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**Kuruthukuli Model Watershed  
Nilgiris District  
Tamil Nadu**



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





# **Kuruthukuli Model Watershed Nilgiris District Tamil Nadu**

## **Project Implementation Team**

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## FOREWORD



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The ICAR-IISWC, Research Centre, Udhagamandalam, Chennai took up Kuruthukuli (KG-4-1) watershed in Nanjanad Tehsil, District Nilgiri, Tamil Nadu covering four villages Basavakkal, Kuruthukuli, Bagalahatti and Bengichakkal under NATP-Watershed Technology Mission Mode, World Bank from 1999 to 2005. The watershed has an area of 903 ha with 1180 mm average annual rainfall. The major problems in the watershed were less availability of food, fuel wood, fodder, soil erosion and environment degradation. Under soil and water conservation measures, new bench terraces were formed in an area of about 0.6 ha at a critically erosion prone site in the sub-watershed. In addition to this, renovation of bench terraces and outward sloping terraces was carried out in an area of about 1.5 acres and 7 ha of land respectively. Desilting of check dam in Kavakadu sub-watershed and formation of earthen side bunds on either side were done to create a storage capacity of about 500 m<sup>3</sup>. Tea clones were planted on the risers of the renovated terraces in an area of about 0.5 ha in KG-4-1 watershed. Eight collection wells with a total capacity of 128 m<sup>3</sup> were installed in KG-4-1 watershed for subsurface harvesting. Two water harvesting check dams were also constructed with a water storing capacity of about 90 m<sup>3</sup> each. One gabion check dam was also constructed in the main stream of Kavakadu sub-watershed (33 ha), where there was a sudden drop of 3 m. Due to soil and water conservation interventions, surface runoff reduced by 41%, whereas surface storage capacity increased by 73.64%.

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## 1.0 Watershed Details

- 1.1 Name: Kuruthukuli (KG-4-1) watershed  
Villages covered: Basavakkal, Kuruthukuli, Bagalahatti and Bengichakkal
- 1.2 Location: Latitude: 11°21' to 11°24'10"N  
Longitude: 76°37'55" to 76°40'E
- 1.3 State: Tamil Nadu District: Nilgiris,  
Block/Tehsil: Nanjanad block, Udhagamandalam taluk
- 1.4 Area (ha): 903 Average Annual Rainfall (mm): 1180  
Elevation range (m amsl): 2000-2360
- 1.5 Average slope (%): 3-55
- 1.6 Implementation Period: 1999-2005
- 1.7 Sponsored by: NATP-Watershed Technology Mission Mode, World Bank
- 1.8 Total Budget (in Rs Million): 10.91
- 1.9 Problems identified for interventions: Less availability of food, fuel wood, fodder, soil erosion and environment degradation.

## 2.0 Demographic Details

- 2.1 **Total Population (number):** 3302  
Total number of families: 618  
Number of farm families: 507 Number of landless families: 111
- 2.2 **General Socio-Economic Status: (Average landholding size, Major occupations, Outmigration, etc.)**  
Literacy: 54%  
Average landholding: 0.99 acre  
Per capita income: Rs 5035  
No. of occupied residential houses: 452  
No. of metallic roads: 4  
No. of Primary Health Centers: 1  
No. of Veterinary Dispensaries: 1  
No. of Schools: 4  
No. of Post offices: 1  
No. of Co-operative Banks: 1  
No. of electrical connections: 452  
Average family size: 5.5

### Distribution of land holdings in Kuruthukuli watershed

Land holding category	No. of families	Percent	Land holding (acres)		Average operational holding (acres)
			Rainfed	Irrigated	
<b>Landless</b>	111	18	-	-	-
<b>Small (up to 1.0 acre)</b>	283	46	0.35	0.26	0.61
<b>Medium (1.1 to 2.0 acre)</b>	142	23	0.67	0.34	1.01
<b>Large (&gt;2.1 acres)</b>	82	13	1.12	1.15	2.27
<b>Overall</b>	618	100	0.56	0.43	0.99

### 2.3 General agricultural status: (total cultivable area, rainfed area, irrigated area, forest land, other land uses)

Major soil group: Laterite and lateritic soils

Major textural classes: Clay loam, silty clay loam and silty loam

Stoniness/gravelliness: very small area is rocky and soils at few places are gravelly

Major structural class: Granular

Permeability status: Moderate to rapid

Internal drainage: Moderate to well drained;

Soil reaction: Acidic

Organic carbon status: High

High hills/slope: Shola forest, man made forest and tea

Middle hills/slope: Annual crops, tea, man made forest, patches of shola forest and grass land

Lower slope: Annual crops and grassy swamp

**Distribution of LCC area under different land uses in Kuruthukuli Watershed (ha)**

S. No.	LCC	Agriculture	Tea	Forest	Grass/ Swamp	Habitation	Rock	Total	Per cent to total
1	II	21.2	-	-	-	-	-	21.2	2.3
2	III	98.3	44.5	61.7	3.1	10.5	-	218.1	24.2
3	IV	124.9	98.5	87.5	20.9	6.2	-	338.0	37.4
4	V	2.2	-	1.6	17.0	-	-	20.8	2.3
5	VI	47.8	36.2	113.7	2.1	1.4	-	201.2	22.3
6	VII	12.3	12.3	71.0	-	-	-	95.6	10.6
7	VIII	-	-	-	-	-	8.1	8.1	0.9
	Total	306.7	191.5	335.5	43.1	18.1	8.1	903.0	-
	%	34.0	21.2	37.1	4.8	2.0	0.9	-	100

**Agriculture area under different cropping patterns**

S. No.	Land use	II	III	IV	V	VI	VII	VIII	Total	Per cent
1	<b>Rainfed area (ha)</b>									
	I. Annual crops									
	a. Occasional cropping	-	0.2	1.0	-	-	0.3	-	1.5	0.3
	b. Single cropping	-	2.4	17.5	-	28.2	8.9	-	57.0	11.4
	c. Double cropping	-	46.5	49.1	-	10.6	1.8	-	108.0	21.7
	d. Fallow	2.3	7.3	4.8	-	-	0	-	14.4	2.9
	II. Tea	-	43.3	99.7	-	36.2	12.3	-	191.5	38.4
	Sub total	2.3	99.7	172.1	-	75.0	23.3	-	372.4	74.7
2	<b>Irrigated area (ha)</b>									
	a. Double cropping	4.9	38.9	49.3	-	8.7	1.3	-	103.1	20.7
	b. Triple cropping	14.0	3.0	3.2	2.2	0.3	-	-	22.7	4.6
	Sub total	18.9	41.9	52.5	2.2	9.0	1.3	-	125.8	25.3
	Grand total	21.2	141.6	224.6	2.2	84	24.6	-	498.2	-
	Per cent to total	4.3	28.4	45.1	0.4	16.9	4.9	-	-	100





### 3.0 Technological Interventions (NRM and Livelihood Activities)

- In a 33 ha sub-watershed situated at Kavakadu (KG-4-1 watershed), renovation of bench terraces was carried out in an area of about 1.5 acres. In addition to this, outward sloping terraces were also renovated in 7 ha of land. New bench terraces had been formed in an area of about 0.6 ha in a critically erosion prone site in the sub-watershed.
- In Kavakadu sub-watershed, an area of about 1 acre was treated by establishing Puertorican terraces. Two multislot divisors were also installed to measure runoff and soil loss.
- Integrated nutrient management practices were demonstrated for potato crop at the site of the renovated bench terraces. A silted up check dam in Kavakadu sub-watershed was desilted and earthen side bunds were formed on either side to create a storage capacity of about 500 m<sup>3</sup>.
- Three collection wells (2m diameter and 5.2m deep) were installed in KG-4-1 watershed for harnessing the subsurface flow.
- Tea clones were planted on the risers of the renovated terraces in an area of about 0.5 ha in KG-4-1 watershed.
- Eight collection wells with a total capacity of 128 m<sup>3</sup> were installed in KG-4-1 watershed for subsurface harvesting. Two water harvesting check dams were also constructed with a water storing capacity of about 90 m<sup>3</sup> each. One gabion checkdam was constructed in the main stream of Kavakadu sub-watershed (33 ha), where there was sudden drop of 3 m.

## 4.0 Impacts

### 4.1 Productivity indicators

S. No.	Indicators	Unit	Before (Year)	After (Year)	Change (%)
<b>1</b>	<b>Change in land use</b>				
i	Net sown area	ha			
a.	Rainfed	ha	372.4		
b.	Irrigated	ha	125.8		
ii	Area sown more than once	ha			
iii	Gross cropped area	ha	551.6		
iv	Current fallow	ha	14.4		
v	Culturable waste land	ha			
vi	Area covered under plantation (non arable land)	ha			
vii	Area put under agroforestry (arable land)	ha			
viii	Number of tube-wells	No	59.0		
ix	Number of functional dug/open wells	No			
<b>2</b>	<b>Area under crops</b>				
i	<i>Kharif</i>	ha			
ii	<i>Rabi</i>	ha			
iii	<b>Change in area under major crops</b>				
a.	Potato	ha	251.8		
b.	Cabbage	ha	109.8		
c.	Carrot	ha	128.3		
d.	Tea	ha	191.5	192.0	0.26
<b>3</b>	<b>Impact on yield of major crops</b>				
i	Potato	q/ha	150.5	291.3	93.5
ii	Cabbage	q/ha	720.0	1090.0	51.4
iii	Carrot	q/ha	300.0		
iv	Tea	q/ha	125.0		
<b>4</b>	<b>Productivity indices</b>				
i	Crop Diversification Index (CDI) or Crops /Crops/Cropping systems before & after				
ii	Water productivity	kg/cum			
iii	Area under cultivation	ha			
iv	Cropping intensity	%	179.87		
v	Change in milk production	litres/yr/family	871		

## 4.2 Environmental impact indicators

S. No.	Indicators	Unit	Before (Year)	After (Year)	Change (%)
1	<b>Hydrology and water resources</b>				
i	Surface Runoff	%	5.80	3.42	-41.03
ii	Surface Water Storage	ha-cm	6.79	11.79	73.64
iii	Surface Water resources (Number of water bodies)				
iv	Perenniality of streams	cum			
v	Average Water Table Depth in Well	m			
vi	Increase in Ground Water Contribution	% or ha-m			
vii	Reduction in Soil Loss	tons/ha/year	6.0	5.17	
2	<b>Soil fertility improvement in the watershed</b>				
i	Organic Carbon	%			
ii	Nitrogen	kg/ha			
iii	Phosphorus	kg/ha			
iv	Potash	kg/ha			

## 4.3 Socio-economic impact indicators

S. No.	Indicators	Unit	Before (Year)	After (Year)	Change
1	<b>Overall People's Participation Index</b>	%			
	<b>Total contribution (Rs) or percent of total budget expenditure (%)</b>	Rs or %			
2	<b>Av. Family Income</b>	(Rs/yr)			
i	Large		59585.15		
ii	Medium		28364.35		
iii	Small		17437.55		
iv	Marginal		6548.18		
3	<b>Av. Family Expenditure</b>	(Rs/yr)			
i	Large				
ii	Medium				
iii	Small				
iv	Marginal				
4	<b>Employment Generation</b>	Man days			
5	<b>IGAs (annual income per SHG)</b>				
6	<b>Amount in WDF Account after financial withdrawal</b>	Rs.			
7	<b>Economic Viability of the Project</b>				
	BCR at discount rate 10 % for period of analysis __10__ years			1.58	
	IRR (%)			>40	



## 5.0 Award/ Appreciation/ Recognition

## 6.0 Project Implementation Team

AK Sikka  
M Madhu  
DV Singh  
V Selvi  
S Chand  
B Chandran  
K Jeevarathnam

## 7.0 Photographs



**Silted up check dam before project intervention at Kavakadu**



**Desilted check dam with side earthen bunds at Kavakadu**



**Triangular weir at Iv<sup>th</sup> nested point**



**Collection well installed at Kavakadu**



**Cabbage crop cultivated in terraces renovated during 2002, Kavakadu watershed**



**Potato crop cultivated in renovated terraces , Kavakadu watershed**





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