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Ayalur Model Watershed(NWDPRA)
Erode District
Tamil Nadu

ICAR-Indian Institute of Soil & Water Conservation (IISWC)
Ree's Corner, P.O. Fernhill Udhagamandalam
The Nilgiris-643 004, Tamil Nadu

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Project Implementation Team

OPS Khola
V Selvi
DV Singh
K Kannan
R Mohan Raj
Murugesan

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Ree's Corner, P.O. Fernhill, Udhagamandalam
The Nilgiris-643 004, Tamil Nadu

Late Dr (Ms)V. Selvi
Dedicated to our brilliant Scientist

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Compiled & Edited by

M Madhu
K Kannan
V Singhal
OPS Khola
M Chandra

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Director
ICAR- Indian Institute of Soil &Water Conservation (IISWC)
218-Kaulagah Road, Dehradun -248 195, Uttarakhand (India)

FOREWORD

ICAR- Indian Institute of Soil &Water Conservation (IISWC)
218-Kaulagah Road, Dehradun -248 195, Uttarakhand (India)
Telephone: (0) 0135 2758564, (R) 0135 2754968
Fax: 0135 2754213, 2755386
Email: directorsoilcons@gmail.com,director.iiswc@icar.gov.in

The ICAR-IISWC, Research Centre, Udhagamandalam, Chennai took up Ayalur Watershed in Gobichettipalayam Tehsil, District Erode, Tamil Nadu State during 2008-2014 to develop it as a model watershed during the XIth Five Year Plan under Centrally Sponsored Scheme of Macro Management of Agriculture (NWDPRA) for supplementation / complementation of States' effort. The watershed lies in the tropical zone characterized with scanty rainfall and dry climate. The average annual rainfall is about 600 mm. The uncertainty of North-Eastern monsoon and not too favorable contribution from the South-West monsoon make the plight of local agriculturists miserable. A total of 18 water harvesting and gully control structures had been constructed and 4 existing structures were rejuvenated in the watershed through which 60749 m^3 storage capacities had been created. As a result of water harvesting through these activities a total of 242 ha-cm water have been harvested and the impact on ground water recharge was visualized by a rise in ground water table ranging from 2.3 to 13.9 m with average of 8.0 m in the vicinity of the structures in the watershed. Because of increased water availability in the bore-well, farmers switched over to cultivation of commercial crops during *rabi* and they could give more irrigation to *kharif* groundnut which resulted in additional yield and income in the tune of 20% and 47%. Lining of surface storage pond resulted in 60% water saving. The water thus saved by provision of the lining was used by the farmer to increase the cropped area under irrigation (44%). The increase in irrigated area (0.8 ha) had fetched the farmer a handsome additional return of nearly Rs. 40,000/year. In order to minimize the risk of crop failure and increase the livelihood in *rainfed* area, more land was brought under agri- horticulture, and industrial forestry. Crop diversification involving nontraditional vegetable crops and floriculture increased farm income by 33% -77%. Crop demonstration in groundnut and maize with INM, improved seed and intercrop resulted in 14-20% higher yield. Considering the presence of large number of land less poor in the watershed, alternative income generating activities were taken up through formation of self help groups (SHGs) for the upliftment of landless poor and resource poor farming families in the watershed. Thirty two SHGs (17 women and 15 men) and 12 user groups have been formed with ten members each from the resource poor community in the watershed to take agricultural based and other livelihood. The team is awarded with ICAR-Vasantrao Naik Award for Best Research application in Dry land Agriculture for their watershed work.

Dr M.Madhu
Director
ICAR-IISWC, Dehradun

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1.0 Watershed Details

1.1 Name: Ayalur Watershed Villages covered: 5

1.2 Location: Latitude: 11°25'16"N to 11°22'19"N Longitude:77°22'43"E to77°24'10"E

1.3 State: Tamil Nadu District: Erode Block/Tehsil: Gobichettipalayam

1.4 Agro ecological region: AER-8

1.5 Area (ha): 782 Average Annual Rainfall (mm): 600
Elevation range (m amsl): 250 to 315

1.6 Average slope (%): 0 to 7

1.7 Implementation Period: April 2008 to March 2014

1.8 Sponsored by: Centrally sponsored scheme of Macro management of agriculture (NWDPRA) in collaboration with Tamil Nadu Watershed Development Agency.

1.9 Total Budget (Rs in lakh)

- Allocated : 87.48
- Utilized : 68.38

1.10 Problems identified for interventions: Lack of water resources for agriculture, low water productivity and water yield in bore wells, gravelly red soils and more number of landless labourers.

2.0 Demographic Details

2.1 Total Population (number): 3610 SC/ST (%): 8

2.2 Total number of families: 640

2.3 Number of farm families: 421 Number of landless families: 181

2.4 General Socio-Economic Status: (Average landholding size, Major occupations, Outmigration etc.)

Socio economic characteristics	Data
Wage rate (Rs/man day)	150
Net Cropped Area (ha)	708
Number of families affected by outmigration	75
Average number of outmigration (days/family/year)	90
Workforce of the watershed employed in government / private service (number)	250
Out migrated away from watershed (number)	100
Employed within watershed (number)	720
Women Workforce (who do not migrate) (number)	450

2.3 General Agricultural Status: (Total cultivable area, Rainfed area, Irrigated area, Forest land, Other land uses)

Area under different land use systems

Landuse	Area (ha) (Before Project)	Area (ha) (After Project)
Crops and Vegetables	719	706
Fruits	6	17
Agro-forestry	11	20

Net irrigated area of the watershed

Cropping season	Irrigated Area in the Watershed (ha) (Before project)	Irrigated Area in the Watershed (ha) (After project)
Kharif	30	40
Rabi	22	25
Summer	62	78
Permanent crop	35	52

3.0 Details of Technological Interventions (NRM and Livelihood Activities)

Technology 1: Integrated nutrient management in Maize

Technology	Gross Revenue (Rs in lakh/ha)	Gross Cost (Rs in lakh/ha)
New/Improved Technology	0.40	0.18
Old Technology	0.32	0.15

Technology 2: INM with high yielding variety in Groundnut

Technology	Gross Revenue (Rs in lakh/ha)	Gross Cost (Rs in lakh/ha)
New/Improved Technology	0.46	0.17
Old Technology	0.30	0.12

Technology 3: Inter crop in groundnut with red gram

Technology	Gross Revenue (Rs in lakh /ha)	Gross Cost (Rs in lakh/ha)
New/Improved Technology	0.50	0.16
Old Technology	0.30	0.12

Technology 4: Crop diversification with marigold in groundnut

Technology	Gross Revenue (Rs in lakh/ha)	Gross Cost (Rs in lakh/ha)
New/Improved Technology	1.21	0.51
Old Technology	0.43	0.16

Technology 5: Lining of surface storage pond with silpaulin sheet

Technology	Gross Revenue (Rs in lakh/ha)	Gross Cost (Rs in lakh/ha)
New/Improved Technology	0.31	0.16
Old Technology	0.22	0.11

Technology 6: Alternate Land Use: Dryland horticulture with mango (after 5 years)

Technology	Gross Revenue (Rs/ha)	Gross Cost (Rs/ha)
New/Improved Technology	1.60	0.42
Old Technology	0.38	0.12

Technology 7: Alternate Land Use: Industrial farm forestry with *Melia dubia* (after 5 years)

Technology	Gross Revenue (Rs in lakh/ha)	Gross Cost (Rs in lakh/ha)
New/Improved Technology	12.00	3.50for five year
Old Technology	0.38	0.12

4.0 Impacts

Runoff Conservation

Runoff water within watershed (ha-cm) (Before project)	Runoff water conserved within watershed (ha-cm) (After project)
821	656.6

Present value of total farm assets

Within Watershed (Rs in lakh/family) (Afer Project)	Outside Watershed (Rs in lakh/family) (without Project)
24 l	**16**

Literacy Improvement (School enrolment of children of watershed community)

Before Project	After Project
60	95

4.1 Productivity Indicators

S. No	Indicators	Unit	Before (2008)	After (2014)	Change (%)
I	**Change in land use**				
i	Net Sown Area	ha	708	703	-0.7
a.	Rainfed	ha	559	508	-9.1
b.	Irrigated	ha	149	195	30.9
ii	Cultivable Waste Land	ha	14.11		
iii	Area Covered under Plantation (Non Arable Land)	ha	6	17	183.3
iv	Area Put under Agroforestry (Arable Land)	ha	11	20	81.8
v	Number of Tubewells	No	36		
2	**Area under crops**				
i	*Kharif*	ha	30	40	33.3
ii	*Rabi*	ha	22	25	13.6
iii	**Change in area under major crops**				
a.	Paddy	ha	4	5	25.0
b.	Fodder sorghum(Irrigated)	ha	20	30	50.0
c.	Fodder sorghum(Rainfed)	ha	176	147	-16.5
d.	Maize	ha	22	34	54.5
e.	Green gram	ha	15	15	0.0
f.	Groundnut (Irrigated)	ha	38	40	5.3
d.	Groundnut(Rainfed)	ha	398	378	-5.0
e.	Sugarcane	ha	3	5	66.7
f.	Coconut	ha	11	15	36.4
g.	Turmeric	ha	3	6	100.0
h.	Tapioca	ha	12	12	0.0
i.	Onion	ha	10	10	0.0
j.	Banana	ha	6	12	100.0
k.	Tobacco	ha	18	20	11.1
3	**Impact on yield of major crops**				
i	Paddy	q/ha	46.6	48.8	4.7
ii	Fodder sorghum(Irrigated)	q/ha	70	75	7.1
iii	Fodder sorghum(Rainfed)	q/ha	50	55	10.0
iv	Maize	q/ha	44	48	9.1
v	Green gram	q/ha	5.5	5.6	1.8
vi	Groundnut (Irrigated)	q/ha	11.5	13.50	17.4
vii	Groundnut(rainfed)	q/ha	6.0	8.5	41.7
viii	Sugarcane	q/ha	900	1100	22.2
ix	Coconut	nuts/year	20050	20050	0.0
x	Turmeric	q/ha	50	55	10.0

xi	Tapioca	q/ha	400	450	12.5
xii	Onion	q/ha	150	155	3.3
xiii	Banana	q/ha	228	250	9.6
xiv	Tobacco	q/ha	25.6	25.6	0.0
3	**Productivity indices**				
i	Crop Diversification Index (CDI) Or Crops/Cropping systems before & after		NA		
iii	Water productivity	Rs/cum	4.18	4.4	5.3
iv	Area under cultivation	ha			
a.	Hybrid Napier	ha		4	
b.	Mango	ha		8	
c.	Melia	ha		2	
d.	Others	ha		2	
v	Change in milk production	litres (in lakh)/yr	14.34	19.19	33.9

4.2 Environmental Impact Indicators

S N	Indicators	Unit	Before (2008)	After (2014)	Change (%)
I	**Hydrology and water resources**				
i	Surface Runoff	%	16.5	12	-27.3
ii	Average water table depth in well	M	0.6 to 12.6	6.2 to 23.3	
iii	Reduction in soil loss	tons/ha/year	3.6	2.3	36.1
					-
II	**Soil fertility improvement in the watershed**				
i	Organic Carbon	%	0.6	0.8	33.3
ii	Available Nitrogen	kg/ha	226	245	8.4
iii	Available Phosphorus	kg/ha	16	18	12.5
iv	Available Potash	kg/ha	160	120	-25.0

4.3 Socio-Economic Impact Indicators

S. No.	Indicators	Unit	Before (2008)	After (2014)	Change
1	Overall People's Participation Index	%		NA	
	Total contribution (Rs) or percent of total budget expenditure (%)	Rs or %		NA	
2	Average family income			(Rs in lakh/yr)	
i	Large		-	-	-
ii	Medium		7.20	8.40	16.7
iii	Small		3.87	4.15	7.2
iv	Marginal		2.44	2.87	17.6
3	Seasonal outmigration				
i	Number of families affected	No	75	40	50
ii	Average number of outmigration	days/family/ year	90	40	56
4 i.	Change in livestock population		1098	1140	3.8
ii.	Fodder production (q/yr)		8	12	50.0
5	Amount in WDF account after financial withdrawal	Rs in lakh		3.23	
6	Economic viability of the project				
i	BCR at Discount Rate15% for period of analysis 10 years			1.82	
ii	IRR (%)			>30	

5.0 Award/ Appreciation/ Recognition

ICAR – Vasantrao Naik award for outstanding research applications in dryland farming systems 2012

6.0 Project Implementation Team

OPS Khola
V Selvi
DV Singh
K Kannan
R Mohan Raj
Murugesan

7.0 Photographs


Photo 1: Executive committee meeting and entry point activity (community hall)


Photo 2: Capacity building activities

Photo 3: In-situ moisture conservation practices

Photo 4: Farm ponds created for supplementary irrigation


Photo 5: Farm ponds created for supplementary irrigation


Photo 6: Gabion check dam and RR masonry check dam


Photo 7: Unlined and silpaulin lined surface storage pond


Photo 8: Demonstration on Drip and Sprinkler units




Photo 9: Crop demonstrations for higher productivity

Photo 10: Crop diversification with cauliflower and marigold

Photo 11: Improved fodder (CO FS 29 and CO 4 Hybrid Napier)

Control plot

Coir pith applied plot

Photo 12: Demonstration on coir pith compost and vermin compost

Photo 13: Dryland horticulture (High density mango plantation)

Photo 14: Block plantation of *Melia dubia* and teak




Photo 15: Integrated farming system (crop, livestock, poultry and fishery)


Photo16: Backyard poultry and chaff cutting machines

Photo 17: Animal health camp in Ayalur watershed

Photo 18: Livelihood activities for resource poor




Photo 19: Convergence (Field day jointly organized by ICRISAT, TNAU and IISWC and desilting of percolation pond with NREGA)





Photo 20: Visit of Project Implementing Agency, Officials from Tamil Agency, Chennai, Watershed Development Team members from state government and farmer from Tamil Nadu and adjoining states visiting the interventions in the watershed.

Photo 21: News paper coverage of the watershed programme

8.0 Other Relevant Details of the Watershed

Livestock Data
Before Project

Livestock name and breed (local / improved / crossbred)	Population (number)	Product name	Average product yield (litreor kg per animal per year)	Average product price duringfirstfive years of the project (Rs per litre or kg)
Cow (Jersy)	626	Milk	1650 litre	15/litre
Buffalo	472	Milk	850 litre	20/litre
Sheep	576	Meat	22 kg live wt.	120/kg
Goat (Thalaicherry)	872	Meat	20 kg live wt.	160/kg
Poultry	12000	Meat	1.5 kg live wt.	60/kg

After Project

Livestock name and breed (local / improved / crossbred)	Population (number)	Product name	Average product yield (litre or kg per animal per year)	Average product price during first five years of the project (Rs per litre or kg)
Cow (Jersy)	932	Milk	1870 litre	15/litre
Buffalo	208	Milk	850 litre	20/litre
Sheep	950	Meat	22 kg live wt.	120/kg
Goat (Thalaicherry)	1125	Meat	20 kg live wt.	160/kg
Poultry	12953	Meat	1.5 kg live wt.	60/kg

Fodder Data

	Before Project	After Project
Quantity of fodder available from all sources with in the watershed per year (tonnes)	**Green fodder:310** **Dry fodder: 215**	**GF: 480** **DF: 320**

Change in Rental Value of Land due to WSM Project

Irrigated Land (Average Rs/ha/yr)	Before Project	After Project
	6000	7500

Rainfed Land (Average Rs/ha/yr)	Before Project	After Project
	4000	5000

Watershed management works undertaken in the watershed for control of soil erosion (e.g. renovation of terraces, horticultural plantation on wasteland and/or agricultural land, grassland development, fuel-fodder plantation in wasteland *etc*.)

S. No.	Watershed management work	Area (ha)
1	Earthern bund	2.5
2	Stone bunding	1.6
3	Trenching	1.0
4	Horticultual plantaation	10.0
5	Agroforestry and industrial forestry	10.0
6	Fodder grass	4.0

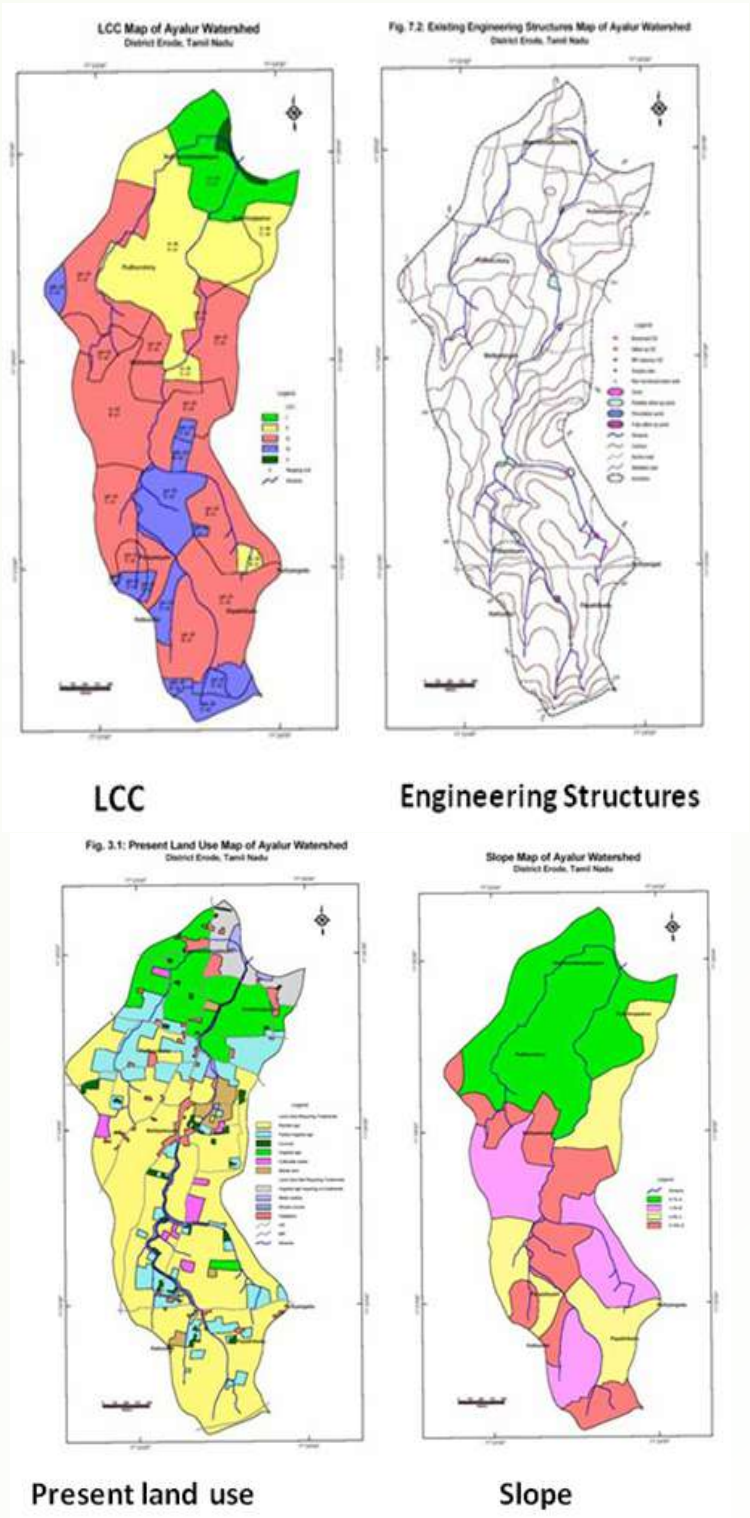

Fig.: Existing Features in Ayalur Watershed

Physical and Financial Achievement

Sl. No.	Budget Component	Unit	Target as per DPR		Achievement till March,2014	
			Physical	Financial (Rs in Lakhs)	Physical	Financial (Rs in Lakhs)
1	**Administration, Monitoring and Evaluation**					
1.1	Administration	%	10	8.74	8.22	7.19
1.2	Monitoring	%	1	0.87	0.51	0.45
1.3	Evaluation	%	1	0.87	0	0
	Sub-total			**10.49**		**7.64**
2	**Preparatory Phase**					
2.1	Entry Point Activities	No	1	3.49	1	3.45
2.2	Institution & Capacity Building					
I	Exposure Visits	No	2	1.44	3	1.06
Ii	Skill development	No	4	2.92	3	1.06
2.3	Detailed Project Report (DPR)	LS	1	0.87	1	0.53
	Sub-total			**8.74**		**6.11**
3	**Watershed Work Phase**					
3.1	**Watershed Development Works**					
3.1.1	**Arable land**					
3.1.1.1	**Soil and moisture conservation measures**					
A	Vegetative hedges	ha	6	0.06	0	0
B	Vegetative hedges supported by bunds	ha	5	0.06	0	0
C	Field bunding (Earthen)	rm	5000	0.56	1557.5	0.35
D	Field bunding (Stone)	rm	1000	1.36	340.5	0.49
E	Trenches	rm	2000	0.14	226.8	0.04
F	Farm ponds	No	2	0.30	2	0.26
G	Dugout ponds	No	5	1.78	5	1.31
H	Surface pond lining with Silpaulin sheet	No	2	1.15	10	3.19
I	Surface pond lining with soil cement (8:1)	No	2	0.27	1	0.045
J	Surface pond lining with soil cement(12:1)	No	1	0.10	0	0
	Sub-total			**5.80**		**5.71**

3.1.1.2	**Agronomic conservation practices**					
B	Dry land horticulture	ha	14	2.46	10.5	2.35
C	Agri horticulture	ha	10	2.2	14.5	2.18
A	Strip cropping	ha	4	0.02	4	1.66
D	Crop demonstration - Single crop	No	17	0.85	32	
E	Crop demonstration - Double crop	No	15	1.5	18	
F	Organic farming system	No	4	0.04	2	0.01
	Sub-total			**7.07**		**6.22**
3.1.2	**Non arable land**					
3.1.2.1	**Runoff management structures**					
A	Percolation pond (large)	No	3	10.36	2	4.24
B	Percolation pond (Medium)	No	3	6.99	3	6.39
C	Percolation pond (Small)	No	3	4.21	3	4.54
D	Rejuvenation of percolation pond (large)	No	2	0.69	2	0.81
E	Rejuvenation of percolation pond (Medium)		2	0.41	2	0.60
	Sub-total			**22.68**		**16.60**
3.1.2.2	**Development of waste lands**					
A	Live fencing	rm	1515	0.57	1213	0.43
B	Agro-forestry	ha	10.25	2.46	3.7	1.52
	Sub-total			**3.03**		**1.96**
3.1.3	**Drainage line treatment**					
3.1.3.1	**Structures**					
A	Loose boulder check dam	No	3	0.22	3	0.18
B	Gabion check dam	No	5	1.13	3	0.52
C	RR masonry check dam	No	3	2.96	3	2.54

D	Desilting & repair of existing Check dam	No	3	0.09	3	0.08
3.1.3.2	**Planting of trees along drainage lines**	No	380	0.60	625	0.06
	Sub-total			**5.02**		**3.40**
3.1.4	**Others (renovation of water tank)**	No	1	**0.12**	1	**0.11**
3.2	**Livelihood support system**					
A	Small entrepreneurship/small business	No	35	5.25	31	3.02
B	Household production system	No	30	2.85	38	2.71
C	Dairy, sericulture, bee keeping, mushroom cultivation, commercial poultry etc	No	2	0.25	1	0.25
D	Livestock management including goatery	No	3	0.39	1	0.25
	Sub-total			**8.74**		**6.23**
3.3	**Production system and micro enterprises**					
A	Crop diversification	No	10	0.07	4	0.04
B	Integrated farming system	No	3	0.9	12	0.87
C	Drip irrigation for fruit trees	No	30	7.30	34	7.29
D	Sprinkler irrigation	No	10	2	8	1.07
E	Adoption of proven / new technology	No	12	0.42	6	0.60
G	Health camps					
I	Human	camp	2	0.15	0	0
Ii	Animal	camp	4	0.36	3	0.50
F	Livestock improvement	No	30	0.15	30	
	Sub-total			**11.37**		**10.41**

4	**Consolidation Phase**					
A	Upscaling of successful activities	No	4	3.00	10	3.61
B	Watershed plus activities	No	4	0.40		0
C	Documentation of successful experiences	No	1	0.40	1	0.31
D	Preparation of project completion report	No	1	0.25		0
E	Mechanism for sustainability of interventions	No	1	0.32		0
				4.37		**3.93**
	Grand total			**87.48**		**68.37**

For further details, please contact

Head

ICAR-Indian Institute of Soil & Water Conservation(IISWC)
Ree's Corner, P.O.Fernhill, Udhagamandalam
The Nilgiris-643 004, TamilNadu
Phone: 0423-2444038
E-Mail:oty_cswcrti@sancharnet.in

or

Director

ICAR-Indian Institute of Soil &Water Conservation (IISWC)
218-Kaulagarh Road, Dehradun 248 195, Uttarakhand
Phone: 0135-2758564 Fax:0135-2754213
E-Mail: directoresoilcons@gmail.com