatory learning approaches, strategies and methodologies adopted in planning and implementation of the SCOR program.	<ul style="list-style-type: none"> <li>• To define and describe the experiential learning process.</li> <li>• To analyse the perceptions of target groups on the usefulness of training conducted by SCOR Teams during the past 2 years.</li> <li>• To evaluate the adoption/application of knowledge and skills gained by target groups and behavioral change for balancing production and conservation and increased sharing of control of natural resources.</li> <li>• To evaluate the lessons learnt and assess training needs and plans to support the future SCOR programme.</li> </ul>
13.	The Land and Water Based Area Development	<ul style="list-style-type: none"> <li>• To examine the relevance of land and water based approach for area development in agricultural regions where water is the dominant resource.</li> <li>• To examine the activities of line agencies (Forestry, Irrigation, agriculture including plantation crop agencies) and the private sector centered around water resource based interventions.</li> <li>• To review the use of SCOR concepts by the Government of Sri Lanka and the other Donors for area development.</li> <li>• To characterize a land and water resources based regional development model.</li> </ul>
14.	The Role and Effects of Different Modes of Production and Marketing for Watershed Resource Management	<ul style="list-style-type: none"> <li>• Examine the character and the evolving process of different modes of production and marketing in the pilot watersheds under SCOR project.</li> <li>• Assess the viability of such production and marketing modes for sustainable resource management.</li> <li>• Determine what factors caused most influence upon the venture viability.</li> <li>• Make recommendations to inform the development practitioners, policy makers and the research community on required policy formulation and change.</li> </ul>



No	Research Titles	Objectives
15.	Effectiveness of Integrated Planning Strategies and Processes for Watershed Resources Management	<ul style="list-style-type: none"> <li>• Assess the effectiveness of integrated planning strategies as means of achieving the objectives of sustainable productivity of natural resources in watersheds.</li> <li>• Inform the planners, policy makers and the resources users on the necessary changes in the current practices to facilitate integrated planning for watershed resource management.</li> </ul>
16.	Learning experiences of SCOR – An analytical study of the SCOR process in developing and testing concepts, approaches and strategies in managing watersheds through shared control mechanisms over a period of 6 years. (A series of working/research papers each having a specific title).	<ul style="list-style-type: none"> <li>• To document the SCOR concepts, approaches, and strategies and the processes of their development through the participatory SCOR project design process (Research paper No: 1)</li> <li>• To develop and design a framework and methodology to analyze and assess the planning and implementation processes and their successes and failures in achieving results expected in respect of the key components of SCOR (Research paper No: 2) and;</li> <li>• To produce and publish a continuing series of working papers which describes, analyses and records the lessons learnt from the SCOR processes, using the framework and methodology developed under objective 2, over the 6 year project period.</li> </ul>

## **SECTION IV**

### **Research Results - A Summary**

#### **4.1 INTERIM RESULTS RELATED TO CONSERVATION FARMING TECHNOLOGIES:**

The following were among the indicators used to assess the impact of conservation interventions introduced under SCOR in Huruluwewa Watershed during the first phase of the project period :

- a. Vegetation cover
- b. Soil movement
- c. Soil fertility :      Earthworm casts  
                                 Earthworm counts  
                                 Weed composition
- d. Conservation adoption index

Three research (draft) papers have been prepared so far and the contents of these papers are briefly discussed below.

##### **4.1.1 Paper 1 :      Assessment of soil movement in the dry zone                                  chena lands by 'contour mapping technique'.**

##### **Objectives**

Assessment of soil erosion on the basis of soil loss data seems to be less important as it indicates only the net soil loss. In selecting effective conservation techniques, understanding of the soil erosion process especially the intra-field erosion and deposition, soil compaction, micro-relief changes, sorting out of surface soil and crust formation are more important than the resultant soil loss. Thus, a methodology has been developed on the basis of contour mapping to generate information on the perspective of soil movement.

##### **Results and Discussion**

Two contour maps from surveys conducted before and after a certain period of time are super-imposed to obtain the 'shifted contour map'. Soil depth reduction values are used to prepare the erosion severity map and a cumulative depth reduction graph for elucidation of the erosion process.

**(a) Shifted contour map**

Shift of the contour indicates the variation of soil surface elevation due to erosion or deposition. Expansion and reduction of the contour area show deposition and erosion respectively. Size of the shift indicates the magnitude of the erosion or deposition.

**(b) Erosion severity map**

Erosion pattern shown by shifted contour map can be further elucidated by mapping the differences of surface elevations measured in two surveys. Differences can be related to an arbitrary datum and prepare a depth reduction contour map which shows the severity of erosion. The knowledge of soil erosion pattern gained from these maps can be used to plan strengthening of the protective measures to the areas where high erosion risk is found. Further, the erosion severity map indicates the production potential of the land, and crops can be selected accordingly.

**(c) Cumulative depth reduction graph :**

This exercise is to understand how erosion process varies along the slope downward. Erosion may accelerate, slow down or be at a steady rate when water moves down depending upon the soil, terrain conditions and protective measures imposed. By taking soil removal as positive and deposition as negative, cumulative depth is plotted against distance downslope. The nature of curvature of the graph produced would indicate how erosion process behaves over the land, and measures to control it can be suggested accordingly.

Results of three studies indicate that in the dry zone chena lands splash and inter-rill erosions are prominent. Erosion is mostly location specific, and in the micro-relief mounds are the most erosion prone areas revealing the high erodible nature of Rhodustalf. Improvement on aggregate stability and covering of the soil surface are the most important aspects in planning soil conservation practices for the dry zone chena lands of Sri Lanka.

Location of Study - Maha Meegaswewa

**4.1.2 Paper 2 : Changes in flora and fauna in conservation farming fields.**

The objective of this study was to investigate changes in weed floristic composition and earthworms in farmer fields as a result of establishing graded terraces recycling of crop residues, wastes and mulching.

## Results and Discussion

### a. Earthworms

There is a gradual increase of the number of earthworms casts from hill side towards graded bund to the lower parts. Once the graded bunds are placed soil and organic matter tend to move towards lower parts with the rainwater and get deposited towards the lower bund. As far as the earthworm casts in homegardens, scrub jungle and chena are compared, homegarden and scrub jungle show high densities of casts to chena.

### b. Weed Floristic Composition

Thirty eight weed species have been identified in upland farmlands. Of them twenty eight were broad leaved weeds, eight were grass and two sedges. Of these weeds Commelina diffusa and Aneilima spiratum emerged in the plots at the latter part of the Maha season and continue to grow even during the dry period. Commelina and Aneilima are categorised as wetland weeds as these are rooted in the soil that is usually saturated with water at least in the early part of their life. The emergence of Commelina and Aneilima in chena where bunds are placed and organic matter are incorporated, clearly indicate there is an improvement of soil moisture in upland soils and conserve soil moisture for a long period.

It is shown in all locations there is an increase in grassy weeds in maize plots, however, in contrast there is a change in weed composition in soya, where the broad leaved weeds are dominating at the latter part of the season.

The experiment set up with and without rice straw, with cowpea and mungbean respectively, the weed growth in all plots were low compared to plots without mulch. Therefore, it is evident that the weeds could be reduced by using mulches alone and could keep below 40% cover in all plots.

Locations of Study - Gerandiyaulpotha, Meegaswewa, Mahasengama

#### 4.1.3 Paper 3 : Adoption of Conservation farming technologies by the farmers in Huruluwewa Watershed.

The objective of this study is to evaluate the level of conservation farming technologies adoption in highlands and homegardens during the first phase of the project.

## Results and Discussion

In this study a conservation farming adoption index have been developed on the basis of user adoption of following conservation measures.

- a. Live fencing
- b. Recycling of residues
- c. Graded bunds
- d. Drains
- e. Stabilization of bunds
- f. Hedges - row planting
- g. Mulching
- h. Inter-cropping of annual crops
- i. Intergradation of perennials
- j. Integration of perennials

The study revealed that, in Mahameegaswewa chena lands 63% of the farmers show a 'weak' adoption, 33% an 'average' adoption, 4% a 'high' adoption and 0% a very high adoption Technology Adoption, Mahameegaswewa - Chena Lands. In homestead it shows a different trend with 37% 'weak' adoption, 60% 'average' adoption 3% 'high' adoption and 0% 'very high' adoption. In Gerandiyaulpotha homesteads 27% shows a 'weak' adoption, 46% an 'average' adoption, 27% a 'high' adoption and 0% a 'very high' adoption. In Mahasengama homesteads 16% shows a 'weak' adoption, 64% an 'average' adoption, 20% a 'high' adoption and 0% a very high adoption. Tract 6 and Walgamwewa that adoption levels are very low.

When these data were further analyzed for more details on the adoption of each technology, the following results could be observed in the three locations. In chena lands in mahameegaswewa adoption of bunds are at an average of 76 with 23 farmers following the practice, adoption of drains at an average of 60 with 18 farmers following the practice, adoption of recycling at an average of 32 with 14 farmers following the practice. Adoption of other practices are marginal. Bund stabilization is the most marginal practice adopted in chena lands with an average adoption of 0.01 followed only by one farmer in the sample. In homestead in Mahameegaswewa an average adoption rate of 48 is shown for contour bunding, 36 for bund stabilization, 40 for mixed annual cropping, 37 for recycling of crop residuals, 31 for live fencing, 47 for mixed permanent crops. The farmers adopt these technologies favourably in homesteads though they do not follow them in chena lands due to various socio-economic reasons. A similar kind of a trend can be observed in other two locations.

### **Reasons for differences in adoption in the locations studied :**

Adoption Index for homesteads : there is no marked difference in adoption of technology by the communities in their homesteads. They follow all the technologies to some extent in the homestead because homestead is always under a cultivation with either annual or permanent crops and therefore farmers can practice number of conservation technologies in them. Recycling of crop residues as mulch, mixed tree component etc. is widely practised by them. The availability of water from drinking wells too is an encouragement for them to follow these techniques as they are well aware now that they can keep the plants alive during dry period with conservation techniques such as mulching with the application of a small quantity of water. Even though these technologies are followed by the three communities to some extent a location specific difference in attitude towards conservation can be observed. Mahasengama farmers have more positive attitude than those in Meegaswewa and Gerandiyaulpotha. It is revealed that there is a relationship between attitude towards conservation technology and ground water availability and soil conditions (soil depth and fertility). In Mahameegaswewa and Gerandiyaulpotha as there is a severe water problems during dry period s for which the conservation measures have not so far been able to find a solution. In case of Mahasengama as the lands are located close to Padikkaramaduwa tank and therefore groundwater problems are not so severe, as a result there is a very positive attitude towards conservation farming technologies. As informed by most of the farmers in Gerandiyaulpotha and Mahameegaswewa, their lands have been eroded and are therefore less fertile. In mahasengama the lands are still fertile and can improve the soil fertility and moisture retaining capacity with the conservation measures.

It could also be observed that some technologies like integration of livestock, alley cropping and bund stabilization are less adopted. Certain farmers are reluctant to plant grilicidia and pavatta etc. on the bunds to make bunds stabilize mainly because they felt that those plants would compete with the crops.

The chena stabilization activities in mahameegaswewa be considered separately. Average adoption level in chena lands are very low for all the conservation technologies except for contour bunding and drains which were done with the heavy involvement of SCOR catalyst. During Maha 1995/96, only 11 farmers could be seen cultivating these lands while the rest moved into the scrub jungle surrounding the village to do slash and burn cultivation. Even those who cultivated the one acre land again cleared the scrub jungle adjoining his land to do chena cultivation. This is mainly due to the fact that Mahameegaswewa farmers totally depend on chena cultivation done during Maha seasons. They know for certain that one acre land cultivating the second time would not bring sufficient yield for them to sustain during the whole year. In addition, they have sufficient scrub jungle surrounding the village to practice chena cultivation. Since they are subsistence oriented and less diversified, this tendency to do slash and burn cultivation is likely to continue for some time. It is necessary to introduce diversified income generating activities like livestock raising, OFC cultivation, collection of medicinal plants etc. which provide them additional income in order to have a curb in this environmentally harmful farming practice.

Locations - Mahameegaswewa, Mahasengama, Gerandiyaulpotha

## 4.2 INTEGRATED WATER MANAGEMENT RESEARCH AND SOME ISSUES

An two year action research programme was implemented under this theme. **The purpose** was to understand and quantify the base line status (present status) and the impact of specific SCOR interventions in respect to allocation, conveyance, distribution, use and management of water for irrigated agriculture in the Huruluwewa watershed. The sample locations studied included Huruluwewa Feeder Canal, Huruluwewa irrigation system, thirty dugwells in irrigated command and highlands and three minor tanks namely, Mahameegaswewa, Paddikkaramaduwa and Puwakpitiya.

The **key hypotheses** being tested by this particular component of SCOR were that land and water productivity, water use efficiency, and farmers' income can be increased in a sustainable manner by promoting appropriate seasonal planning and water management culture through proper institutional arrangements that will make enable shared decision making, control, monitoring and management of irrigated agricultural activities.

**Research Findings** have been documented in several seasonal reports. A research paper recommending some methods and guidelines for planning, design and management issues for extraction, use and management of groundwater with dugwells is under preparation. The salient research findings will be presented at the National Steering Committee.

Research findings under this theme have surfaced a number of **research issues** for further pursual and follow up research. Some issues are highlighted below.

Results of the research conducted during maha 94/95, yala 95 and maha 95/96 seasons have shown the potential for improving the land and water productivity, water use efficiency and farmers income in the Feeder Canal, Huruluwewa irrigation system and minor tanks by promoting appropriate seasonal planning culture and water management through organizational arrangements that will make enable shared decision making, control, monitoring and management of irrigated agricultural activities. However, the following key issues are noted.

- In addition to the interventions that are being tried out by SCOR, there exist potential to increase water use efficiency of the Feeder Canal area by other means. For examples it is possible to plan and schedule cultivation under the minor tanks that are found in the vicinity of the Feeder Canal to synchronize with the water issues in the Feeder canal and to use dugwells to make the best use of the canal seepage and drainage return flows.
- The measured values of daily water releases to the Huruluwewa Feeder canal at Naula and Kandalama bifurcation do not match with the records of the Mahweli Authority. The records of the Mahweli Authority show higher values.
- Despite the interventions conducted in the Feeder canal area, the conveyance of water from the Feeder canal to Huruluwewa irrigation system cannot be improved

unless the management of subsystems consisting three minor tanks (Pahala Talkote, Hiriwadunna and Habarana minor tanks) is improved.

- At present, the management of the tanks in this subsystem is the official responsibility of the Irrigation Department, while the management of cultivation is the responsibility of the Agrarian Services Department and farmers. Early action is required to streamline the management modes of this subsystem.
- Despite the low water use for paddy in maha 94/95 season the water use for soyabeans cultivated on 'bethma basis' in the following yala 95 season was very high (although one cannot compare the water use for mama and yala seasons with one another). This observation shows that although, cultivation of a field crop on bethma basis in a water-short yala season would help enable to share the limited available water among a many farmers, it would not be an efficient water saving strategy and a water sharing mode unless the on-farm water management (water distribution and application) is strictly done. At present, on-farm water management for OFCs in major irrigation schemes like Huruluwewa is a neglected activity.
- Dugwells have become popular means of supplementing rainfall in highlands and both rainfall and tank water in irrigated commands to grow cash crops. Research to understand the occurrence, fluctuation, potential and limitations of the ground water as a source of irrigation and implications for use and management have been conducted.
- On one hand, there are no legislature governing and controlling the over-exploitation of ground water. On the other hand, no single agency provides technical guidance to farmers to locate, construct, operate and manage the existing dugwells and to manage water for agriculture under those. This is a constraint for using ground water in the best possible manner under the already existing dugwells.
- Combined use of dugwells with tank water in Huruluwewa tank scheme would be one alternative to make the available water in the tank in water-short yala seasons, which otherwise would be lost as open water evaporation and seepage if retained in the tank without use. At present, scheduling irrigation under Huruluwewa scheme do not consider the potential for combined use of dugwells with tank water as dugwells do not come under their purview.
- Even with strict water management, the success of maha and yala seasons in Huruluwewa system depend on the timely onset, distribution and quantum of rainfall in maha season. For example, yala 96 season is a water-stressed season and as a result, yala 96 season in Huruluwewa and many minor tanks is likely to



be forgone. This signals the need for deviating from the complete dependence of farmers on seasonal crops under irrigated conditions to other cropping patterns with and without irrigation. Precise irrigation techniques coupled with rainwater harvesting on highlands and use of dug wells with intermittent water issues from the tank to cultivate short season crops appear to be some viable alternatives.

#### **4.2.1 TESTING SUSTAINABLE DEVELOPMENT STRATEGIES IN A SMALL TANK SYSTEM THE CASE OF PUWAKPITIYA IN HURULUWEWA WATERSHED**

##### **4.2.1.1 Introduction**

Puwakpitiya is a small village tank system in Palugaswewa Divisional Secretary's Division. It is a traditional village inhabited by a single caste as in case of many other traditional villages in the North Central Province (NCP). Being a members of a caste which the other villagers considered as 'very low', they had to experience discriminations based on caste in the past. It is believed that this discrimination made them work hard and diversify their sources of income in order to become strong economically. At the time SCOR started its activities in this village, some villagers even owned lands or cultivated lands on lease and other arrangements in surrounding tanks systems like Habarana and Hiriwadunna in addition to cultivating lands in Puwakpitiya tank. They were economically better off than villagers in other surrounding villages. The main crop cultivated in paddy lands in by the farmers in this village in Maha was paddy. In addition, the villagers cultivated chilies, vegetables, maize and many other crop varieties in chena, highlands and home gardens. In Yala, they cultivated chilies and big onions or vegetables in paddy lands depending on the water availability in the tank. Also they cultivated same crops using agro wells, both in tank command and residential areas in Yala seasons. However, there are only very limited number of agro-wells in the village. Therefore, all the villagers had no access to irrigation water supply during Yala seasons. Gingerly was the main crop cultivated on highlands and home gardens in Yala. Due to lack of rainfall in Yala, other crops are not cultivated in highlands.

The farmers main problem with regard to agriculture was the shortage of water during Yala seasons to undertake a cultivation. SCOR catalyst started to work with this community in Yala 1994 in which farmers who had cultivated chilies in their paddy lands faced a severe water shortage problem. The catalyst could help them to save the crop by getting farmers to use straw as mulch and manage tank water in a systematic way. This helped him to win their confidence for implementing other innovations under integrated water management in Puwakpitiya tank in Maha 1994/95, Yala 1995 and Maha 1995/96 seasons as described below in detail.

#### 4.2.1.2 Maha season 1994/95

##### a) Planning process

The Water Resource Management Team (WRMT) initiated by SCOR to coordinate and integrate watershed level planning held a workshop and a meeting at Dambulla Divisional Secretary's Division on 6 September 1994 to make initial cultivation and water allocation planning for maha 1994/95 for the entire Huruluwewa watershed comprising of Huruluwewa feeder canal, three minor tanks (Pahala Talkote wewa, Hiriwadunna wewa and Sigiriya wewa), other minor tank systems and Huruluwewa Irrigation Scheme. The meeting was attended by the four Divisional Secretaries (Dambulla, Galenbidunuwewa, Naula and Palugaswewa), Farmer representatives from Feeder Canal area, Huruluwewa command area and minor tank systems, Irrigation Engineers from the Department of Irrigation and Mahaweli Authority, Agricultural Instructors of the Department of Agriculture serving in the respective Agrarian Service Divisions, Project Manager of the Irrigation Management Division in charge of Huruluwewa Scheme and the members of SCOR team.

The major intervention attempted as agreed upon at the WRMT meeting in this season in different sub systems, Feeder canal, Huruluwewa Irrigation system and small village tank systems in Huruluwewa watershed was the maximum use of rainfall for land preparation. In small tank villages where farmers give priority to chena cultivation with on set of rains were initiated to integrate chena and paddy cultivation. Attempts were made to promote dry land paddy (kakulan) in these systems.

The other intervention attempted was to get farmers to adhere to the cropping calender. Though cultivation meetings are held prior to the season and plan cultivation according to an agreed upon cultivation calender, they tended not to follow them. As a result, water issues had to be extended beyond the date agreed upon at the kanna meeting and the farmers completely emptied down the tank by staggered cultivation here and there in the command areas. Therefore, it was attempted through organizational arrangements and coordination of services and input supplies to make the farmers to follow the agreed upon cultivation calender. For this purpose participatory planning of the cultivation season was attempted.

Therefore, in Puwakpitiya too, the intervention attempted was chena paddy integration with maximum use of rainfall for land preparation under the tank. With this aim catalysts attempted to introduce dry land paddy cultivation to the farmers under this tank. Pre-kanna meeting for the tank was held on 24 September 1994 with the participation of Assistant Director (AD) and the AI of the Department of Agriculture (DOA), Grama Niladari, Divisional Officer of the Department of Agrarian Service (DAS), Colonization officer attached to the Divisional Secretary's office and some members of the SCOR team and 54 farmers from Puwakpitiya. The following decisions were taken at this meeting.

- to commence sowing on 5 October and complete by 15 October 1994

- to cultivate 4 - 4 1/2 month paddy varieties, if this is not possible to cultivate 3 1/2 month varieties

- to obtain seed from the Department of Agriculture. The organization to prepare a list of those who require seed.

#### **b) Implementation process and results and achievements**

Rain started in the area on 16 September prior to the pre-kanna meeting. By 6 October 1994, the farmers had completed kakulan cultivation in Akkarawela. However, the farmers in upper portion of Puranawela could not do dry land ploughing because of heavy rains. They had to do wet ploughing and therefore, the cultivation was delayed by about one month. Harvesting in Akkarawela was completed by 15 February while in Puranawela it continued from 15 February to 1 March 1995. It is important that except one farmer who irrigated his allotment on 24 February 1995 for a period of 8 hours, none of the farmers used tank water for their cultivation. The particular farmer had obtained the sluice gate key from vel vidane and opened the gate. The FRs did not intervene in this and catalyst closed the door himself to save water which was the fruit of his commitment and hard work during the whole season. It should also be noted that there were no serious effort in this season for water management because cultivation was done with minimum use or without using tank water.

#### **4.2.1.3 1995 Yala season**

##### **a) Planning process**

Initial planning discussion for the entire watershed for Yala was held on 12 February at SCOR office, Galenbidunuwewa with the participation of the SCOR team members working in Huruluwewa. The possible interventions for the three main sub systems, Huruluwewa command, Feeder Canal and small tank systems in the watershed was identified and discussed in details at this meeting for the catalysts to take them up at farmer level seasonal planning workshops to be held prior to the season. The catalysts as well as specialists in respective disciplines and line agency officials working in these areas were expected to attend these planning meeting to help farmers to draw a plan for their areas. The interventions identified by SCOR team members as most appropriate for small tank systems was the cultivation of OFCs on bethma basis in a limited area of the command areas of these tanks.

A planning workshop was held accordingly at Puwakpitiya on 26 February 1995. The farmers decided to cultivate OFCs, mainly big onions and vegetables on bethma basis under the Akkarawela area in the tank and chilies, big onions and vegetables under agro wells.

At the pre- kanna meeting and kanna meeting held on 15 March 1995 they took the following decision regarding the cultivation activities in the season.

- Cleaning of canals etc - 2 April 1995
- The date of first water issue - 15 April 1995
- Crop establishment - 20 April to 22 April 1995
- Crops and extent - big onions - 8 acres  
vegetables - 4 acres

These decisions were ratified at the kanna meeting held on 19 March 1995.

## **b) Implementation process and results and achievements**

The big onion nurseries established in March were completely damaged due to the heavy rains in March and April. Therefore, decisions were taken to cultivate chilies before 20 May 1995. However, this decision too could not be implemented due to rains during this period. Considering this situation a farmer level meeting was held on 29 May 1995 to review the decisions of the kanna meeting. At this meeting a decision was taken not to expand the cultivated area any more because of the risk involved in undertaking a cultivation in a larger area with the dry periods ahead. The cultivated area in the command area of this tank was limited to 10 acres of chili, onions and vegetables.

Water issues to the command area under this tank was made on 2 June 1995. Farmers did land preparation activities from 20 April to 19 June and established crops between 28 April and 23 June. They took such a long periods for these activities because of rains.

The responsibility of water management activities were done under the supervision of the farmer organization. This was because of their bad experience with the Vel Vidane's operational procedure in previous Maha season in which he gave the reservoir key to the farmers to do the operation themselves. Also ten days rotations were implemented through out the season because of water shortage problems faced in Yala 1994 due to bad water management practices. The farmers in Puwakpitiya did not face water shortage problems due to their rational decision making and improved water management practices in this season.

The farmers in this tank reported comparatively low yields. However, they were of the opinion that it was due to bad wether condition. Since most of the farmers under this tank manage their agricultural activities within their own resources, SCOR needed to give them only proper guidance to organize and implement their seasonal activities. The farmers now view that they need to do OFCs on bethma basis in a much more systematic way to overcome their water problems. They have identified importance of practices like mulching to face serious water shortage situations.

#### 4.2.1.4 Maha 1995/96

##### a) Planning process

By the end of Yala 1995, the tank water level had dropped down to dead storage level. Attempts at higher level to initiate farmers for pre-planning could not be observed as in case of other two seasons. However, catalysts had discussed with farmers to start cultivation with the on set of rains and do dry land paddy. Some rains were received in the area on 23 September and 24 September. Thereafter the catalyst organized a kanna meeting on 26 September 1995 through the Divisional Officer (DO) of the Department of Agrarian Services (ASD). The kanna meeting was attended by the DO, SCOR catalysts and 20 farmers. Majority of farmers had gone to chenas and other highlands to start cultivation and did not attend kanna meeting because of lack of confidence to start a cultivation with a very low storage. However, they had told leaders that they would agree to any decision taken by them at the kanna meeting. At the kanna meeting the following decisions were taken:

Extent to be cultivated	-	full extent of 54 acres
Date of commencement	-	1 October 1995
Crops	-	Paddy 4 - 4 1/2
Last date for sowing	-	15 November 1995

No decision was taken over water issues as there was no water in the tank. The farmers decided to do land preparation with rain and take water after the establishment of the crop.

##### b) Implementation process and results and achievements

Farmers started land preparation work with the rain received on 24 and 25 September but there was no rain for a period of ten days or so after this initial rains. Therefore, the farmers could do land preparation and sowing only during the period from 19 to 23 October 1995. There was no sufficient rain even after sowing. The tank water level was still very low and no water issues could be made to the tank command, specially to Akkarawela. No water issues were made even to the Purana wela. However, Purana wela located close to the tank received some seepage water, hence the crop was not much affected. The farmers could not use tank water for weed control as they were used to do, due to water shortage and therefore, they could not control weeds. They could not effectively use agro-chemicals too for weed control due to the same reason.

A heavy rain was received on 5 November and tank got filled up to some extent. However, the water level did not raise up to the required level to make issues to Akkarawela. Also, there was no necessity to make water issues for sometime as the area received some rains during this period. Water issues to Purana wela was made on a rotational basis from 30

November to 25 November on the basis of once a week, once in ten days and finally once in five days. Since Akkarawela farmers could not be issued water, they were allowed to use water pumps and irrigate their lands. However, it is only three farmers used water pumps because of the expenses involved. They too used pumps only on one occasion.

Because of water shortage and weeds, the farmers could not get a good yield as in Maha 1994-95 in which some farmers reported high yields such as 100 bushels per acre. Yield in this reason dropped down below 50 bushels and many farmers reported yield below 15 bushels per acre. Many farmers in Akkarawela could not get any yield.

This experience is likely to affect their future cultivation planning and they would concentrate more on their highland cultivations as they did in this season in the face of severe water shortage situations. However, it should also be mentioned that the tank was at its active storage level even by the end of Yala in spite of the severe drought condition in the area. This was mainly due to the water management attempts by the organization. This water is now being used by farmers to establish onion and chilly nurseries for their Yala cultivation in Habarana and other tanks systems. Also, they use remaining tank water for bathing and other domestic requirements. Unless for this water in the tank, they have to go to very distance places to bathe and wash their clothes.

#### **4.2.2. Overall results of the interventions for sustainable development**

1. The village level farmer organization could be strengthened to plan and implement seasonal activities with the community members and line agencies concerned. The farmers as well as their leaders are on the view that pre-planning of the season is useful and they want to continue the efforts in future
2. Taking over of the responsibility of water management activities from vel vidane to the organization which is accountable to the community
3. Economic and other social benefits to the farmers through the interventions

## **4.3 MICRO HYDROELECTRIC POWER GENERATION : INTEGRATING ENVIRONMENTAL CONCERNS WITH PRODUCTION AND WELFARE GOALS**

### **4.3.1 INTRODUCTION**

This note is based on an assessment of a participatory and "market oriented" natural resources conservation effort. In this effort SCOR catalysed a process of mobilising resource users, Non Government Organizations (NGOs) and Government Agencies to **develop a micro hydro-electric power plant, MHPP, and to establish a participatory conservation program in the catchment.**

Illukpitiya villagers are the primary beneficiaries of the Micro Hydro-electric Power Project (MHPP). The village is located in the Bovitiya Dola sub watershed of the Nilwala Watershed/basin. The village consist of about 100 families. The terrain is steep only in the upper catchment of the Nilwala watershed and the river flows across a flat landscape for most part of its length. Hence, micro hydroelectric power generation is expected to be profitable only in the upper catchment.

### **4.3.2 The Participatory Development Process of Micro Hydro-Electric Power Project**

In January 1994, SCOR facilitated a participatory appraisal of natural resource use in the Bovitiya Dola Sub Watershed (BSW). In the sub-watershed, participatory appraisal of the characteristic of resource uses and users as well as mapping of **current** resource use were done by groups comprising of resource users/farmers, local officials of government agencies such as Tea Small Holdings Authority, Agriculture, Forestry and Agrarian Services departments, IIMI-SCOR professionals and catalysts. The SCOR catalysts took the lead role in preparing the resource use maps and recording information.

Subsequently a participatory planning exercise was conducted and a resource management plan was formulated for the sub watershed. This was aimed at changing land and water use pattern to a more diversified resource use combining production (including hydroelectric power generation) and conservation using appropriate technologies; novel shared control arrangements.

During the planning sessions itself, the villagers expressed deep interest and concern in harnessing the Bovitiya Dola waterfall for generating electricity for both domestic consumption and small industries. Moreover, the need for protecting the catchment to ensure the sustainability of the hydroelectric power plant too was emphasized. It was noted that the village was located 2.5 km away from the main grid transmission and that the estimated cost of supply was about Rs.3-4 million. Even the future possibility of grid connection remained weak. An average family spent about Rs.145.00 (US\$3) per month for energy use; the main sources being kerosene and car batteries.

Because of its remote location and difficult accessibility, villagers had less contacts with government departments and projects. Even though the villagers were aware of micro-hydro- electric power generation, they did not know how to obtain technical know-how, financial resources etc. There was no government agency directly responsible for micro-hydroelectric power generation.

### **Formation of User Organization**

As decided during the planning sessions, the villagers were organized into a cohesive group to develop and use the water fall/stream as the source of electricity **without having adverse effects on the existing minor irrigation deliveries**. The IIMI/SCOR catalyst facilitated this process. The organization, among other things, decided and designed action-plans for the following:

- i. take collective measures to conserve and maintain the catchment;
- ii. construct the hydro-electric power plant and supply electricity **directly** to 48 families;
- iii. establish a "battery charging center" and supply electricity **indirectly** to another 22 families;
- iv. invite the ITDG to provide mainly the technical assistance;
- v. share a considerable portion of capital costs of construction in the form of (limited) capital and offer voluntary and organized labor;
- vi. plan and take over the responsibility of post-construction operation and maintenance of the hydro electric power plant;
- vi. undertake necessary post-project rehabilitation.

### **"A Rights Issue"**

Paddy farmers whose fields were located further downstream had two irrigation lines installed at the point where the weir was constructed. They feared that the construction of weir and the diversion of part of the Bovitiya Dola through the fore bay tank would reduce the flow of irrigation water to their fields. As a compromise, the members of the micro-hydroelectric power group, at a negotiation process, agreed to assign priority for irrigation and **fixed two irrigation lines, six inches below the existing levels.**

In order to maintain equity and also to optimize the limited power generated, the organization **decided to limit the supply to only 100 W per household.**

### **4.3.3 Resources for the Construction of Micro Hydroelectric Power Plant**

Members were requested to contribute Rs.1,500 (US\$28) each in cash and supply their share of construction material and labor equitably for construction. The organization borrowed Rs.11,000 (US\$204) at 2% annual interest rate from their apex farmer



borrowed Rs.11,000 (US\$204) at 2% annual interest rate from their apex farmer organization<sup>1</sup>. This organization expects to recover the loan within two years after the completion of the power plant.

The proposal for hydroelectric power development was submitted to Watershed Resources Management Team, WRMT. The forest department official (who had participated in the design of catchment development efforts) commended that the users for their motivation on conserving the forest. The representative of Agrarian Services Department agreed to the project as it was clear that irrigation water rights had been protected. WRMT discussed the possibility of linking the proposal with the Matara Integrated Rural Development Project (MIRDP) mainly to obtain funding for electro mechanical equipment. This proposal was well within the scope of MIRDP and the Director of that program, who was also a member of the WRMT, agreed to provide the balance funding.

In addition to the consultancy services, ITDG also volunteered to supply a battery charger free.

### **Hydrological Considerations and the Design of Power Plant**

IIMI watershed management coordinator, being an engineer, joined ITDG in providing technical assistance. He assisted the organization in the hydrological analysis.

The discharge of the stream was computed based on the stream flow during the dry months of the year and studying the variations during the rest of the months. The "design flow" of the stream was 35 lit/sec. Several elders in the area reported that they experienced continuous flow (implying the perennial nature of the stream) before the destruction of forest in the catchment.

The location of the diversion weir, inlet canals, forebay tank, penstock and power house were decided collectively by the users, the ITDG and the IIMI Watershed Management Co-ordinator. A low level spillway incorporated with a regulating device was also provided in the diversion weir to protect the banks from collapsing. The team decided to provide silt exclusion devices at the diversion weir and at the forebay tank to protect turbine vanes from impacts of silt particles. Complying to the requirements laid down by the Central Environmental Authority of Sri Lanka and the Forest Department, user organization decided to build a stone terraced leader drain to discharge outflow of the turbine back to the same stream to minimize damages to the environment.

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<sup>1</sup> This apex organization, namely the Horagala Service Farmer Organization was formed as a result of SCOR intervention.

#### **4.3.4 ECONOMIC ANALYSIS OF THE PROJECT**

##### **A. Cost of Micro Hydroelectric Power Generation Plant**

*Capital Costs*

*Labor cost*

*Material cost*

*Operation and Maintenance costs*

##### **B. Cost of the Battery Charging Center**

*Capital Costs*

*Operation and maintenance costs of the battery charger*

##### **C. External Costs**

Reforestation and "enrichment planting".

Tea land conservation

#### **Benefits of the Project**

Cost savings accrued by the introduction of electricity in place of kerosene oil use.

Cost saving through reduced car battery utilization for operating radios and TVs and savings of the battery recharging costs

Cost saving by reducing torch battery utilization

#### **External Benefits**

*Tea yield improvement due to soil conservation practices*

*Value of the trees planted*

*Returns to reforestation*

*Returns to the enrichment planting of degraded forest (0.5 ha)*  
*Returns from stream reservation conservation*

**Financial Analysis**

Financial analysis of the project was carried out taking into consideration only direct costs and benefits of the project. In the process of discounting a discount rate 6% was used. It was assumed that beneficiaries will not use batteries after receiving the electricity.

The B/C ratio and Internal (Financial) Rate of Return were estimated to be 1.08 and 7% respectively.

**Economic analysis**

Economic analysis considered all direct and secondary (including conservation benefits) and true economic price of kerosene and labor etc. The economic analysis is carried out under 6 assumptions

**Assumption 1**

- \* The opportunity cost of the labour for de-silting channel bed is 0.
- \* The opportunity cost of the labour spent during Sundays and holidays to build and establish micro hydropower plant is 0.
- \* Car battery users continue to use car batteries after receiving electricity during day time.
- \* Conservation benefits are not included.

**Assumption 2**

- \* The opportunity cost of the labour for de-silting channel bed is 0.
- \* The opportunity cost of the labour spent during Sundays and holidays to build and establish micro hydropower plant is 0.
- \* Car battery users will not use car batteries after receiving electricity during the day time.
- \* Conservation benefits are not included.

**Assumption 3**

- \* The opportunity cost of the labour for de-silting channel bed is 0.
- \* The opportunity cost of the labour spent during Sundays and holidays to build and establish micro hydropower plant is 0.
- \* The potential battery use beneficiaries will not use car batteries after receiving electricity during day time.
- \* Conservation benefits are not included.

**Assumption 4**

- \* The opportunity cost of the labour is not zero for any operation.
- \* The actual battery use beneficiaries will not continue to use car batteries after receiving

#### Assumption 5

- \* The opportunity cost of the labour is not zero for any operation.
- \* The actual battery use beneficiaries will not use car batteries after receiving electricity during day time.
- \* Conservation benefits are included

#### Assumption 6

- \* The opportunity cost of the labour is not zero for any operation.
- \* The actual battery use beneficiaries will not use car batteries after receiving electricity during day time.
- \* Conservation benefits are included

The result of the economic analysis is given in the table 2.

**Table 2. Economic analysis.**

Assumption	NPV(at 6%)	B/C Ratio (at 6%)	IERR%
Assumption 1	-280955	0.74	1%
Assumption 2	26527	1.02	6%
Assumption 3	311733	1.28	10%
Assumption 4	6028185	2.40	19%
Assumption 5	6335707	2.47	20%
Assumption 6	6620913*	2.54*	21%*

\* 8% Discount rate.

**IN ADDITION TO RESEARCH RESULTS REPORTED IN THIS SECTION, FEW MORE PAPERS WILL BE PRESENTED TO NSC.**