

**COMPLETION REPORT**

# **CAPACITY BUILDING OF WOMEN FOR NATURAL RESOURCE MANAGEMENT IN COMMAND AREAS**



**FUNDED BY**

**INDIAN NATIONAL COMMITTEE ON IRRIGATION AND DRAINAGE  
MINISTRY OF WATER RESOURCES  
GOVERNMENT OF INDIA**

**IMPLEMENTED BY**



**CENTRE FOR WATER RESOURCES DEVELOPMENT AND MANAGEMENT  
KUNNAMANGALAM PO, CALICUT, KERALA 673571**

## COMPLETION REPORT

### 1. Name and address of the Institute

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### 2. Name and address of the PI and other Investigators

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**3. Title of the Scheme**        :      Capacity building of Women for Natural Resource  
Management in Command Areas

### 4. Financial details                :

Letter sanctioning the project	: No. 21/77/2004/R&D/737-748 dated 16.3.2004
Head of account	: 27 05.00.800.04.00.31 - Command Area Development - Other Expenditure - Research & Development Programme-Grant-in-Aid of the Budget (Plan) MoWR
Sanctioned Cost	: Rs 16.31 lakh
Amount released	: Rs 11.45 lakh
Expenditure	: Rs 10.38201 lakh
Unspent balance	: Rs 1.06799 lakh
Return of unspent balance	: Not applicable. Overhead charge of Rs 2.719 lakh is to be released to CWRDM

## **5. Original objectives and methodology as in the sanctioned proposal**

### **5.1. Objectives**

The project was proposed and implemented with the following two objectives:

- To propagate the management strategy developed by CWRDM for mainstreaming women in irrigated agriculture through grass root level organisation and thus to strengthen the existing Water User Associations.
- To empower selected women and grass root level organizations in the mainstreaming process through appropriate front line demonstrations and thus to capacitate women for taking up location specific activities of natural resources conservation and management in a scientifically sustainable manner

### **5.2. Methodology**

- In Kerala, at least 10 agro-hydro-climatic regions with special characteristics will be delineated after detailed investigation. Priority will be given to those command areas where there is natural resource deterioration and improper resource utilization.
- The propagation of management strategy in mainstreaming women in Natural resource management in command areas will be achieved through module based training programmes for those grass root level organizations. In each selected zone, the organizations which contribute to women empowerment activities will be selected to be trained as trainers / facilitators.
- The Training of Trainers (TOT) programme will be conducted at the rate of one in each of the identified zones and in each programme the number of participants will be limited to 25.
- In each identified zone, in a selected location, front-line demonstration on scientific land and water conservation/management activity will be undertaken (through the participation of one established organization of the area).
- The strengthening of the existing Water User Association in the area will be ensured through these processes and by the trained grass root level workers.

### 5.2.a. Training of trainers programme

Number of programmes	- 10
Number of participants in each programme	- 20
Duration of each training	- 3 days

### TOT schedule on land and water conservation

#### DAY-1

0930-1000	Registration
1000-1030	Participant Introduction and ice breaking
1030-1115	Introducing the topic-
1115-1130	Tea break
1130-1245	Cont'd
1245-1330	Scale of utilization of land and water as a multiple resource
1330-1415	Lunch Break
1415-1530	Need for human resource development in the command areas with specific reference to stake holder participation and gender aspects
1530-1630	The present status of land and water management in general
1630-1730	Discussion and interaction on the day's session. Home assignment on the possible under utilization / deterioration of resources and after effects that the participants foresee in that zone

#### DAY-2

0930-1000	Presentation by the participants on the assignment
1000-1100	Scientific interpretation of some of the aspects presented
1100-1115	Tea break
1115-1245	Group tutorial on participatory marking of the resources and problems in the command area map supplied
1245-1330	Water conservation / management measures in command areas
1330-1415	Lunch break
1415-1530	Water conservation management measures - Cont'd
1530-1630	Biomass conservation / management measures
1630-1700	Discussion and interaction



### DAY-3

0930-1000	Presentation based on the assignment and discussion
1000-1100	How to mobilize women's participation in resource management
1100-1115	Tea break
1115-1215	Cont'd
1215-1330	Measures to ensure the sustainability of women's participation in resource management through agri business centers and farm clinics and their inclusion in WUAs
1330-1415	Lunch break
1415-1515	Tips on monitoring and evaluation of activities
1515-1530	Tea break
1530-1630	General discussion & interaction on the sessions, immediate activities that can be planned, long term measures for planning etc
1630-1730	Concluding session

#### 5.2.b. Front line demonstration

The appropriate front-line demonstrations will be selected based on the need of the location. However, a few were suggested in the proposal which are given below:

1. Rainwater harvesting and management in command areas
2. Water and sediment conservation ponds
3. Traditional water resource development / rehabilitation and conservation (spring, surangam, ponds, tanks etc) for supplemental use in command areas.
4. Channel bank stabilization mechanisms
5. Simple and traditional water lifting models
6. Water efficient cropping system
7. Water saving irrigation techniques in the irrigated commands

#### Technical programme / implementation schedule

- Selection of intervention area and identification of the most appropriate target group (The intervention area will be a representation of one agro-climatic zone)

- Investigation of all the selected zones and formulation of appropriate training modules
- Identification of appropriate front-line demonstrations , areas for implementation, target women etc
- Conduct of training
- Participatory implementation of the front – line demonstration
- Monitoring the transfer of technology to the women of the zone

## **6. Any changes in the objectives during the operation of the scheme**

No changes had been brought during the operation of the scheme

## **7. All data collected and used in the analysis with sources of data**

This project being a development oriented programme, the data analysis was not a major activity. However, the data needed for implementation of the scheme, as well as for analyzing the impact were collected. The following session gives the details.

## **8. Methodology followed in the project**

**The major activities undertaken in the project include the following:**

- Identification and documentation of the problems and prospects in the respective zones with respect to natural resource management
- Training of trainers on various topics of natural resource management
- Pilot demonstrations for site specific problem solving

### **8.1. Identification and documentation of the problems and prospects in the respective zones with respect to natural resource management**

#### **8.1.1 Selection of zones**

Altitude, rainfall pattern, soil type and topography are the four distinct parameters that together result in distinct agronomic environments wherein distinct cropping patterns flourish. The parameters and their levels used for delineating agro-ecological zones are summarised in Table 1.

### Altitude

Altitudinal variations influence the temperature regime. Sizeable areas in the high ranges of Idukki and Wayanad districts and many areas along the Western Ghats fall under the *high altitude* category. The *low altitude* region, endowed with humid tropical climate is spread over the entire length of the state.

### Rainfall

The State is relatively rich in rainfall endowment; with an annual precipitation around 2600 mm. Ninety percent of the precipitation is received during the two monsoons, June to August (south-west) and October to November (north-east). About 60% of annual rainfall is received during south-west monsoon period and about 30% during north-east monsoon. From December to March there is very little rainfall. The quantum of annual precipitation is concentrated around lesser periods towards the northern part of the State while it is spread over longer periods in the southern parts.

The co-efficient of variation of the annual rainfall is below 20% and hence, agriculture is expected to flourish under relatively stable conditions. The southern region is having relatively well distributed rainfall and June maxima for SW monsoon while the northern region has relatively ill distributed rainfall and July maxima for SW monsoon.

### Soil Types

Soil type is the third factor for distinguishing specific zones. The major soil group of Kerala is laterite and its variations. In the traditional midland region, the dominant soil type is typical laterite with the B-horizon present. The areas skirting the Western Ghat and the high ranges which together form the traditional highland region has lateritic soil where the B-horizon is absent. Red loam is found in the southernmost tip of the State. All these variability constitute distinct homogeneous agro-ecological zones, though the rainfall pattern is the same.

### Topography

Areas having similar rainfall pattern and soil type are further delineated into zones based on topographical features.



**Table 1. Parameters for identifying agro-ecological zones**

<i>Parameter</i>	<i>Level</i>	<i>Description</i>		
I. Altitude	Type I	Up to 500 m above MSL (Low altitude zone- hot humid tropics, spread over the entire state)		
	Type II	More than 500 m above MSL		
II. Rainfall	Pattern I	Both the southwest and northeast monsoons are active and moderately distributed. Southwest monsoon with June maximum (South of 11°N latitude).		
	Pattern II	Poorly distributed rainfall; southwest monsoon with July maximum and concentrated in 3-4 months. Northeast monsoon relatively weak (North of 11° N Latitude).		
III. Soil types	1	Alluvial soil (Spread over river banks)		
	2	Sandy soil (Coastal areas)		
	3	Sandy loam soil (Coastal areas)		
	4	Laterite soil with well defined B horizon (Natural midlands)		
	5	Laterite soil without B-horizon (Natural highlands).		
	6	Red soil (Southern-most Kerala)		
	7	Black soil (Chittur taluk of Palakkad district)		
	8	Peat (kari) soil (Kuttanad)		
	9	Acid-saline soil (Pokkali and Kaipad areas)		
IV. Topography		<i>Valleys</i>	<i>Hill tops</i>	<i>Slopes</i>
	Model-I	Extensive valleys with level but raised garden lands		
	Model-IIa	Valleys less extensive	Hills with moderate gradients	Slopes having mild gradients
	Model-IIb	Valleys less extensive	Hills with moderate gradients and top with egg shaped hump	Steep slopes
	Model-IIc	Valleys less extensive	Hills with table tops	Steep slopes
	Model-III	Narrow valleys	Hills with steep gradients	Steep slopes

Ref: Kerala Agricultural University. 2002. *Package of Practices Recommendations: Crops*. 12th Edition (eds. A. I. Jose *et al.*). Kerala Agricultural University, Trichur. 278p.



### **8.1.2 Delineation of Agro-ecological zones**

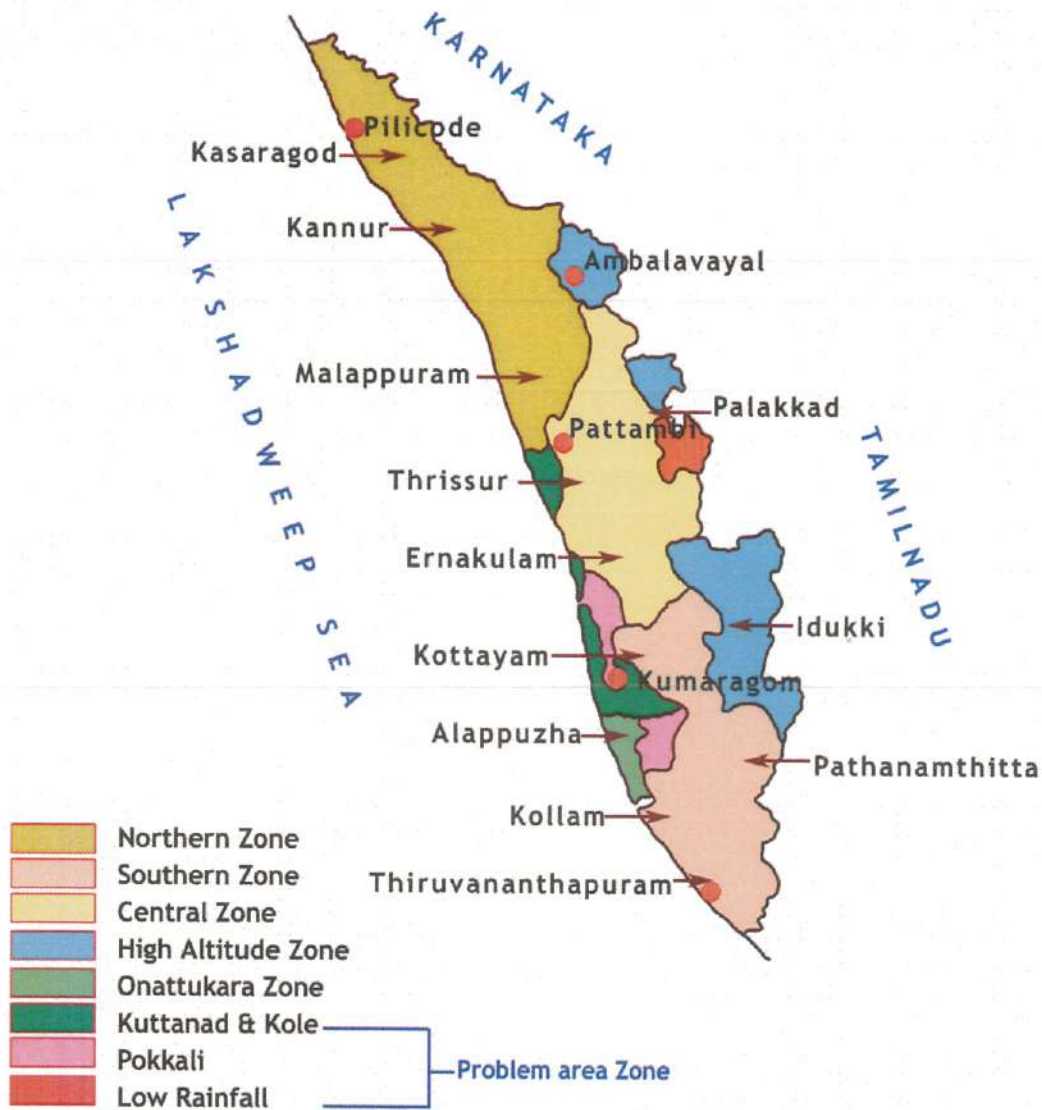
Following the above approach and using a matrix built upon altitude, rainfall, soil and topography, the State has been delineated into thirteen agro-climatic zones. For the purpose of the project, Block Panchayat has been taken as the unit for purposes of delineation. All the Blocks, Municipalities and Corporations have been grouped into appropriate agro-ecological zones. Whenever a Block or Municipality was found to fall in more than one agro-climatic zone, it was assigned to that zone which has the largest area. Though 13 agro-climatic zones have been identified, no Block was assigned to one zone viz. the Riverbank alluvium as it is found scattered in several blocks. This zone is found generally all along the banks of the major rivers. It is found relatively extensively in the lower basins of the Periyar and Pampa river systems. Further, such alluvium deposits are generally found in the paddy fields that form the valley portions of the undulating landscape, which is interspersed with mildly sloping hills.

The objectives were proposed to be achieved through training and demonstration of the scientific water management options in the different zones.

### **8.1.3 Zones selected for implementing the project**

The six major agro ecological zones were selected for the implementation of the project and these zones were demarcated (Fig 1). The zones are Northern zone, Southern zone, Central zone, High altitude zone, Onattukara zone and Problem area zone. The problem area zone comprises of Kuttanad, Kole, Pokkali and the low rainfall areas of Kerala.

## AGRO ECOLOGICAL ZONES OF KERALA



Source: Kerala State Land Use Board

Fig 1 Agro-ecological zones of Kerala

#### **8.1.4 Problems and prospects with respect to natural resource management identified in the selected zones**

##### **a. Northern zone**

The districts coming under the northern zone are Kasargod, Kannur, Malappuram and Kozhikode. It is a long strip of land located between 10°30' and 12°48' north latitudes and 74°52' and 76°30' east longitudes. The average percentage of literacy of the zone is 89.76 as against 90.92 of the state. The land is singularly diversified in its physical features. The land undulates from Western Ghats to the seashore in the west having a series of hills and valleys intersected by rivers and streams. The zone has four natural divisions viz, low lands, midlands, high lands and high ranges. Numerous small lakes and backwaters may be seen in the narrow coastal belt. The major soil types in north zone comprise of laterites, coastal alluvium, riverine alluvium, brown hydromorphic, hydromorphic saline and forest loam.

The zone enjoys a tropical climate. Though the zone has the highest rainfall in the State, the prolonged dry spell due to weak or absence of north east monsoon, adversely affect the growth of perennial crops. The mean annual rainfall of the zone is 3378 mm with minimum rainfall of 2800 mm in south eastern part of Malappuram and the maximum of 4000 mm in the high ranges of Kozhikode and Kannur districts. There is decreasing trend in the rainfall towards the south and south eastern tracts of the zone.

The gross cropped area of the zone is 8.73 lakh ha which constitute 28.64 % of the total cropped area of the State. The major cropping systems adopted are rice based cropping system, coconut based cropping system and homestead farming system. Of these, the homestead farming system is adopted in all the physiographic divisions in the zone.

The important crops grown in the zone are coconut, rice, cashew, rubber, pepper, cassava, arecanut, fruit crops, vegetables etc.

Animal husbandry has considerable scope for development in the north zone. Though its potential has not been properly exploited, it is one of the sectors capable of bring about speedy



economic and social transformation in the rural areas. Commercial poultry rearing as a subsidiary occupation has got immense scope for increasing the farm income of rural people.

#### **b. Southern zone**

The southern zone of Kerala comprises of the districts of Thiruvananthapuram, Kollam, Pathanamthitta and Kottayam. The zone lies between North latitudes  $8^{\circ} 17'$  and  $10^{\circ} 21'$  and between East latitudes  $76^{\circ} 17'$  and  $77^{\circ} 25'$ . 27.84 percent of its geographical area is covered by forest. The soils of the south zone are classified into the following associations based on the genesis, morphological and physico-chemical characteristics. Coconut is the main crop and is grown mainly rainfed. Coconut is raised in garden land, dry land, bunds and reclaimed land mostly as a pure crop. Paddy is cultivated only in very limited areas. The zone has a warm humid tropical climate with a mean annual rainfall of 1875 mm. The temperature vary from  $21^{\circ}$  C to  $35^{\circ}$  C. The zone is benefited with both south-West and North-East monsoon.

#### **c. Central zone**

The central zone of Kerala comprises of the districts of Ernakulam, Thrissur and Palakkad. The Pokkali area of Ernakulam district, kole areas of Thrissur district and Attappadi area of Palakkad district are excluded from this zone, as they come under the problem area and high altitude zones. The zone can be basically classified into three natural physiographic divisions viz, the high land, midland and the lowland. The six rivers flowing through the central zone are, the Bharathapuzha with tributaries, Bhavani, Siruvani, Chalakudy, Karuvannur and Keecheri. More than 75 percent of the annual precipitation is received during the three months of June, July and August. The average maximum temperature of the zone varies from  $24.8^{\circ}$ C to  $31.4^{\circ}$ C and minimum from  $21.1^{\circ}$ C to  $23.1^{\circ}$ C. The mean value for humidity is as high as 82 percent in the months of June-August. This zone has around 30 % of the soils under moderate erosion, about 18.15 % is moderate to slightly eroded and 17.83 % slight to moderately eroded.

Rice is major crop covering nearly half of the total cropped area of the zone. Paddy, a labour intensive and comparatively remunerative crop, is giving way to commercial crops like coconut, arecanut and rubber and for brick making. Fruit trees form an integral component of the homesteads of the zone.

#### d. High altitude zone

The high range (high altitude) zone is a sub-region of Western ghats with an elevation above 750 M from MSL and comprises of the districts of Wayanad and Idukki, Nelliampathy and Attappady hill ranges of Palakkad district. Thannithode and Seethathode panchayaths of Pathanamthitta district. Aryankavu, Kulathupuzha and Thenmala panchayaths of Kollam district and Peringamala, Vithura, Aryanad, Kallikkad and Amboori panchayaths of Thiruvananthapuram district. Altogether the zone comprises of 9 taluks, 11 development blocks and 84 panchayaths with a total geographical area of 917050 hectares.

The different geographical regions coming under the high altitude zone are not contiguous. Soils of the arable lands (clear felled forests converted to plantation and homestead) are shallow with predominance of gravel and boulders and good physical properties. The surface soils are rich in organic matter with textures ranging from loam to clay loam. The forest loams cover the typical lands and cardamom plantations. Mild sub-tropical climate is prevails in the zone, which is conducive for growing both sub-tropical and tropical crops.

The high altitude zone differs from the other zones in having large areas under forests and perennial crops. Wayanad district has 78787 hectares under forests while Idukki shares 260907 hectares under forest, both together account for 76 percent of the total forests in the zone.

Due to lack of irrigation facilities, a second crop of paddy is not raised during summer season in most of the paddy fields. The principal occupation of the people in the zone is agriculture which accounts for the major share of the house-hold income. Another notable feature of the agriculturists in the zone is that a major percentage of them are full time agriculturists growing mostly commercial/plantation crops. The high altitude zone is characterized by the cultivation of perennial plantation crops and spices. The major plantation crops include coffee, tea, pepper, cardamom and rubber. The High altitude zone accounts for almost the entire production of crops like cardamom, coffee and tea in the zone. Medicinal plants are the richest source of herbal medicines and are most suited to the agro-ecological situations in the zone. A large number of medicinal plants are seen in the forests under natural conditions. The predominance of forests and grass lands in the high altitude region is congenial for the development of cattle wealth.



Constraints for production in the zone are as follows:

- Deforestation has brought about changes in the ecosystem which is seriously affecting the cardamom cultivation in the zone.
- Pests of cardamom like cardamom borer, rhizome weevil, thrips, nematodes etc, disease like azhukal, katte are serious problems. Evolving high yielding cardamom varieties and resistant clones will help in increasing the overall productivity of cardamom.
- Major area in Wayanad is planted with Robusta coffee which has a low production potential, due to the overcrowded planting. Lack of high yielding coffee strains suitable for Wayanad conditions and non-adoption of optimum crop combinations and scientific planting methods stand in the way of maximum returns from unit area.
- Coffee is mainly raised as rainfed crop. Timely showers (blossom showers) are very essential for good coffee yield. Failure of monsoons will result in poor crop yield. Only in some large estates sprinkler irrigation systems have been installed. Developing low cost sprinkler irrigation units and supplying them at subsidized cost to small farmers may help in stepping up production of the coffee crop.
- Non-adoption of preventive and control measures against quick wilt and slow wilt diseases of pepper resulted in the death of large number of pepper vines and subsequent drastic fall in production of black pepper
- Replanting/rehabilitation of diseased and old senile pepper gardens
- Standardisation of agro-techniques for cool season vegetables grown in the region so as to increase the productivity and area under cultivation.

**e. Problem area zone (Including Onattukara zone)**

The problem area zone lies on the coastal line of Kerala state, extending from Kollam district in the south to Malappuram district in the north. The zone comprises of parts of the districts of Alappuzha, Kottayam, Ernakulam, Thrissur and Malappuram, covering an area of 428.54 Sq.Km (428540 ha.). This zone lies between 80° 18' and 12° 48' North latitudes and 74° 52' and 77° 22' East longitudes. The whole zone lies in the physiographic division "low land" (upto 7.5 m above MSL). The zone is divided into four geographical tracts, covering the taluks noted against each tract.



The zone effectively covers four development blocks in Thrissur district, four blocks in Ernakulam district, seven blocks in Alappuzha district, four blocks in Kottayam district, two blocks in Kollam district and one block (Ponnani) in Malappuram district.

The texture of the soil in the zone can be mainly classified as sand, sandy loam and clay. The following soil associations have been identified in the zone with extent based on their depth, surface soil texture, slope, soil drainage, erodability etc. The zone enjoys a humid tropical climate without much variation in the seasons. The zone enjoys South-West and North-East monsoons. The average rainfall is 3000mm. of which 65 to 70 percent received during South-West monsoon. The maximum temperature in the zone varies from 30 °C to 34 °C. The minimum temperature falls within the range of 21 ° - 25 ° C. The low altitude of the zone receives heavy rainfall during monsoon which results in floods and consequent crop damage. The summer is hot and dry.

The total area of the problem zone comes to 428540 ha which accounts for 11.02 percent of the area of the State. The maximum area of 136058 ha. (31.75%) comes under Alappuzha district followed by 110126 ha. (25.7%) in Kottayam district. No forest area comes within the zone. The net area is 304504 ha. which accounts for 13.54 percent of total area sown in the State. Gross cropped area comes to 430051 ha. (14.12 percent of the total area in the State). The main crops grown in the zone are rice, sesamum, coconut and banana. Rice occupies the largest gross area under crops in the zone and it is cultivated in the low lands below sea level. The uplands and the drylands located in between the canals and the lakes are mainly under homestead farming where a mixture of crops are grown without any scientific line of thinking. Coconut occupies the major area under homestead farming. The other crops include arecanut, banana, mango, jack, miscellaneous trees, vegetables etc. The important production constraints in the various agro-ecological situations in the problem area zone are narrated below:

#### Situation 1- Onattukara

- The main constraints that limit rice production in the situation are intermittent floods and poor drainage during South-West monsoon and drought during summer months. This will lead to the virippu crop being affected by floods and mundakan by a dry spell during its latter part of the growth.

- Non-availability of organic manures and its prohibitive cost stand in the way of adoption of production technology.
- Lack of moisture during the third crop season will adversely affects taking a good sesamum crop which is a traditional crop of the area.
- Severe incidence of root wilt disease of coconut in uplands

#### Situation – II (Kayal)

- Entry of saline water when the water level in the backwater recedes, is detrimental for the Punja crop in its later stages of growth.
- High cost of cultivation due to necessity of annual maintenance of embankments of paddy fields, salinity problems, weed problem etc.
- At present shortage of labour is also experienced during planting and harvesting operations.
- Water pollution due to increased use of pesticides and weedicides.
- Economy is highly nature based with high incidence of erratic floods.

#### Situation – III (Karappadams)

- Production constraints are more or less similar to those mentioned under Kayal lands.
- Poor drainage, unpredictability of the success of the crop due to floods.
- High incidence of pests and water borne diseases.

#### Situation – IV (Karilands)

- Production constraints are more or less similar to Kayal situation (II).
- Kari soils are highly acidic. Acidity at the commencement of cultivation and intrusion of salt water at the latter half of the crop growth are the important problems of this situation.
- Non availability of good salt resistant/tolerant paddy varieties.

#### Situation – V (Koottumundakan and Orumundakan)

- These are lands which suffer problems of acidity, salinity and waterlogging.
- The main constraint limiting production is lack of flood and salt tolerant varieties to meet the seed requirements of the area.

#### Situation – VI (Pokkali)

- Existence of different padasekharams lying at different levels. A scientific water balancing system for cultivation of paddy is therefore to be evolved for the situation.
- Construction of bunds all along the boundary of padasekharams which is required for controlling the level of water in the padasekharams; i.e., for letting in and draining of water which is required both for paddy cultivation and prawn culture.
- Release of sufficient quantity of flood and salt tolerant paddy varieties in order to rectify the present shortage of non availability of these type of seeds suitable for the area.

#### Situation – VII (Kole lands)

The major production constraint of rice in kole lands is scarcity of irrigation water during the later growth period of the crop in summer season. As a common feature experienced in all irrigation projects in the State, irrigation water available from Peechi Irrigation Project during summer months is not sufficient to meet the water needs of kole lands. It is expected when the ongoing Chimoni – Mupli project in Mukundapuram taluk in Thrissur district is commissioned, this water problem can be solved to a great extent.

Saline water ingress into the Kole lands during summer months is another constraint affecting rice production. However the regulators at Enammakkal and Kottankottuvalavu and Karanchira lock solve this problem to a great extent by preventing saline water entry into the area. The timely upkeep and proper maintenance of these regulators need attention and are important pre-requisites for the successful raising of the punja crop in the situation.

### **8.2 Training of trainers (TOT)**

#### **8.2.1 Selection of participants to be trained as trainers in natural resource management**

A major objective of the project was to develop trainers who can effectively transfer the technology among the fellows under their command. A systematic approach was adopted to select the trainees.

At the outset, a survey was conducted in the selected agro-ecological zones to identify and evaluate the credibility of the leading organizations and NGOs. The participants to be invited for training were selected from the prominent NGOs and farmer organizations in the respective areas. The objective of empowering trainers is to use them to propagate the



technologies and knowledge gained from the training among the fellows in their community and also to adopt the scientific technologies in their areas of operation. Training was scheduled for 3 days in each location.

## 8.2.2 Preparation for training and printing of training modules

The schedule prepared for the TOT programme is given below. However based on the specific location based problems and prospects, needed topics are added if found necessary. Pretest was conducted to evaluate the participants' level of knowledge and their experience in the topics included in the training. It helped the trainers to make appropriate changes in the topics and presentation for better results. The post test was used to evaluate the impact of the training on knowledge enhancement among the trainees.

### General training schedule

Day	Time	Topic
Day 1	0930-1000	Registration
	1000-1030	Participant Introduction and ice breaking
	1030-1115	Introducing the topic- Need for appropriate land and water management and women's empowerment in command areas with specific relevance to that agro climatic location.
	1115-1130	Tea break
	1130-1245	Cont'd
	1245-1330	Scale of utilization of land and water as a multiple resource
	1330-1415	Lunch Break
	1415-1530	Need for human resource development in the command areas with specific reference to stake holder participation and gender aspects
	1530-1630	The present status of land and water management in general
	1630-1730	Discussion and interaction on the day's session.
Day 2	0930-1000	Presentation by the participants on the assignment
	1000-1100	Scientific interpretation of some of the aspects presented
	1100-1115	Tea break

	1115-1245	Group tutorial on participatory marking of the resources and problems in the command area map supplied
	1245-1330	Water conservation / management measures in command areas
	1330-1415	Lunch break
	1415-1530	Water conservation management measures - Cont'd
	1530-1630	Biomass conservation / management measures
	1630-1730	Discussion and interaction
Day 3	0930-1000	Presentation based on the assignment and discussion
	1000-1100	How to mobilize women's participation in resource management
	1100-1115	Tea break
	1115-1215	Cont'd
	1215-1330	Measures to ensure the sustainability of women's participation in resource management through agri business centers and farm clinics and their inclusion in WUAs
	1330-1415	Lunch break
	1415-1515	Tips on monitoring and evaluation of activities
	1515-1530	Tea break
	1530-1630	General discussion & interaction on the sessions, immediate activities that can be planned, long term measures for planning etc
	1630-1730	Concluding session

### Modules prepared for training

Two types of modules were prepared; A generic module is prepared for common use. Zone specific modules are also prepared incorporating problems specific to the zones.

#### a. Generic module

The generic module included details on topics like natural resources of Kerala, agro-ecological zones, concepts of watershed development, rain water harvesting, land and water conservation measures, irrigation projects and water management activities in command areas, agroforestry, land and water quality management, organic farming, stake holder participation in

natural resource management, participatory techniques in planning and development, gender concerns in natural resource management, women and water management etc.

#### **b. Specific module**

The specific modules include aspects related to natural resource scenario of the different zones selected for the project interventions and also topics on minor irrigation and community participation.

#### **8.2.3 Conduct of Training programmes**

The training programmes were scheduled so as to address the problems in the respective zones. The representatives of the important NGOs and other organizations in the zones were selected as the trainees. The training was conducted in such a manner that the trainees will serve as trainers of their organizations. In each location, class room sessions and field visits were arranged. The pre and post tests conducted helped to evaluate the impact of training. The number of persons that could be trained by the empowered trainers were also recorded.

##### **8.2.3.1 Northern zone**

Among the six agro-ecological zones of Kerala, Northern zone was selected for the first set of training programme. Two training programmes were scheduled for the four districts in Northern zone ie. Kasargode, Kannur, Malappuram and Kozhikkode. The first training was conducted at Kannur for the Kasargode and Kannur districts. The second training was conducted at Malappuram, in which the participants were drawn from Malappuram and Kozhikkode Districts. The lists of NGOs and other social welfare groups were collected from various sources, from which the participants were selected.

The training included interactive lecture sessions and also field visit. For both the trainings in the Northern zone, training topics were the same, but the field visits were in the respective districts. The various mechanical and biological measures devised for the soil and water conservation was dealt in the opening session of the third day. The emphasis was given to the measures which are viable in small holdings.

##### ***Training and field visit for the Kasargode and Kannur districts of the Northern Zone***

For the Kasargode and Kannur Districts, training was held at Community Hall, Kannur during 6-8 September 2005 24 women representing 7 NGOs and 5 SHGs of the two districts participated in the training. In addition to the regular schedule, special classes were taken on the



need for preservation of traditional varieties, various organic plant protection measures, water saving irrigation systems and the need for scientific water management in agriculture.

After the sessions, a field visit was arranged to the successful sites in Kannur where soil and water conservation activities as well as rain water harvesting structures were taken up in a scientific manner. This was done in collaboration with the Soil conservation wing of the Agriculture Department. After the training the response of the trainees was collected and a post test for technical evaluation of the training was made.



**Fig 2. Training in progress**

#### ***Training and field visit for the Malappuram and Kozhikode districts of the Northern Zone***

For Malappuram and Kozhikode Districts of the Northern Zone the training was organized at the conference hall of Kudumbashree District Mission Office, Malappuram during 5-7 January 2006. In addition to this, specific aspects related to natural resource scenario of northern zone, topics on minor irrigation and community participation were also included in the training sessions. The training helped the participants to become aware of the existing problems and the probable measures that can be adopted for improving the scenario. A total of 22 participants representing 6 NGOs, 6 SHGs and 1 Kudumbasree Community Development Society (CDS) unit participated in the training.



**Fig 3. A view of the self introduction between the participants and faculty members**



**Fig 4. A view of the participants on class room exercise**

The Kattuppara Lift Irrigation System across Thootapuzha in Malappuram district was selected for field visit. The prime aim of selecting this area was to give an idea to the participants about the need for efficiently managing water on a community basis. The Kattuppara lift irrigation system is one of the earliest commissioned minor irrigation systems in the district. The operational aspects of the scheme was explained to the trainees by the officers of irrigation department. The trainees made a walk through survey and had detailed interaction with farmers in the area.





**Fig 5. Trainees in the field**

After the field visits the trainees prepared a report including the problems, prospects and lessons learnt in the project area. Problems observed by the trainees through detailed field visit and after discussion with the farmers of the area are as follows:

- Water doesn't reach the tail end as the canals are not properly maintained. The sediments and weeds have prevented water from reaching about 1km of the main canal. The same is the case with about half of the length of branch canal also.
- The field channels are not established in the command area and hence surface irrigation is followed, which results in wastage of water.
- There is no unified cropping system in the command area. In some patches paddy is grown while in adjacent plots banana or cassava is cultivated.
- Leasing of land is predominant in the area and the farmers are forced to practice intensive cropping practices to repay the leasing charges.
- Reclamation of paddy fields is also prevalent thanks to the non assurance of water in the third crop season and the high cost of cultivation.
- Water theft and conflicts in sharing of water are common problems.

The trainees opined that the training was of great use to them to address their problems. The comparison of pre and post evaluation revealed that there was a knowledge gain of 60% through the training programme.



### 8.2.3.2 Central zone

Ernakulam, Thrissur and Palakkad are the three districts coming under the Central zone. For the three districts in Central zone, two training programmes were conducted, one at Ernakulam (for Ernakulam district) and the other at Kodungallur (for Palakkad and Thrissur districts)

#### *Training and field visit for Ernakulam district of the Central Zone*

At Ernakulam the training was organised during 25-27 May 2005. The participants included the representatives of NGOs and other voluntary organizations working in women empowerment located in Ernakulam district. Two delegates each from the selected 15 NGOs and 1 Kudumbasree CDS unit working in the field of women empowerment participated in the programme. The training was conducted at the Govt. Youth hostel, Kakkanad, Ernakulam District. In addition to the general topics, specific aspects related to natural resource scenario of Central zone, salient features of the Central zone and topics on water related environmental problems and water quality parameters and its assessment were also included in the training. A field visit was conducted to the integrated watershed developed in the nearby watershed, where the trainees got a first hand information on the soil and water conservation measures that can be adopted for ensuring better water conservation in the areas.



**Fig 6. A class on 'water quality' in progress**

Pre-test was conducted to understand the participants' level of knowledge in the topics included in the training. Analysis of the answers of the pre-test revealed that almost all the trainees had only a vague idea about the watershed concept and the need for integrated development. All the participants strongly opined the necessity of ensuring the participation of public in conservation and management of natural resources. Analysis of the post test revealed that after the training, there was marked improvement in the knowledge level of the trainees, especially with respect to the concept of watershed and its role in the developmental programmes. Further, the trainees were convinced of the fact that NGOs should act as a more effective and viable capacitor and mediator at the grass root level to ensure better and effective natural resource management.

The overall success of the training was evaluated and all the trainees expressed strong appreciation on the training.

#### ***Training and field visits for the Palakkad and Thrissur districts of Central zone***

The training programme for the Thrissur and Palakkad districts was conducted at the Kottappuram Integrated Development Society (KIDS), Kodungalloor during 29.11.2005 to 01.12.2005. The training included topics like Need for appropriate natural resource management, Water quality management, Effective management of the wetlands, Need for peoples participation in natural resource management, Gender issues in water management, Women in agriculture and few discussion points. There were 31 participants in the training, out of which 20 members represented Self Help Groups and 11 were from Mahilamandals. The programme was inaugurated by Rev. Fr. Johnson Pangeth Director, KIDS. Analysis of the pre-test revealed that the participants lacked technical knowledge in topics related to Natural Resources Management. The post evaluation test was analysed and the knowledge rise was 92%. All the trainees agreed that women can play a great role in the natural resources conservation and management. It can be concluded that the training had great impact on the trainees. The trainees agreed that NGOs which they represent can act as a more effective and viable mediator for taking the technologies to the grassroot level.





**Fig 7. Inauguration of the training programme by Fr. Johnson Pangeth, Director, KIDS**

### **8.2.3.3. Southern zone**

The southern zone of Kerala comprises of the districts of Thiruvananthapuram, Kollam, Pathanamthitta and Kottayam. In this zone, two training programmes were conducted viz: at Thiruvananthapuram and Kollam.

#### ***Training and field visit for Thiruvanthapuram district in the Southern zone.***

Training Programme on Natural Resource Management held at Thiruvananthapuram during 25-27 July 2006 at Jubilee Animation Centre, Vellambalam, Thiruvananthapuram. Twenty seven participants representing CDS units, NGOs and Local bodies participated in the training. In addition to the regular topics, organic vegetable cultivation and seed production and terrace farming of crops were also included in the training.

The trainees were taken on a field visit to the terrace farming sites in the Trivandrum city. The participants got a first hand knowledge on the ways and means of taking up vegetable crops in the terraces in a successful manner. This method of cultivation is a boon to those who do not have land of their own and helps to produce healthy vegetables and fruits for consumption. The trainees agreed to take up the activity in a big way through their associations.



Training evaluation revealed that there was bridging of knowledge gap in various aspects of natural resource management.

***Training and field visit at Kollam district in the Southern zone.***

Training Programme on Natural Resource Management was held at Kollam during 2-4 August 2006 at the Socio-Economic Unit Foundation at Kollam. Representatives from Kottayam and Pathanamthitta Districts also participated in the training. The topics included 'Agro- ecological zones and water resources of Kerala, watershed management and development, Terrace farming, Rain water conservation and harvesting, Conservation of mangroves, special problems and prospects of the coastal zone etc..

Field visit was arranged to the areas where mangroves were being cut and removed and thus causing problems to the river coasts and to the fish. Measures were described for reviving the mangrove areas for the safety of the ecosystem and many of the participants made projects for reclamation of the areas under their groups.

The post test was conducted and analysed. The comparison of the pre and post tests revealed that there was considerable knowledge build up and that the training helped in many ways to bridge the knowledge gap with respect to the topics on natural resources development and management

**8.2.3.4 Problem zone**

The problem area zone lies on the coastal line of Kerala state, extending from Kollam district in the south to Malappuram district in the north. The zone comprises of parts of the districts of Alappuzha, Kottayam, Ernakulam, Thrissur and Malappuram. Onattukara and Kuttanad zones are also taken as problem zones.

***Training and field visit at Alappuzha in the Problem zone***

Representatives from the various problem zones were called for training which was organized at the Kuttanad Vikasana Samithi(KVS) Hall, Alappuzha during 13-15 March 2006. In addition to the regular topics, topics on wetland paddy cultivation in polders, management of the aquatic weeds and the problems faced in polder cultivation also were included. The women who participated in the programme expressed great desire to come for follow up programmes in CWRDM, Calicut since their problems are highly specific and since there is great opportunity

for development. The knowledge empowerment was to the tune of 69% as could be noticed from the post test analysis.

The field visits were arranged to the shrimp cultivation areas in the Kuttanad and also in the integrated wetland paddy farming areas. The trainees got a good knowledge on these farming practices which may help them to replicate it their areas of activity and also to pass on the information to their unit members.

#### **8.2.3.5 High altitude zone**

The high altitude zone comprises of the districts of Wayanad and Idukki, Nelliampathy and Attappady hill ranges of Palakkad district, Thanithode and Sethathode panchayths of Pathanamthitta districts, Aryankavu, Kulathupuzha and Thenmala panchayats of Kollam district and Peringamala and Vithura, Aryanad, Kallikad and Ambori panchayaths of Thiruvananthapuram districts.

#### ***Training and field visits in the Idukki region of the High altitude zone***

Training was organized at Kattappana in the Idukki region during 21-23 April 2006 at the Conference Hall of the World Vision, Kattappana. The trainees were drawn from women organizations and also from the established NGOs of the regions. Altogether there were 21 participants in the course. In addition to the regular topics, the special topic on mulberry cultivation and sericulture were also included, since that is a profitable venture in the area.

The trainees were taken to the sericulture fields maintained by the beneficiaries of the NGO, World Vision. The needed know how was imparted to the trainees and the trainees expressed their desire to take up the activity for income generation. The training evaluation revealed that 78% of the trainees had not attended any training programme before and the analysis further revealed that the trainees had acquired considerable information on natural resource management.



**Fig 8. Presentation of report by the participant during the training session**

#### ***Training and field visits in the Attappady region of the High altitude zone***

The training programme for the Attappady region was organized at the Attappady Area Hill Area Development Society (AHADS), Attappady, Palakkad District during 17-19 August 2006. Twenty three women representatives from various groups and NGOS participated in the training. In addition to the regular topics, fodder cultivation and dairying was also included in the training programme, since animal husbandry is a regular activity of the inhabitants of the problem zone.

Field visit was arranged to the successful sites developed by the AHADS in their project. These areas were once barren hills, but due to scientific interventions on soil and water conservation and dairying, these areas were brought back to high value lands with lush vegetation and plenty of water.

#### ***Training and field visits in the Kalpetta region of the High altitude zone***

The training module was prepared to suit the natural resource management in high altitude zone. For this natural resource status and salient features of the high altitude zone was collected from various secondary sources. The problems existing with respect to natural resource management was identified through frequent field visits and the informal discussion



held with stakeholders. A detailed module covering the topics such as an overview of natural resources and demographic features of Kerala, land and water conservation measures, agro forestry, land & water quality management, women and water management etc. In addition to this specific aspects related to natural resource scenario of high altitude zone, salient features of a representative district in high altitude zone were also included in the module. The training was organized at Everglades Hotel at Kalpetta, Wayanad during 17-19 May 2005. Twenty one participants representing 12 NGOs and 2 Kudumbashree units participated in the programme. In addition to the regular classes already decided in the project, the topic on 'Biodiversity conservation' and 'Patenting laws' also was added since these areas are declared as hotspots for biodiversity.

The trainees were taken to the demonstration plots of the MS Swaminathan Research Foundation, where the various endangered plant species were protected and the value addition of forest products were done by the tribal and other women groups. The trainees could get many ideas that can be implemented in their respective groups.

#### **General result of evaluation of the training programmes conducted at different sites**

Efforts were taken to get the feed back from the trainees and also evaluate how the training helped to improve the knowledge of the trainees with respect to the various topics on natural resource management. The success of the training was evident from the strong appreciation noted by all trainees in their evaluation reports. For majority of the trainees, the aspects like watershed management, soil and water conservation methods and water related environmental problems were new. To convey the information to the trainees, trainers succeeded to a great extend. This is because the information was delivered in an easily assimilating manner connecting properly with practical conditions and experiences of the trainers. The field visits were also very much appreciated by all the trainees, since the experience gained could help them to take up necessary improvements and innovations in their areas of work. The trainees further reported that training facilities and food were satisfactory in all the places.

The trainees had their own suggestions on natural resource management based on their field visits, some of which are given below. They urged -

- To entrust both the panchayath and voluntary organization in carrying out a proper maintenance of the indigenous varieties of crops

- To establish a seed bank for the varieties and crops which are gradually going out of the scene.
- To include the users in the maintenance and sharing of water
- To revamp the existing padasekhara samities to initiate a uniform cropping system
- To furnish a master plan for the proper use of the water in the area both for domestic and agricultural purpose.
- To introduce the water saving irrigation methods wherever possible
- To empower the grass roots on all aspects related to the sustainable management of natural resources

The trainees further emphasised that proper interference from the part of research organizations like CWRDM is a must for enabling the authorities to achieve sustainable utilization of the natural resources of any area.

#### **The spread of the information gained by the participants**

The trainees who were trained as trainers were representatives of various groups. It is expected that the information gained would be passed on to the grass root level of their organizations. The following is the way of transfer that could be expected and hence examples of the NGO networks in two selected regions is given below. It can be seen that the knowledge will be disseminated to a wide community through the process.

District	Name of NGO / Trainer	No. of beneficiaries that can gain the impact
Alappuzha	KVS Thekkemuri area- clients reached	263
	KVS Vezhappata	1173
	KVS Mitragiri area	300
	KVS Nedumudi	815
	KVS Kannady	390
	KVS Vadakkan Veliyanad	375
	KVS Kandankary	720
	KVS Vadakke amichakany	537
	KVS Kayal pana	945
	KVS Punnakunnu	795
	KVS Pallikunnu	150
	KVS Pulikunnu	625
	KVS Thekkekara	795
	KVS Kuttanad area	263

	KVS Bhajanamadana	575
	KVS Kainakiri	200
	KVS Vazhapra	425
	KVS Chambakulam	540
	VOSARD	9000
	Dist. Woman Council - Idukki	
	Vikas Yojana Social Service Society	10500
	Vadaumedu Development Society	7550
Trivandrum	National Women's Welfare Centre	25000
	Planet Kerala	157
	AISR Foundation, Benedict Nagar Nalanchira	600
	Mitra Niketan	1078
	TSSS	350
	Dele view	50700
	Neyyatinkara Integral Development Society	71835
	AGES (Agri + Ecosystem Management Group)	1000
	Rural Women Development Society, Parassala	6000
	Community Welfare Centre	815
Kollam	Thrikkadavoor	3600
	Anchalamade Society	641
	Mayyanad Kudumbasree	1200
	Veliyam Kudumbasree	2320
	Punalur Social Service Society	1250
	Kerala Rural Development Agency	1600
	Quilon Social Service Society	75122
	Vettikavala Block Panchayath	2715
Pathanamthitta		
	Literacy Mission, Pathanamthitta Grama Panchayath	1010
	Poothakulam Grama Panchayath	737
	Shasthamkotta Grama Panchayath	4127
	Mayyanad Grama Panchayath	5000
	District Saksharatha Mission	77
	VOICE	5900
	Centre for Youth Development	3180
	Voluntary organization for innovative and collective Action	4960
	Sreyas Social Service Society	40000
	Sarva Seva Mandalam	2480
	Centre for Youth Development	9300



	Brahmagiri Development Society	53000
	Jeeva Tram	158
	CASP	2089
	Jeevagram	3000
Ernakulam	Welfare Services EKM	14400
	Jyothirgamaya	9471
	Nirmalgram Welfare Centre	3870

### 8.3 Front line demonstrations for site specific problem solving

In order to bring the women to the field of action, efforts were taken up for involving them in front-line demonstrations in their respective areas. The problem that need to be tackled on a priority basis/ the activities that can be taken up for their empowerment was discussed in groups and after reaching the consensus, the planning for frontline demonstration was made on a participatory mode. The various front line demonstrations taken up by the women groups are briefed below.

#### 8.3.1 Systems of Rice Intensification

In Kozhikode district, the front line demonstration on Systems in Rice Intensification was done Chelannur by a group of women in the Kudumbasree units. The group consisted of 7 women and they raised the crop in a leased paddy field. This was the pilot activity on SRI in the district. The technical know-how was imparted by the project team and also by the officers from the Agricultural Department. The plot was visited by many people, both men and women from the nearby panchayaths and they took decision to replicate it in their areas. The performance of the crop was excellent and there was doubling of yield in the method. The benefit cost ratio was almost 1.8 and the water use efficiency was also very high. During the second season itself, many farmers in the area started adopting this method of cultivation.



**Fig 9. SRI plot during the initial tillering stage**



**Fig 10. A plot of SRI in Chelannur**



**Fig11. Women clarifying doubts on SRI**

Evaluation of frontline demonstration of Systems of Rice Intensification done at Kozhikode revealed the following benefits when compared to the conventional rice culture method.

- Higher yields – The grain yields of rice was 4.8 t/ha under SRI method, whereas it was 2.5 t/ha in conventional method.
- Enhanced root growth – SRI encourages vigorous root growth. The increased root volume, number and weight, helps the roots to absorb more nutrients, withstand adverse soil conditions and increase the availability of nutrients etc.



- Increased tillering- Number of tillers per hill are was thrice that in the conventional method.
- Water saving- There was about 30-40 percent water saving in SRI method as compared to conventional rice culture method. It is because the fields are not kept flooded during the entire crop cycle. Water requirement was very less during the vegetative growth phase, and only a minimum quantity of water is kept in the field during the reproductive phase . This saving in water will become increasingly important, especially during drought year, in the agricultural sector.
- Less lodging- Due to stronger tillers and larger root systems, SRI plots may with stand the strong winds, rains and even cyclone.

The SRI methodology for raising rice production demands three main changes in irrigated rice cultivation: transplanting younger seedlings, planting the seedlings singly and keeping the paddy soil moist but not continuously saturated during the plants 'vegetative phase. All the members of women group involved in this activity opined that the knowledge they gained from the demonstration was sufficient for carrying out cultivation in the most successful manner. They also gained confidence from the demonstration that when properly sensitized and given opportunities, rural women participate actively in meetings, training and field activities and are able to identified their problems and suggest solutions

### **8.3.2 Water saving irrigation using KAU sprinkler**

A frontline demonstration was conducted at the Alavi Centre, Chalakkudy, Thrissur District. This site comes under the command area of Chalakkudy Irrigation Project. Sixteen women groups were raising "bush jasmine" for the past seven years. There was acute water shortage in the area mainly during the summer months. They were getting water in the summer months from the nearby well for which they had to pay a huge amount which they could not afford. As a result, they used to irrigate twice a week only. A frontline demonstration was set up to familiarize the 'KAU Micro sprinkler' irrigation, which is an efficient, affordable and long-lasting irrigation method which can form a replicable model in similar conditions. Technical support and training was provided by the scientists of Agricultural Research Station of the Kerala Agricultural University, Chalakkudy, Thrissur. The main advantages of this system are as follows:



- More uniform distribution of water in the crop root zone
- Complete wetting of the basin area and providing a cool environment for plant
- No water loss due to deep percolation and runoff
- Facilitates application of fertilizers, herbicides and cooling of green houses, poultry houses, cow sheds etc
- Minimum initial investment, running and maintenance costs.



**Fig 12. A plot of bush jamine irrigated by KAU sprinkler**

By demonstrating this cost effective farmer friendly system has definitely attracted small/marginal farmers due to its greater economy in labour, water use and initial investment. As a result of this demonstration, the members of women group could also save their time, energy and they could fetch more income. From the social point of view, they could develop strong communication skills by explaining the technology to the visitors and they further improved in their organizing ability. The group could add more plants in their community garden and in the first year itself they could take 75 more plants successfully in the area. The women reported that the system was affordable, dependable and simple. This activity could help to demonstrate a very useful technology to many nearby groups and thus could propagate a farmer friendly technology for efficient utilization of scarce irrigation water. The system was found to be very effective for jasmine crop, since it helped to increase the number and size of flowers, to bring more area under cultivation, to reduce the cost of labour for land preparation, tillage and harvesting and also to save water and power costs. Actual costs vary widely, however, the cost of

installation including pump and motor will come to approximately Rs 1 lakh per hectare. Initial cost will increase as labor saving devices are added. Permanent systems where the main and lateral lines are not moved will cost more than portable lines. The average total cost per hectare per year includes initial investment and operating costs. The life expectancy of a sprinkler system varies with handling care and maintenance, but on an average the life expectancy of the system is about 15 years. Total cost of micro sprinkler system set up for irrigating the 150 jasmine plants worked out to Rs15,100/-.

### **8.3.3 Indigenous Seed Bank for vegetables and tuber crops**

The front line demonstration in Kannur district was carried out at Thermala in Ulikkal Panchayath. Thermala is the remote hilly area of northern side of Kannur district and majority of the inhabitants are migrated from the southern part of the Kerala. The major objectives behind the front line demonstration were to build an indigenous seed bank and to bring more participation among the people. Five women self help groups (SHG) were identified to develop the indigenous seed bank of different agricultural products. Each women group included 5 to 6 members and they are very much enthusiastic to do such a programme. The indigenous varieties of vegetable and tuber crops were listed by the participants and the seed materials were collected from different parts. These were distributed among the group members and they were trained on the various cultural practices to raise the crops. The crops were raised scientifically and the seed materials thus produced were distributed to the various other groups/ organisations in Kannur District. The NGO named Thalassery Social Service Society (TSSS) also participated actively in the programmes. Since TSSS had implemented many programmes for the welfare of the community in the area, this organization was provided technical as well as financial support for implementing an indigenous vegetable seed bank under the project.





**Fig 13. Plots of indigenous variety plants**

The seed materials produced for the 7 varieties of *Dioscorea*, 3 varieties of *amorphophallus*, 2 varieties of *amaranthus*, 6 varieties of cowpea and 3 varieties of *colocasia* are in popularity in the zone after three years of the project. The attempt which started with 5 women groups including 27 members served the seed materials to 133 women in the different parts of the Northern zone.

#### **8.3.4 Controlled irrigation in mulberry plots**

Mulberry plants are raised in the barren lands and mostly in steep hills in the Idukki district. Sericulture is a common activity in these areas and hence, fresh leaves of mulberry is a must. Mulberry plants need good irrigation in the slopes for optimum vegetative growth. Women groups of 15 members took up the venture as a front-line demonstration in the project. The area selected was a hill slope and mulberry plants were planted and established as per the recommendations of sericulture department. A pond of size 10M X 10 M X 2 M was dug at the lower portion of the plot. Water can be ensured in this valley area even during peak summer season. From the pond, water was pumped into a tank placed at the top portion of the hillock. The irrigation system was laid out in such a manner that the water from the tank can be given to the plants through hose irrigation. The attempt was very successful. The advantages included less effort for irrigation, better yield of crop in terms of the leaves harvested, high yielding even during the summer season when there is acute shortage of availability of mulberry leaves and thus ultimately better production of silk cocoons.





**Fig 14. Pond dug for water source**



**Fig 15. Water collection tank**



**Fig 16. Laying of irrigation in the field**



**Fig 17. Mulberry plot with healthy plants**

### **8.3.5 Controlled irrigation for vegetables in summer rice fallows**

Considerable area of the paddy fields remain fallow during the summer season due the non availability of adequate quantity of water for the cultivation of paddy which is a water loving plant. The residual water and the presence of a comparatively high water table can be made use of by cultivating crops like pulses, vegetables etc which require comparatively lesser quantity of water. The advantage is that the water and land use efficiency can be improved and women can effectively take up the cultivation in summer fallows for ensuring better income and utilizing their otherwise wasted time and energy. Women take up such activities by taking land on lease. Such an area in the Malappuram district was selected for a front line demonstration of controlled irrigation. The existing irrigation practice was to pump water from the well in a nearby plot and

irrigating through flood method. This resulted in considerable loss of water and also wastage of energy and time. Moreover, the area that could be brought under cropping also was very less since water was not sufficiently available in the source during the summer seasons.

In the demonstration fields the women group of 23 members raised different vegetables such as bhindi, bitter gourd, pumpkin, cucumber, bottle gourd, brinjal etc in an area of 200 sq. m. Water source was the same well, but the water was pumped and directed through PVC pipes laid in the field. In the PVC pipes, at suitable locations, stand posts were given for further irrigating the small plots and the sprinkler heads were provided as outlets. This was found to be very effective from the point of water conservation and labour saving. Two women could manage the irrigation a day and thus managed their time by shift labour. Since the wastage of water was almost nil, water could be ensured throughout the summer season. This demonstration was visited by many farmers and they expressed their desire to take up such irrigation in their fields also.



**Fig 18. View of the controlled irrigation in the demonstration plots at Malappuram**



### 8.3.6 Gabion check dam for water conservation at Bappanamala

Bappanamala is about 12 Km north of Padincharathara town in Padincharathara Panchayath in Wayanad District. The northern boundary of the remote village is reserve forest. About 70 farmers are residing this area. Among them, 24 families are tribals rehabilitated from the Banasurasagar Irrigation Project site. Most of them are wage earners and others mainly depend on agriculture for their livelihood. Women of the area had been facing the problem of water scarcity especially during the summer season and the women were the sedentary farmers of the area as men used to go out seeking job elsewhere. Women had the additional responsibility of fetching water for their family also. In order to ensure water availability during the peak summer also it was decided to construct a check dam across Parathodu stream at Bappanamala with the active participation of the stake holders and MS Swaminathan Research Foundation, an NGO in Kalpetta, as a front line demonstration. The stream was getting the discharge from the spring situated in the Reserve forest. A detailed investigation was made to study the technical, economical and social feasibility of the scheme and the studies revealed that the check dam could improve the water flow during the summer season. Accordingly a gabion check dam was constructed across the stream near to the forest boundary. The entire activity was on a participatory mode and using the granite stones available in the locality.



**Fig 19. Stream before the construction**



**Fig 20. After construction of check dam**

After the construction of the check dam, the first season analysis revealed that the flow in the stream could be retained during the entire summer season. The flow in the nearby streams also was improved due to the construction. The water level in the wells of the nearby areas also



increased due to the activity. This demonstration was appreciated by the district authorities and they expressed the desire to take up such schemes in replicable areas.

### **8.3.7 Composting of noxious weeds for organic farming**

In the Kuttanad and Alleppey regions, where wetlands are common, many species wetland weeds create problems in the water bodies. If the problem can be made into a prospect, the menace can be reduced. With this idea and after taking the suggestions from the women groups in the area, a demonstration site was selected for composting the wetland weeds for use in the organic farming. The advice of the Kuttanad Vikasana Samithi was taken for this and the women took up the activity in the most successful manner. The demonstration was visited by many people in the locality and it is expected that the same will be replicated elsewhere also.



**Fig 21. Composting unit for composting of wetland weeds**

### **8.3.8 Bush pump irrigation**

Vegetable cultivation during summer season in summer rice fallows is a regular activity taken up by many women groups. The greatest problem that they usually face is to meet the irrigation demand, and hence they restrict the area that can be cropped every season. The usual practice is pot irrigation from the nearby wells for which, on an average one member had to spend 2 to 3 hours per day. It has already been proved by CWRDM that irrigation can be made

easy with bush pump irrigation. With limited physical effort and with no other energy, water can be lifted and transported to the field by using the required length of pipes. After the season's need, the whole system can be dismantled and kept safely for the next season. Considerable time and physical drudgery can be saved through adoption of bush pumps.

A demonstration was taken up by a women group in Kozhikode district for irrigating by bush pump which was fabricated in CWRDM. It could be seen that bush pump could be easily operated by women by just rotating the wheel. Pits lined by polythene were made in different parts of the field so to divert water from the source and collect for further distribution. A time analysis of the method showed that time saving was considerable and that only one-third of the time was enough to irrigate the entire area using bush pump. Even children could do the watering and this was a great help to the women; this also generated interest among children in agriculture.



**Fig 22. The Bush Pump**



**Fig 23. An initial stage of system lay out**

Bush pump is used to manually pump water from depressions. It is very easy to be made and consists of pipes, rubber tyre and ropes. The total cost for making, welding etc will come to Rs 2500/-. Water can be drawn from a depth of upto 4 Metres.



## 9. Conclusions / Recommendations

The training and demonstrations which were undertaken in the project had great impact on empowering the women in various aspects of natural resource management. The activities were centering around the scientific management of land, water and biomass. It could be understood that the project could make considerable impact on the target women.

The knowledge gaps could be bridged in various aspects like mechanical and biological measures of soil and water conservation, organic farming, organic manure production, vegetable farming, fodder production, water conserving irrigation methods, vegetable farming, water resource development and management, team building and leadership skills, accounting and book keeping etc through demonstrations, practical training, field visits, lecture sessions etc.

The front line demonstrations were useful for empowering the selected women groups and also for technology transfer to the farmers of the nearby panchayaths, school children as well as to their neighbours. Moreover, they had transferred the experiences and knowledge gained to others when they had group meetings in the associations in which they are members eg. *kudumbasree* etc.

As a result of the project, the perception and attitude of the target women towards natural resource management changed and they became confident to be ambassadors of the activity to other areas as well.

There had been considerable social empowerment since the women could express their problems, needs, priorities, ideas etc.

The experiences in the project had considerably empowered the project officials to study the problems and prospects of such an initiative. Based on the experiences, some of the replicable strategies are presented below.

- Women must be educated and motivated properly and sufficiently to overcome their shyness, recognize their capabilities, understand their own needs and desires and limitations and develop a strong will to achieve their goals.
- It is advisable to include lady extension workers in the project aimed to empower women in any activity.



- Activities generating income directly will have to be included in the project, since this will attract participation at the initial level.
- Efficient communication with the grass root level women should be ensured by being with them, being friendly to them, working with them and understanding their life and explaining the things in multiple ways in their local dialect.
- It is advisable to formulate unbiased laws and administrative practices to ensure women's equal rights to natural resources, credit and social status.
- Training, awareness and demonstrations on alternate livelihoods will have an everlasting impact on the minds of women; it will lead them to adopt new income generating activities, health care and other technologies to which they were hitherto averse.

## **10. How do the conclusions/ recommendations compare with current thinking**

Our natural resources are under tremendous pressure and in many cases they are degrading as a result of unscientific management and pollution. There are opportunities to modify our existing practices to make the best use of land and water in the command areas. Irrigation is an added advantage and an investment made in certain areas to boost the production. Land and water in the command areas are not usually used to the best possible extent. These resources if used in the efficient and perfect manner can increase the resource use efficiency and will add to income generating capacity of local residents in a sustainable manner. In Kerala, the reasons for lesser level of peoples participation in the command areas is due to many reasons, the important being low holding size, high cost of living, low remuneration from paddy etc. At the same time in many of the rural areas, the potential of farmwomen is mostly underutilized. A concerted effort is needed to bring women to the mainstream of activities which could be proved in the earlier studies made by CWRDM, Kerala. This project successfully addressed this problem and helped to popularize the efficient management strategy in the different agro-ecological zones of Kerala. In some areas, the unscientific and haphazard use and handling/treatment of land and water resources was found to be the major cause of decline in resource security status. Awareness of and respect for natural resources could sufficiently encourage a personal life-long commitment of responsibility and positive community participation.

The project focused on women since they constitute almost half of the population, but in the rural areas they are isolated and socially made to concentrate only on the household routine activities. It is proved beyond doubt that once technology reaches the women there will be information transfusion to family members and the neighbours. Moreover, since women are mostly sedentary they would be more concerned about the local resources and environment since they would be the first victims of the problems. The project activities were helpful to introduce demonstration which added to their income generation and thus helped to improve the economic status of the family and thus the community.

All the topics which were considered in the project were of great relevance to natural resource management and in particular to conservation of the water resources. Irrigation water reaching the command areas is an economic good and if not used to the best possible extent will result in loss in a big way. The land which were otherwise left fallow were brought under cultivation and the otherwise underutilized irrigation water was also put to the best efficient use through the demonstrated technologies. Hence the project activities were of great benefit in the current scenario.

The project resulted in strengthening the women who were trained to be trainers in various topics of natural resource management. Women who are otherwise underexposed to such situations were brought to the fore front of activities. The training given to was diffused to the different lower levels and the transfer of technology helped the local people to work for their own upliftment. Frontline demonstrations were successful in giving clear guidance on how to conserve and use water in command areas and also to improve the water use efficiency.

#### **11. Field tests conducted - NA**

Since the project was development oriented this aspect is not applicable.

#### **12. Software generated if any**

Not applicable

#### **13. Patents/ copyrights**


Not applicable


#### 14. Suggestions for further work


The following suggestions are made based on the project interventions:

- Technologies are available in the scientific institutions, and hence it will be of great use if many more technologies are taken to the grass roots through such projects.
- Participatory appraisal of the region-wise status of natural resources and documentation of the same will help to assess the need for further improvement in the areas
- The women who are usually devoid of land possession may be given the financial support by the development departments for taking up activities.
- Documentation and prioritization of activities for the scientific natural resource management will have to be taken up in a big way in the different agro-ecological zones.

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