



**Government of Kerala**

**EVALUATION STUDY  
ON  
SOIL CONSERVATION  
1998-99**

**Department of Economics & Statistics  
Thiruvananthapuram  
2003**



## PREFACE

The geographical peculiarity of Kerala and heavy monsoon causes tremendous erosion of its surface soil and fertility. This loss of fertility and moisture content of the earth's surface result in diminishing rate of agricultural production. Hence Government is implementing various soil conservation measures through the Soil Conservation Department in order to maintain the fertility and moisture content of the surface soil

The Evaluation study of schemes implemented by Soil Conservation Department has been done by the Directorate of Economics and Statistics for all districts except Wayanad where direct implementation and evaluation is done by the Central Agency.

This report relates to the survey results of the 59 schemes already completed by the Soil Conservation Department. The field Survey was conducted during the agricultural year 1998-99. The Schemes completed by the Soil Conservation Department before five years are taken up for study so that the full benefit of the scheme could be evaluated and assessed. This evaluation study can be an invaluable asset for Administrators, Statisticians, Research Scholars and Agricultural Geologists.

The tabulation and consolidation of data were done in the Evaluation Division of this Directorate. The report of the survey has been prepared by Dr.T.Bhavana, Deputy Director under the guidance of Sri.P.KochuNarayana Pillai, Joint Director.

In this context, I acknowledge my thanks to the staff of Soil Conservation Department who have given whole hearted co-operation for the successful conduct of the survey. Suggestions for improvement are solicited.

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## Chapter – I

### Introduction

1.1 It is believed that universe is totally ordered for the safe living of mankind. But the analysis of activities, which developed during this period, revealed that certain changes have been occurred.. The interaction of man and nature now created certain problems in ecological balance. These changes might have created earthquakes cyclones, etc..

One of the most valuable gifts of nature to mankind is soil.. For the maintenance of soil, adequate protection and conservation are necessary. Due to the peculiarity of the rainfall and topography of this State, soil conservation assumes importance in our planning progress. Nature takes centuries to form topsoil of the earth. But man destroys it by excessive exploitation and in intelligent use. The loss of topsoil effects by way of soil erosion. As per the estimates of the soil conservation Department out of a net cropped area of 22 – 8 lakh hectare about 9,5 lakhs is highly prone to soil erosion hazards.

Soils of Kerala are briefly classified as (1) soils of hills and uplands (2) Soils of Central Sahyadri (3) Soils of Eastern parts of Malappuram and (4) Soils of South Sahyadri

Topography and climates are the Chief factors, which influence, soil formation. The texture of the surface layer of soils of Kerala covers a wide range from sandy to clayee. About 82% of the area of Kerala has well drained and moderately well drained soil. About 35% of the area of the State is dominated by soil with high AWC (Available Water Capacity)

Soil Conservation generally means applying of all necessary practices to maintain the capability of the land for which it is suited and to improve the productivity of agricultural land in Kerala. The measures adopted for conserving soil are bunding, gully plugging, terracing, grassing of waterways and spillways.

### The main objectives of the Soil Conservation Schemes include

1. Rebuilding the lost fertility of land due to soil erosion.
2. Conservation of moisture in Grid region
3. Proper and effective water management
4. Promoting surface and subsoil drainage in badly drained areas and
5. Other management practices to optimise the benefit from investment on land.

### 1.2 Objectives and Methodology of the Survey.

The main objectives of the evaluation study are:

- i) To assess the benefit of the programme particularly in relation to the cultivation of seasonal and perennial crops.
- ii) To throw light on various aspects like cost benefit analysis, production potential etc.
- iii) To estimate the extent of additional area brought under cultivation consequent on the implementation of the programme.
- iv) To study the effects of the work carried out by the soil conservation Department in this direction.

For the conduct of evaluation study 59 schemes already completed by the Soil Conservation Department during 1993-94 were selected for 1998-99. The study covered all the districts of the State except Wayanad where the same is directly done by the Central Government. The list of beneficiaries under each scheme is obtained from the Soil Conservation Department. The beneficiaries are selected by stratified random sampling method on the basis of the area of the holding. The holdings are stratified into four strata viz.,

Holdings with less than 1 acre  
 Holdings with 1 acre to less than 3 acres  
 Holdings with 3 acres to less than 5 acres  
 Holdings with 5 acres and above

- Stratum - 1  
 - Stratum II  
 - Stratum III  
 - Stratum IV

### Selection of Beneficiaries

Selection of beneficiaries is done by the District level Officers from the list of beneficiaries collected from Soil Conservation Department. A total number of 25 beneficiaries are selected from each scheme by simple random sampling covering all the above 4 strata with at least 6 from each stratum. If in any stratum, the total number of beneficiaries in the frame is less than the number to be selected, this short fall is compensated from another stratum with the nearest area holding. If the beneficiaries in a scheme are less than 25, all of them are selected. For the purpose of comparison 5 control plots are also selected from the scheme area, where the Soil Conservation works are not carried out under any scheme.

The district wise selection details of beneficiary plots and control plots are given in the table 1 & 1(a)

**Table - I - Statement showing stratum wise distribution of selected beneficiaries**

Sl. No	Districts	No. of scheme selected	Stratum I		Stratum II		Stratum III		Stratum IV		Total	
			No.	Area in Acre	No.	Area in Acre	No.	Area in Acre	No.	Area in Acre	No.	Area in Acre
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Thiruvananthapuram	1	2	0.56	2	2.32	-	-	-	-	4	2.88
2	Kollam	5	105	27.90	4	6.97	-	-	-	-	109	34.87
3	Pathanamthitta	6	60	25.21	10	10.97	8	30.21	-	-	78	66.39
4	Allappuzha	6	43	3.20	-	-	-	-	-	-	43	3.20
5	Kottayam	4	72	4.53	-	-	-	-	-	-	72	4.53
6	Idukki	5	17	6.35	66	104.01	17	57.51	11	65.57	111	233.44
7	Eranakulam	6	39	19.66	19	12.86	-	-	-	-	58	32.52
8	Thrissur	5	93	11.46	-	-	-	-	-	-	93	11.46
9	Palakkad	5	103	13.79	2	3.40	-	-	-	-	105	17.19
10	Malappuram	6	83	10.15	-	-	-	-	-	-	83	10.15
11	Kozhikode	5	42	7.31	3	3.76	-	-	-	-	45	11.07
12	Kannur	1	23	4.54	-	-	-	-	-	-	23	4.54
13	Kasaragod	4	41	21.57	48	66.54	4	14.97	-	-	73	103.08
	Total	59	723	156.23	154	210.83	29	102.69	11	65.57	917	535.32

Table - I (a) - Statement showing stratum wise distribution of Control Plot

(Area in acres)

Sl.No	Districts	No. of scheme selected	Stratum I		Stratum II		Stratum III		Stratum IV		Total	
			No.	Area in Acre	No.	Area in Acre	No.	Area in Acre	No.	Area in Acre	No.	Area in Acre
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Thiruvananthapuram	1	4	2.15	1	1.50	-	-	-	-	5	3.65
2	Kollam	5	24	3.92	1	1.30	-	-	-	-	25	5.22
3	Pathanamthitta	6	22	7.51	2	1.60	1	3.00	-	-	25	12.11
4	Allappuzha	6	30	7.81	-	-	-	-	-	-	30	7.81
5	Kottayam	4	20	4.72	-	-	-	-	-	-	20	4.72
6	Idukki	5	3	1.10	20	35.14	2	9.25	-	-	25	45.49
7	Eranakulam	6	28	12.73	2	3.00	-	-	-	-	30	15.73
8	Thrissur	5	25	1.95	-	-	-	-	-	-	25	1.95
9	Palakkad	5	21	9.35	-	-	-	-	1	6.00	22	15.35
10	Malappuram	6	30	3.72	-	-	-	-	-	-	30	3.72
11	Kozhikode	5	25	6.49	-	-	-	-	-	-	25	6.49
12	Kannur	1	5	1.23	-	-	-	-	-	-	5	1.23
13	Kasaragod	4	11	6.12	7	8.40	-	8.00	-	-	20	22.52
	Total	59	248	68.80	33	50.94	3	20.25	1	6.00	28	145.99

Thus from the 13 districts 59 schemes are selected. The total number of beneficiaries comes to 917. About 79% of the beneficiaries are having holding of less than one acre and only 1 % of the beneficiaries are having holdings of more than 5 acres. In order to compare the benefits of the implementation of Soil Conservation Programmes 287 control plots are also selected. Their distribution is 86%, 12% 1.76%, and 0.34% respectively under Stratum I, II, III & IV

Following 4 types of schedules are used for collecting the details from beneficiary plots and control plots.

- Schedule I - List of selected beneficiaries
- Schedule II - Detailed study of the selected beneficiaries
- Schedule III - List of control plots.
- Schedule IV - Detailed enumeration of the control plots.

### 1.3 Problems of Soil Erosion:

Soil erosion means the disappearance of the top Soil due to the vagaries of nature. It has been estimated that 9.5 lakh hectares of cultivated land in the State is under Soil erosion problems. Soil should be productive and conservation programmes are indispensable. Due to erosion, top soil disappeared and it results in deterioration in the fertility of land. To avoid this, various soil conservation Schemes have been implemented in the State. Climate, topography, physical and chemical characteristics of soil etc. are the main factors, which influence the extent of erosion. For sustaining agricultural production in Kerala better preservation of soil assume utmost importance.

#### Responsibility for prevention of erosion:

Before the commencement of the Eighth Five Year Plan Soil Conservation activities in the State were confined to departmental programmes. By recognising the responsibility for prevention of erosion soil conservation programme was rationalised. "Peoples" campaign programmes, also gave utmost importance to these programmes. Government used to provide both loan and grant through budgetary support for soil conservation in available lands. Central Government and NABAD also rendered financial assistance to soil conservation programmes. Soil and Water conservation programme on watershed basis was also launched in

the state with the objectives of prevention of land degradation, improvement of land capability and moisture regime in the watershed, promotion of land use to match land capability etc.

#### 1.4 Methods of Soil conservation Programme:

Soil conservation practices are mainly grouped into two categories viz., Agronomic and Mechanical. The Agronomic practices are such as crop rotation, cover cropping, strip cropping etc. to protect the fertility of the soil and the mechanical practices includes various engineering aspects that supplement the effect of agronomic measures. The various mechanical practices are contour bunding, contour cultivation, terracing, bench terracing etc.

#### Extent of problem in the State:

The land use pattern for the state reveals certain features of the classification of land. The total geographical area of the state excluding Waynad district is 3672937 hectares, of which forest occupies 1002722 hectare (27.3%) land put to non-agricultural use shares to 323222 hectares(8.80%), barren and uncultivable land accounts to 27985 hectares (0.76%) . Net area sown is 2142529 (58.33%). It is noticeable that land being a scarcest resource of the State, the cultivable waste shares to 60838 hectare(1.66%), fallow other than current fallow accounts to 30401 hectares(0.83%) and land under miscellaneous tree crops shares to 19167 hectares.

#### Soil conservation programmes:

Preliminary estimates by soil conservation department indicates that out of net cropped area of 22.8 lakh hectares about 9.5 lakh is highly prone to erosion hazards.

Earlier Soil Conservation programmes were carried out by individual knowledgeable farmers of the state independently. Later by realising its importance different agencies like NABARD, NWDPR, State, Local bodies etc. are also rendered financial assistance for the implementation of the soil conservation programmes in the state. An evaluation study on the benefits derived from these programmes is very useful for the decision makers and planning process in this field.

This study is confined to the soil Conservation measures undertaken in the Kerala State except in Waynad district.



## CHAPTER - II

### 2.1 Impact of Soil Conservation Programme on land use and cropping pattern

One important factor which determines the cropping pattern of a region or state is the fertility of the soil. Due to soil erosion better land use planning and most apt manuring practices for the varied soil tracts of the state is not easy. So various soil conservation schemes have been implemented in the state. Evaluation of the result of these programmes are very useful for the success of the decision process.

During the year under review 59 schemes were selected for the evaluation study of soil conservation programme in the state. The details of the study such as area, cost, the total number of beneficiaries and number of selected beneficiaries etc. are furnished below:

**Table – 2 District wise details of area, cost and number of beneficiaries**

Sl.No	Districts	Area (acre)	Cost (Rs.)	No.of beneficiaries	
				Total	Selected
1	2	3	4	5	6
1	Thiruvananthapuram	2.88	74768	4	4
2	Kollam	34.87	87037	151	109
3	Pathanamthitta	66.39	320550	78	78
4	Allappuzha	3.20	889708	43	43
5	Kottayam	4.53	87037	72	72
6	Idukki	233.44	514589	177	111
7	Ernakulam	32.52	134579	58	58
8	Thrissur	11.46	220725	99	93
9	Palakkad	17.19	218365	121	105
10	Malappuram	10.15	302203	83	83
11	Kozhikode	11.07	129700	45	45
12	Kannur	4.54	35587	23	23
13	Kasaragod	103.08	354865	93	93
	Total	535.32	3369713	1047	917

Above table reveals that 917 beneficiaries were selected out of total 1047 beneficiaries (88% of the total beneficiaries) and they occupy 535.32 acres of land. The cost incurred for the 59 schemes is Rs.3369713.

An analysis of the land use particulars of beneficiary plots and control plots are very helpful for understanding the emerging trend of land use pattern. Tables 3 and 3(a) given below show the land use particulars of beneficiary plots and control plots respectively.

Table-3 - Land use particulars of Beneficiary plots

(Area in Acres)

Districts	Area Cultivated						Current Fallow						Other Use					
	Before			After			Before			After			Before			After		
	Area	%		Area	%		Area	%		Area	%		Area	%		Area	%	
1	2	3	4	5	6	7	8	9	10	11	12	13						
Thiruvananthapuram	2.67	92.71	2.67	92.71	-	-	-	-	0.21	7.29	0.21	7.29						
Kollam	30.49	87.44	31.28	89.71	0.03	0.08	0.02	0.05	3.47	9.95	3.47	9.95						
Pathanamthitta	59.23	89.22	61.28	92.30	3.60	5.42	0.63	0.94	4.31	6.49	4.31	6.49						
Allappuzha	2.41	75.32	2.48	77.50	0.33	10.31	0.33	10.31	0.72	22.50	0.72	22.50						
Kottayam	2.57	56.73	2.68	59.16	-	-	-	-	1.75	38.63	1.75	38.63						
Idukki	216.74	92.85	221.96	95.08	-	-	-	-	10.36	4.43	10.36	4.43						
Ernakulam	32.30	99.32	32.48	99.88	0.02	0.06	0.02	0.06	0.02	0.06	0.02	0.06						
Thrissur	6.97	60.82	8.02	69.99	0.00	0.00	0.00	0.00	3.04	26.53	3.04	26.53						
Palakkad	15.23	88.60	16.25	94.54	0.10	0.58	0.05	0.29	0.94	5.47	0.94	5.47						
Malappuram	6.69	65.91	7.65	75.38	0.11	1.08	0.05	0.49	2.45	24.14	2.45	24.14						
Kozhikode	8.45	76.33	9.33	84.28	0.39	3.52	0.20	1.80	1.41	12.73	1.61	14.54						
Kannur	3.80	83.70	3.95	87.00	1.13	24.88	0.40	8.82	0.59	12.99	0.59	13.00						
Kasaragod	95.93	93.06	97.97	95.04	6.23	6.04	2.15	2.08	4.64	4.50	4.75	4.61						
Total	483.48	90.31	498.00	93.03	11.94	2.23	3.85	0.71	33.91	6.34	34.24	6.39						

Above table reveals that as a result of soil conservation work, an area of 14.52 acres of land more could be brought under cultivation. In other words the percentage increase in the cultivated area due to the implementation of soil conservation measures comes to 2.72%

Districts	Area Not cultivated						Total			
	Before			After			Before		After	
	Area	%	Area	%	Area	%	Area	%	Area	%
1	14	15	16	17	18	19	20	21		
Thiruvananthapuram	-	-	-	-	2.88	100	2.88	100		
Kollam	0.91	2.61	0.12	0.34	34.87	100	34.87	100		
Pathanamthitta	2.85	4.29	0.80	1.21	66.39	100	66.39	100		
Allappuzha	0.07	2.18	0.00	0.00	3.20	100	3.20	100		
Kottayam	0.21	4.64	0.10	2.21	4.53	100	4.53	100		
Idukki	6.34	2.72	1.12	0.49	233.44	100	233.44	100		
Ernakulam	0.20	0.62	-	-	32.52	100	32.52	100		
Thrissur	1.45	12.65	0.40	3.49	11.46	100	11.46	100		
Palakkad	1.02	5.93	0.00	0.00	17.19	100	17.19	100		
Malappuram	1.01	9.95	0.05	0.49	10.15	100	10.15	100		
Kozhikode	1.21	10.94	0.13	1.18	11.07	100	11.07	100		
Kannur	0.15	3.31	0.00	0.00	4.54	100	4.54	100		
Kasaragod	2.51	2.44	0.36	0.35	103.08	100	103.08	100		
Total	17.93	3.35	3.08	0.58	535.32	100	535.32	100		

Table-3 (a) - Land use particulars of (Control plots)

(Area in Acres)

Sl. No	Districts	Area cultivated		Current fallow		Other use		Area not cultivated		Total	
		Area	%	Area	%	Area	%	Area	%	Area	%
1	2	3	4	5	6	7	8	9	10	11	12
1	Thiruvananthapuram	3.55	97.26	-	-	-	-	0.10	2.74	3.65	100
2	Kollam	4.37	83.72	-	-	0.77	14.75	0.08	1.53	5.22	100
3	Pathanamthitta	11.33	93.56	0.20	1.65	0.73	6.02	0.05	0.42	12.11	100
4	Allappuzha	6.72	86.05	0.39	4.99	0.99	12.67	0.10	1.28	7.81	100
5	Kottayam	4.18	88.56	-	-	0.25	5.29	0.29	6.15	4.72	100
6	Idukki	41.91	92.13	-	-	2.18	4.79	1.40	3.08	45.49	100
7	Eranakulam	14.72	93.58	-	-	0.23	1.46	0.78	4.96	15.73	100
8	Thrissur	1.25	64.11	-	-	0.65	33.33	0.05	2.56	1.95	100
9	Palakkad	14.60	95.11	0.20	1.30	0.75	4.89	-	-	15.35	100
10	Malappuram	2.54	68.28	0.12	3.22	0.94	25.26	0.24	6.46	3.72	100
11	Kozhikode	4.50	69.34	-	-	1.09	16.79	0.90	13.87	6.49	100
12	Kanur	0.95	77.24	0.51	41.46	0.13	10.57	0.15	12.30	1.263	100
13	Kasaragod	12.25	54.39	2.85	12.65	0.88	3.92	9.39	41.69	22.52	100
	Total	122.87	84.16	4.27	2.92	9.59	6.58	13.53	9.26	145.99	100

Table - 4 - Crop Pattern (Area wise)

Sl. No	Districts	Perennial Crops			Seasonal Crops			Total					
		Before SC Work	%	After SC work	%	Before SC work	%	After SC Work	%	Before SC Work	%	After SC Work	%
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Thiruvananthapuram	1.26	47.19	1.56	58.43	1.41	52.81	1.11	41.59	2.67	100	2.67	100
2	Kollam	25.38	83.24	26.63	85.13	5.11	16.76	4.65	14.87	30.49	100	31.28	100
3	Pathanamthitta	44.67	18.54	50.70	82.73	14.56	81.46	10.58	17.27	59.23	100	61.28	100
4	Allappuzha	2.06	85.48	2.17	87.50	0.35	14.52	0.31	12.50	2.41	100	2.48	100
5	Kottayam	1.99	77.43	2.27	84.70	0.58	22.57	0.41	15.30	2.57	100	2.68	100
6	Idukki	158.54	73.15	194.86	87.79	58.20	26.85	27.10	12.21	216.74	100	221.96	100
7	Ernakulam	16.90	52.32	19.28	59.36	15.40	47.68	13.20	40.64	32.30	100	32.48	100
8	Thrissur	6.50	43.26	7.70	83.54	0.47	6.74	0.32	16.46	6.97	100	8.02	100
9	Palakkad	6.10	40.05	8.85	54.46	9.13	59.95	7.40	45.54	15.23	100	16.25	100
10	Malappuram	6.06	90.58	7.07	75.78	0.63	9.42	0.58	24.22	6.69	100	7.65	100
11	Kozhikode	7.95	94.08	8.88	95.18	0.50	5.92	0.45	4.92	8.45	100	9.33	100
12	Kannur	2.05	57.95	2.43	61.52	1.75	46.05	1.52	38.48	3.80	100	3.95	100
13	Kasaragod	95.58	99.64	97.625	99.64	0.35	0.34	0.35	0.34	95.93	100	97.97	100
	Total	375.04	77.57	430.02	86.35	108.44	22.43	67.98	13.65	483.48	100	498.00	100

In order to compare the benefits derived through the implementation of soil conservation measures the analysis of the land use particulars (control plots) are essential. From the above table, it is seen that about 84.16% of the area of the control plots were cultivated whereas the area not cultivated is about 9.26%.

The land use pattern and cropping pattern are inter related. Implementation of soil conservation measures influences the cropping pattern of the State. The above table 4 reveals this tendency. Area under perennial crops has increased by 54.98 acres (i.e. increase from 375.04 to 430.02 acres) in the scheme area after the implementation of the programme. It has certain implication that the emerging trend of the cropping pattern is predominated with the cultivation of perennial crops. It is very helpful for reducing soil erosion. The study reveals that the area under cultivation of seasonal crops has reduced after the implementation of soil conservation programme. There is reduction of 40.46 in the area under seasonal crops.

**Table – 5 Area under selected perennial crops**

Sl. No.	Districts	Coconut			Arecanut			Cashew		
		Before SC work	After SC work	% increase	Before SC work	After SC work	% increase	Before SC work	After SC work	% increase
1	2	3	4	5	6	7	8	9	10	11
1	Thiruvananthapuram	0.74	0.75		0.07	0.07		0.05	0.15	
2	Kollam	11.09	13.00		1.50	1.95		3.65	3.77	
3	Pathanamthitta	3.58	6.26		2.01	2.16		0.66	1.01	
4	Allappuzha	1.83	1.95		0.05	0.04		0.18	0.18	
5	Kottayam	1.30	1.39		0.08	0.08		0.01	0.03	
6	Idukki	44.30	49.19		5.15	6.38		4.45	7.70	
7	Eranakulam	8.40	9.40		1.20	1.30		-	-	
8	Thrissur	3.35	4.37		0.20	0.22		0.56	0.78	
9	Palakkad	1.65	3.15		0.09	0.12		0.46	0.76	
10	Malappuram	4.74	5.44		0.20	0.25		0.15	0.25	
11	Kozhikode	5.81	5.84		0.52	0.67		0.44	0.75	
12	Kannur	0.50	0.52		0.05	0.13		0.75	0.92	
13	Kasaragod	36.78	36.98		3.76	3.95		17.89	18.69	
	Total	124.07	138.24	11.42	14.88	17.32	16.40	29.25	34.99	19.62

Sl. No.	Districts	Pepper			Rubber		
		Before SC work	After SC work	% increase	Before SC work	After SC work	% increase
1	2	12	13	14	15	16	17
1	Thiruvananthapuram	0.20	0.38		-		
2	Kollam	7.12	7.64		-		
3	Pathanamthitta	7.33	8.84		29.29	31.50	
4	Allappuzha	-	-		-		
5	Kottayam	0.20	0.25		0.40	0.50	
6	Idukki	72.40	88.08		3.00	11.91	
7	Eranakulam	5.80	7.94				
8	Thrissur	0.84	1.60				
9	Palakkad	0.80	1.06		2.11	2.55	
10	Malappuram	0.85	1.00				
11	Kozhikode	1.06	1.39				
12	Kannur	0.69	0.77				
13	Kasaragod	35.86	36.63				
	Total	133.15	155.58	16.85	34.80	46.46	33.51

Table - 5 (Contd.)

Sl. No.	Districts	Cocoa			Coffee			Cardamom		
		Before SC work	After SC work	% increase	Before SC work	After SC work	% increase	Before SC work	After SC work	% increase
1	2	18	19	20	21	22	23	24	25	26
1	Thiruvananthapuram									
2	Kollam									
3	Pathanamthitta									
4	Alappuzha									
5	Kottayam									
6	Idukki	11.59	11.91		6.03	6.86				
7	Eranakulam									
8	Thrissur									
9	Palakkad	0.43	0.50		0.46	0.56		11.36	12.57	
10	Malappuram									
11	Kozhikode									
12	Kannur									
13	Kasaragod									
	Total	12.02	12.41		6.49	7.42		11.36	12.57	

Sl. No.	Districts	Others			Total		
		Before SC work	After SC work	% increase	Before SC work	After SC work	% increase
1	2	27	28	29	30	31	32
1	Thiruvananthapuram	0.20	0.21		1.26	1.56	
2	Kollam	2.02	0.27		25.38	26.63	
3	Pathanamthitta	1.50	0.93		44.67	50.70	
4	Alappuzha	-	-		2.06	2.17	
5	Kottayam	-	0.02		1.99	2.27	
6	Idukki	0.26	0.26		158.54	194.86	
7	Eranakulam	1.50	0.64		16.90	19.28	
8	Thrissur	1.55	0.73		6.50	7.70	
9	Palakkad	0.10	0.15		6.10	8.85	
10	Malappuram	0.12	0.13		6.06	7.07	
11	Kozhikode	0.12	0.23		7.95	8.88	
12	Kannur	0.06	0.09		2.05	2.43	
13	Kasaragod	1.29	1.37		95.58	97.62	
	Total	9.02	5.03	44.24	375.04	430.02	114.60

The above table shows that after the introduction of Soil Conservation Programme, the cropping area under different crops are interchanged, according to the suitability of land. Inter district variation has been noticed among various crops. In Idukki District, due to Soil Conservation Programme land under cultivation of perennial crops has increased from 158.54 acres to 194.86 acres; contributing a total percentage increase of 14.66 in the State. Area under pepper in Idukki District increased from 72.40 acres to 88.08 acres. In the District Plantation Crops like Coffee also changed to the tune of 6.03 acres to 6.86 acres.

Table 5 also shows that after the implementation of Soil Conservation programme pepper has occupied the largest area under perennial crops. The area under pepper has increased from 133.15 acres to 155.58 acres. Eventhough it occupied the largest area the percentage increase in area is recorded to the highest for rubber while the area occupation rank of rubber is four. The area of rubber increased from 34.80 acres to 46.46 acres amounting to an increase of 33.51%. While in the second place increase in area is for coconut. It increased from 124.07 acres to 138.24 acres and showed an increase of 11.42%. In occupation third place accounts to cashew. The area under this crop before Soil Conservation work was 29.25 acres. It increased to 34.99 acres after the implementation of Soil Conservation schemes. The percentage increase is 19.62. Next to cashew, arecanut occupied the largest area. It increased from 14.88 acres to 17.32 acres. The percentage increase is 16.40 shows the fourth position. Among the selected perennial no crops showed a

negative trend after the implementation of soil conservation work. Area under cultivation of plantation crops like coffee, cardamom also showed an increasing trend. Before Soil conservation work its area was 6.49 and 11.36 acres respectively. It increased to 7.42 and 12.57 acres respectively. While evaluating the overall performance of selected perennial crops it showed a positive impact of 14.66%.

Among the seasonal crops the area under paddy, tapioca, ginger, etc. were reduced substantially. In the scheme area in two districts, paddy was seen cultivated before Soil Conservation work. But after soil conservation work paddy cultivated area is seen to be decreased(-16.64%). Regarding tapioca the decrease in area is about 30 % and for ginger is it 73%.(Table 6)

Sl. No	Districts	Paddy			Tapioca			Plantain		
		Before SC work	After SC work	% increase	Before SC work	After SC work	% increase	Before SC work	After SC work	% increase
1	2	3	4	5	6	7	8	9	10	11
1	Thiruvananthapuram				1.15	0.63		0.07	0.18	
2	Kollam				2.49	0.99		1.48	1.58	
3	Pathanamthitta				9.38	5.14		1.91	1.64	
4	Allappuzha				-	-		0.21	0.16	
5	Kottayam				0.45	0.25		0.12	0.14	
6	Idukki				29.44	19.44		13.64	3.31	
7	Eranakulam	10.70	8.87		1.91	1.80		-	-	
8	Thrissur				0.43	0.28		-	-	
9	Palakkad	0.30	0.30		2.98	1.99		1.38	0.60	
10	Malappuram				0.01	0.02		0.54	0.43	
11	Kozhikode				0.20	0.17		0.24	0.21	
12	Kannur				1.33	1.10		0.24	0.24	
13	Kasaragod				0.30	0.25		0.05	0.10	
	Total	11.00	9.17	16.64	50.07	35.06	29.98	19.88	8.59	50.51

Sl. No.	Districts	Ginger			Others			Total		
		Before SC work	After SC work	% increase	Before SC work	After SC work	% increase	Before SC work	After SC work	% increase
1	2	12	13	14	15	16	17	18	19	20
1	Thiruvananthapuram	-	-		0.19	0.30		1.41	1.11	
2	Kollam	0.13	0.13		1.01	1.95		5.11	4.65	
3	Pathanamthitta	0.12	0.41		2.65	3.39		14.56	10.58	
4	Allappuzha	-	-		0.14	0.15		0.35	0.31	
5	Kottayam	-	-		0.01	0.02		0.58	0.41	
6	Idukki	14.39	2.89		0.73	1.46		58.20	27.10	
7	Eranakulam	-	-		2.80	2.53		15.40	13.20	
8	Thrissur	-	-		0.04	0.04		0.47	0.32	
9	Palakkad	0.75	0.70		3.72	3.81		9.13	7.40	
10	Malappuram	-	-		0.07	0.13		0.63	0.58	
11	Kozhikode	-	-		0.06	0.07		0.50	0.45	
12	Kannur	0.18	0.18		-	-		1.75	1.52	
13	Kasaragod	-	-		-	-		0.35	0.35	
	Total	16.07	4.31	- 73.18	11.42	13.85	+21.28	108.44	67.98	-37.31



### Impact of Soil conservation treatment on the yield of crops

An analysis of the impact of soil conservation treatment on the yield of crops enables to assess the cost benefit of the projects – details regarding yield and value of crops are also collected from the beneficiaries in the scheme area. District wise details are furnished in Table – 7.

**Table – 7 – Crop wise yields and value of perennial crops in scheme area.**

District	Name of Crop	Unit	Before SC work		After SC work	
			Quantity	Income	Quantity	Income
1	2	3	4	5	6	7
Thiruvananthapuram	Coconut	Nos.	1297	3806	1590	6771
	Arecanut	Nos.	3465	1223	3520	2945
	Cashew	Qtl.	0.15	308	0.19	651
	Pepper	Qtl.	0.50	1963	0.70	12776
	Rubber	Qtl.				-
	Others			320		450
	Total				7620	
Kollam	Coconut	Nos.	21208	67469	27422	135259
	Arecanut	Nos.	98926	34416	106815	68041
	Cashew	Qtl.	10.26	21428	12.80	44704
	Pepper	Qtl.	16.61	62447	17.45	314774
	Rubber	Qtl.				
	Others			2590		72
	Total				188350	
Pathanamthitta	Coconut	Nos.	6265	218217	6887	32191
	Arecanut	Nos.	99562	33871	115248	73152
	Cashew	Qtl.	1.89	3946	2.15	7061
	Pepper	Qtl.	17.35	69561	19.76	365428
	Rubber	Qtl.	117.46	234360	126.30	315750
	Others			3425		1715
	Total				366990	
Allappuzha	Coconut	Nos.	35036	10840	37458	172625
	Arecanut	Nos.	2478	767	2496	1483
	Cashew	Qtl.	0.68	1341	0.75	2372
	Pepper	Qtl.				
	Rubber	Qtl.				
	Others					
	Total				12948	
Kottayam	Coconut	Nos.	2361	7454	2685	12733
	Arecanut	Nos.	5174	1651	5394	3459
	Cashew	Qtl.	0.04	0.85	0.05	193
	Pepper	Qtl.	0.49	19.64	0.71	13115
	Rubber	Qtl.	2.02	40.40	2.06	5150
	Others			500		120
	Total	Qtl.			15694	
Idukki	Coconut	Nos.	96570	361790	105340	509909
	Arecanut	Nos.	255042	80671	704157	418762
	Cashew	Qtl.	13.72	27463	14.23	48323
	Pepper	Qtl.	238.96	972123	250.73	4650650
	Rubber	Qtl.	9.68	19360	11.70	29325
	Cocoa	Qtl.	152.00	153520	172.30	344600
	Coffee	Qtl.	25.25	37875	26.50	132500
	Cardamom	Qtl.	10.41	468450	11.85	592500
	Others			842		959
Total				2122094		6727526

District	Name of Crop	Unit	Before SC work		After SC work	
			Quantity	Income	Quantity	Income
1	2	3	4	5	6	7
Eranakulam	Coconut	Nos.	16520	58025	17347	81149
	Arecanut	Nos.	59460	20234	61816	36008
	Pepper	Qtl.	171.72	68597	195.40	345152
	Others			7630		3215
	Total			154486		465524
Thrissur	Coconut	Nos.	6182	19685	7016	31065
	Arecanut	Nos.	9885	3622	9976	7364
	Cashew	Qtl.	1.60	3630	2.06	7618
	Pepper	Qtl.	1.83	7048	2.05	37689
	Others			6795		3942
Total			40780		87678	
Palakkad	Coconut	Nos.	2993	6812	3415	14487
	Arecanut	Nos.	4472	2954	4695	2364
	Cashew	Qtl.	1.25	2615	1.52	6055
	Pepper	Qtl.	1.87	7226	1.99	36059
	Rubber	Qtl.	1.52	15500	7.96	19900
	Cocoa	Qtl.	5.60	5656	7.20	14400
	Coffee	Qtl.	1.50	2280	1.72	8600
	Others	Qtl.		800		950
	Total			43843		102815
Malappuram	Coconut	Nos.	5218	14195	5340	21411
	Arecanut	Nos.	7287	2185	7310	4094
	Cashew	Qtl.	0.38	845	0.56	1051
	Pepper	Qtl.	1.28	5045	1.54	27765
	Others	Qtl.		470		680
Total			22710		55001	
Kozhikode	Coconut	Nos.	5216	15338	6584	29043
	Arecanut	Nos.	25990	6144	33774	21072
	Cashew	Qtl.	1.35	3013	1.80	6033
	Pepper	Qtl.	2.04	7998	2.46	44946
	Others	Qtl.		1200		1320
Total			33693		102414	
Kannur	Coconut	Nos.	955	2826	978	3554
	Arecanut	Nos.	2675	765	3071	2045
	Cashew	Qtl.	1.12	2820	1.56	6311
	Pepper	Qtl.	1.60	6312	1.81	33063
	Others	Qtl.		900		1000
Total			13923		46373	
Kasaragod	Coconut	Nos.	66850	151740	69345	256680
	Arecanut	Nos.	181160	63346	215323	143385
	Cashew	Qtl.	26.82	67528	37.78	152840
	Pepper	Qtl.	32.80	129396	36.77	665171
	Others	Qtl.		4200		5820
Total			416210		1223896	

District	Name of Crop	Unit	Before SC work		After SC work		Percentage of Increase
			Quantity	Income	Quantity	Income	
1	2	3	4	5	6	7	8
STATE	Coconut		266671	1006257	291407	1306877	9.28
	Areca nut	Nos.	75576	251849	116925	784174	54.71
	Cashew	Qtl.	59.26	135022	75.45	283212	27.32
	Pepper	Qtl.	487.05	1489680	531.37	6546980	9.10
	Rubber	Qtl.	130.68	27320	148.02	370125	13.27
	Cocoa	Qtl.	157.60	20976	179.50	359000	13.90
	Coffee	Qtl.	26.75	40145	28.22	141100	5.50
	Cardamom	Qtl.	10.41	438450	11.85	592500	13.80
	Others			29642		20243	
	Total				3439341		10404217

From the above table it is seen that yield of perennial crops increased due to the implementation of soil conservation programme. However certain peculiarities has been observed among yield and area and various crops. The increase in area of rubber is about 34%. But the yield shows only an increase of 8% over production before soil conservation programme. The area under cashew has increased by 20% there is an increase of 32% in the yield of cashew.

The analysis of the production details at district level shows that even though Kasaragod district occupies 2nd rank in area under pepper cultivation production has not increased in that district when compared to Idukki district which possess. In Kasaragode district coconut cultivation also faces the same situation. District wise analysis shows that in Allappuzha district the impact of SC work is not seen considerably under perennial crops. Similarly in the case of plantation crops like coffee and cardamom nominal changes occurred after SC work. These changes are visible in Idukki and Palakkad districts.

The following table reveals (table 8) the production details of seasonal crops. During this round after the implementation of soil conservation works the area and production of seasonal crops showed a negative trend. At state level it is recorded to -37.31% (See table 6 and 8) and -31.67% respectively. This is mainly due to the decrease in area under paddy, tapioca and ginger in the scheme area. It is particularly noticed that changes have been recorded in two districts viz. Ernakulam and Palakkad under paddy sector. After the implementation of soil conservation programmes even though in Ernakulam paddy area declined, in Palakkad it is retained. Out of the thirteen districts covered under the study in twelve districts except Malappuram there is decrease in area of tapioca. Production has also come down in 11 districts except Malappuram and Kozhikode. In the case of ginger in Idukki district area as well as production declined in remarkable extent after the implementation of SC work (see table 6 & 8).

Due to the implementation of soil conservation measures area as well as production of plantain haven't benefited. In area percentage decrease is recorded as 50.51 and in production it is 45.77%.

**Table - 8 - Crop wise yield and value of seasonal crops in the scheme area**

District	Name of Crop	Unit	Before SC work		After SC work		% of increase
			Quantity	Income	Quantity	Income	
1	2	3	4	5	6	7	8
Thiruvananthapuram	Paddy	Qtl	-	-	-	-	
	Tapioca	Qtl	4.96	820	25.28	9266	
	Ginger	Qtl	-	-	-	-	
	Plantain	Qtl	2.56	1280	9.18	5049	
	Others	Qtl	7.12	3550	10.25	5728	
	Total	Qtl	14.64	5650	44.71	20043	
Kollam	Paddy	Qtl	-	-	-	-	
	Tapioca	Qtl	92.14	15679	43.07	12750	
	Ginger	Qtl	4.10	11822	4.95	24441	
	Plantain	Qtl	71.80	35900	85.35	46942	
	Others	Qtl	39.70	19820	66.50	37055	
	Total	Qtl	207.74	83221	199.87	121188	

District	Name of Crop	Unit	Before SC work		After SC work		% of increase
			Quantity	Income	Quantity	Income	
1	2	3	4	5	6	7	8
Pathanamthitta	Paddy	Qtl	-	-	-	-	-
	Tapioca	Qtl	340.68	11590	230.20	15176	
	Ginger	Qtl	21.50	61992	20.10	11893	
	Plantain	Qtl	78.32	39160	95.12	52316	
	Others	Qtl	110.70	54032	112.30	64370	
	Total	Qtl	551.20	166774	457.72	143755	
Allappuzha	Paddy	Qtl	-	-	-	-	-
	Tapioca	Qtl	-	-	-	-	-
	Ginger	Qtl	-	-	-	-	-
	Plantain	Qtl	9.85	4925	8.58	270.88	
	Others	Qtl	5.92	2925	5.40	2931	
	Total	Qtl	15.77	7850	13.98	30019	
Kottayam	Paddy	Qtl	-	-	-	-	-
	Tapioca	Qtl	18.45	3797	10.75	3556	
	Ginger	Qtl	-	-	-	-	-
	Plantain	Qtl	5.30	2650	6.10	3355	
	Others	Qtl	1.05	520	0.67	354	
	Total	Qtl	24.80	6967	17.52	7265	
Idukki	Paddy	Qtl	-	-	-	-	-
	Tapioca	Qtl	1236.50	237059	837.92	259990	
	Ginger	Qtl	402.92	1175434	91.22	520198	
	Plantain	Qtl	610.92	305460	195.70	107635	
	Others	Qtl	29.30	1487	49.36	27810	
	Total	Qtl	2279.64	1719418	1174.20	915633	
Ernakulam	Paddy	Qtl	160.20	64285	148.76	95393	
	Tapioca	Qtl	70.30	13120	68.45	19045	
	Ginger	Qtl	-	-	-	-	-
	Plantain	Qtl	-	-	-	-	-
	Others	Qtl	14.99	65505	89.08	48115	
	Total	Qtl	245.49	142910	306.29	162553	
Thrissur	Paddy	Qtl	-	-	-	-	-
	Tapioca	Qtl	15.05	1875	12.90	3949	
	Ginger	Qtl	-	-	-	-	-
	Plantain	Qtl	-	-	-	-	-
	Others	Qtl	1.49	1975	1.24	750	
	Total	Qtl	16.54	3850	14.14	4699	
Palakkad	Paddy	Qtl	3.95	1642	5.10	3233	
	Tapioca	Qtl	83.45	13470	63.62	17218	
	Ginger	Qtl	23.40	64536	22.70	135916	
	Plantain	Qtl	60.65	30325	30.20	16610	
	Others	Qtl	153.00	77932	135.16	68621	
	Total	Qtl	324.45	187905	256.78	241598	
Malappuram	Paddy	Qtl	-	-	-	-	-
	Tapioca	Qtl	0.28	46	0.60	161	
	Ginger	Qtl	-	-	-	-	-
	Plantain	Qtl	19.45	9725	20.32	11176	
	Others	Qtl	1.20	1424	4.08	3765	
	Total	Qtl	20.93	11195	25.00	15102	

District	Name of Crop	Unit	Before SC work		After SC work		% of increase
			Quantity	Income	Quantity	Income	
1	2	3	4	5	6	7	8
Kozhikode	Paddy	Qtl	-	-	-	-	
	Tapioca	Qtl	6.43	1205	7.90	2537	
	Ginger	Qtl	-	-	-	-	
	Plantain	Qtl	9.12	4560	10.25	5638	
	Others	Qtl	2.15	1230	2.16	2411	
	Total	Qtl	17.70	6995	20.31	10586	
Kannur	Paddy	Qtl	-	-	-	-	
	Tapioca	Qtl	45.24	9579	41.80	15012	
	Ginger	Qtl	6.12	16626	0.14	821	
	Plantain	Qtl	10.81	4405	11.85	6518	
	Others	Qtl	-	-	-	-	
	Total	Qtl	62.17	30610	53.79	22351	
Kasaragod	Paddy	Qtl	-	-	-	-	
	Tapioca	Qtl	10.50	3041	2.75	955	
	Ginger	Qtl	-	-	-	-	
	Plantain	Qtl	2.50	1250	5.28	2904	
	Others	Qtl	-	-	-	-	
	Total	Qtl	13.00	4291	8.03	3859	
STATE	Paddy	Qtl	164.15	65927	153.86	98626	(-)6.27%
	Tapioca	Qtl	1914.13	301334	1336.65	332527	(-)30.17%
	Ginger	Qtl	458.04	1330410	139.11	693269	(-)69.63%
	Plantain	Qtl	881.28	444640	477.93	285231	(-)45.77%
	Others	Qtl	376.47	235325	484.79	288998	(+)28.77%
	Total	Qtl	3794.07	2377636	2592.34	1698651	(-)31.67%

## 2.2 Cost Benefit Analysis of Soil Conservation Programme

An important objective of a project evaluation is to estimate the various impacts of its operation such as income, employment, demographic change, regional development and so on. Hence an analysis to appraise the performance of operating investment projects is essential for improved planning practice. Degradation of land due to soil erosion leads to distraction of agricultural land. If it continue over a period, the entire soil will be lost and the land will become barren and unproductive. In the case of sloppy regions, soil erosion deplete the fertility of the soil and production and degradation of the area under agriculture is to be assessed in terms of production and protection benefits accrued from these areas. These benefits are to be further compared with the investments to arrive at benefit cost rating which gives an indication of the viability of the programme implemented.

Productive benefits are the direct returns from the programmes implemented. In regular agricultural lands, increase in the yield provides the productive benefits. In addition, production from degraded land, which are cultivated after the soil conservation measures are also taken in to consideration.

Productive benefits are the intangible benefits derived from implementation of soil conservation programme. These benefits are more stable and provide base for the continued prosperity in the area. In the case of agricultural land, protective benefits are assessed in terms of these increased values because of the prevention of further soil erosion and its increased productive potentialities. The increase in the land value is to be assessed from the data collected.

In the light of the present study an attempt is made for cost benefit analysis with the collected data. The cost incurred for the soil conservation works, including maintenance work collected from the beneficiaries is Rs.3369713.

The benefits obtained from the cultivation of land with various perennial crops and seasonal crops can be assessed from the table given below.

Table - 9 - Area, Quantity of value of selected perennial crops and seasonal crops

Type	Name of Crop	Unit	Before SC work			After SC work			% increase/decrease in production
			Area Acre	Qty	Income	Area Acre	Qty	Income	
1	2	3	4	5	6	7	8	9	10
A. Perennial Crops	Coconut	Nos.	124.07	266671	1006257	138.24	291407	1306877	+9.28
	Arecanut	Nos.	14.88	75576	251849	17.32	116925	784174	+54.71
	Cashew	Qtl.	29.25	59.26	135022	34.99	75.45	283212	+27.32
	Pepper	Qtl.	133.15	487.05	1489680	155.58	531.37	6546980	+9.10
	Rubber	Qtl.	34.80	130.68	27320	46.46	148.02	370125	+13.27
	Cocoa	Qtl.	12.02	157.60	20976	12.41	179.50	359000	+13.90
	Coffee	Qtl.	6.49	26.75	40145	7.42	28.22	141100	+5.50
	Cardamom	Qtl.	11.36	10.44	438450	12.57	11.85	592500	+13.83
	Others	Qtl.	9.02	-	29642	5.03	-	20243	
	Total A	Qtl.	375.04		3439341	430.02	-	10404217	
B. Seasonal Crops	Paddy	Qtl.	11.00	164.15	65927	9.17	153.86	98626	-6.27
	Tapioca	Qtl.	50.07	1914.13	301334	35.06	1336.65	332527	-30.17
	Ginger	Qtl.	16.07	458.04	1330410	4.37	139.11	693269	-70.00
	Plantain	Qtl.	19.88	881.28	444640	8.59	477.93	285231	45.77
	Others	Qtl.	11.42	376.47	235325	13.85	484.79	288998	28.77
	Total B	Qtl.	108.44	3794.07	2377636	67.98	2592.34	1698651	31.67
Grand Total A+B			483.48		5816977	498.00		12102868	

The total area under cultivation after soil conservation work was 498 acres. The value of crops before the soil conservation programme comes to Rs.5816977/- the value of crop after the soil conservation programme has also been calculated as Rs.12102868/-. Thus the additional benefits due to the implementation of soil conservation programme is worked out to be Rs.6285891/-. Implementation of soil conservation programme could be the main reason for the increase in the production of crops.

Implementation of soil conservation programme is beneficial to the people in different ways.

The main benefit are:-

- i) Extension of area under cultivation
- ii) Increase in productivity
- iii) Diversification of cropping pattern.

i) Extension of area under cultivation:-

The study result shows that 14.52 acres of land has been additionally brought under cultivation by cultivating land which could not be cultivated before soil conservation programme. In other words implementation of soil conservation programme has brought more land suitable for cultivation.

ii) Increase in Productivity:-

A comparison of income, expenditure and net income from the holdings in the scheme area and control plots clearly indicates the benefits acquired due to the implementation of soil conservation programme. The above particulars are furnished in table 10 and 10 (a).

Table 10 – Income, Expenditure and Net Income of Beneficiary Holdings (in Rs.)

Sl.No	Name of District	Income		Expenditure		Net Income	
		Before SC work	After SC work	Before SC work	After SC work	Before SC work	After SC work
1	2	3	4	5	6	7	8
1	Thiruvananthapuram	13270	43636	6609	7185	6661	36451
2	Kollam	271571	684038	110286	119250	161285	564788
3	Pathanamthitta	533764	939052	202435	360781	331329	578271
4	Allappuzha	20798	206499	6675	8576	14123	197923
5	Kottayam	22661	42035	12012	19128	10649	22907
6	Idukki	3841512	7643159	1628630	3815287	2212882	3827872
7	Eranakulam	297396	628077	148541	192531	148855	435546
8	Thrissur	44630	92377	18959	21830	25671	70547
9	Palakkad	231748	344413	97346	162487	134402	181926
10	Malappuram	33905	70103	17652	20854	16253	49249
11	Kozhikode	40688	113000	19973	24063	20715	88937
12	Kannur	44533	68724	17307	20215	27226	48509
13	Kasaragod	420501	1227755	175026	392881	245475	834874
	STATE	5816977	1210286	2461451	5165068	3355526	6937800

Table 10(a) – Income, Expenditure and Net Income of Control Plots (in Rs.)

Sl. No	Name of Districts	Income	Expenditure	Net Income
1	2	3	4	5
1	Thiruvananthapuram	28750	9000	19750
2	Kollam	48838	24513	24325
3	Pathanamthitta	173005	70315	102690
4	Allappuzha	31995	20619	11376
5	Kottayam	42068	20255	21813
6	Idukki	840171	372939	467232
7	Eranakulam	173446	126450	46996
8	Thrissur	12981	4350	8631
9	Palakkad	63995	32595	31400
10	Malappuram	33588	5520	28068
11	Kozhikode	47545	20450	27095
12	Kannur	3836	1850	1986
13	Kasaragod	115145	24140	91005
	STATE	1615363	732996	882367

## iii) Diversification of cropping pattern.

Soil conservation programmes maintain the fertility and moisture content of the surface soil and facilitate the cultivation of more remunerative crops. This advantage can be utilised in full, only if the conservation programmes are followed properly i.e. the dissemination of new techniques of production, adequate provision of inputs and services which will promote productivity.

In the scheme area, cultivation of perennial crops has shown an encouraging performance. The area of perennial crops is increased when compared to the area under the same before soil conservation programme. This is because growing of perennial crops accelerates conservation of soil more effectively.

## Net Income Analysis

The net income received from the beneficiary plot is Rs.6937800/- and from the control plot is Rs.882367. The district wise net income per acre is given in table 11 and 11(a).

**Table 11 – Income per Acre Before and After Soil Conservation Programme**

(Income in Rs.)

Sl.No	Name of District	Before SC work			After SC work		
		Area	Income	Income / Per Acre	Area	Income	Income Acre
1	2	3	4	5	6	7	8
1	Thiruvananthapuram	2.67	6661	2495	2.67	36451	13652
2	Kollam	30.49	161285	5290	31.28	564788	18056
3	Pathanamthitta	59.23	331329	5594	61.28	578271	9437
4	Allappuzha	2.41	14123	5860	2.48	197923	79808
5	Kottayam	2.57	10649	4144	2.68	22907	8547
6	Idukki	216.74	2212882	10210	221.96	3827872	17246
7	Ernakulam	32.30	148855	4609	32.48	435546	13410
8	Thrissur	6.97	25671	3683	8.02	70547	8796
9	Palakkad	15.23	134402	8825	16.25	181926	11195
10	Malappuram	6.69	16253	2429	7.65	49249	6438
11	Kozhikode	8.45	20715	2451	9.33	88937	9532
12	Kannur	3.80	27226	7165	3.95	48509	12281
13	Kasaragod	95.93	245475	2559	97.97	834874	8522
	TOTAL	483.48	3355526	6940.36	498	6937800	13931

**Table 11 (a) – Net – Income per acre in the Control Plots**

Sl.No	Name of Districts	Area in Acre	Net Income (Rs.)	Net Income Per Acre
1	2	3	4	5
1	Thiruvananthapuram	3.55	19750	5563
2	Kollam	4.37	24354	5573
3	Pathanamthitta	11.33	92793	8190
4	Allappuzha	6.72	11377	1693
5	Kottayam	14.18	44475	10640
6	Idukki	41.91	467213	11148
7	Ernakulam	14.72	47000	3193
8	Thrissur	1.25	8631	6905
9	Palakkad	14.60	92272	6320
10	Malappuram	2.54	28068	11050
11	Kozhikode	4.50	27095	6021
12	Kannur	0.95	1986	2091
13	Kasaragod	12.25	91005	7429
	STATE	122.87	903337	7596

The survey results show that the rate of income from the scheme area is high when compared to the income from the holding of control plots. It may be due to the implementation of soil conservation programme. The net income per acre after implementation of soil conservation programme is Rs.13931/- while the net income per acre received from the control plot is only Rs.7596.



## CHAPTER – III

### 3.1 General Observations

At the time of plot visits, the following observations have been noticed.

The success or failure of any programme mainly depends upon the opinion of the beneficiaries. For this study, opinion of 917 selected beneficiaries were collected. Out of this 30% were of the opinion that construction of contour bund effectively controlled the soil erosion, 63% remarked that it is moderately helpful for soil erosion only 7% had different view. According to them it has no effect on the soil erosion.

Preservation of soil fertility is an important objective of the implementation of soil conservation programme. According to 30% of the beneficiaries soil conservation measures have improved the fertility of the soil remarkably. While 67% reported that it is moderately improved the soil fertility and the remaining 3% considered that the scheme had no effect on the fertility of the soil.

Moisture retention is yet another target of the implementation of the soil conservation programme. From the opinion of the 27% of the selected beneficiaries it is seen that the schemes have substantially increased moisture retention while about 66% reported that it moderately increased and the remaining 7% felt that the programme had no effect on the moisture retention.

The district wise details of opinion of cultivators about the effectiveness of bunds, fertility of the soil and moisture retention are given in table 12

**Table 12 – Opinion of Cultivators about effectiveness of Bunds, Fertility of the Soil and Moisture Retention**

Sl.No	Name of District	Effectiveness of Contour Bund			Fertility Soil			Moisture Retention		
		Effectively Controlled	Moderately controlled	No effect	Remarkably Improved	Moderately Improved	No effect	Substantially Increased	Moderately increased	No change
1	2	3	4	5	6	7	8	9	10	11
1	Thiruvananthapuram	4	-	-	4	-	-	4	-	-
2	Kollam	2	104	3	1	105	3	1	105	3
3	Pathanamthitta	18	59	1	15	63	-	5	73	-
4	Allappuzha	7	35	1	4	39	-	2	39	2
5	Kottayam	2	29	41	-	31	41	-	29	43
6	Idukki	57	54	-	54	57	-	56	55	-
7	Eranakulam	-	57	1	-	56	2	-	57	1
8	Thrissur	10	66	17	6	70	17	-	76	17
9	Palakkad	25	80	-	64	41	-	58	47	-
10	Malappuram	19	63	1	1	82	-	1	81	1
11	Kozhikode	14	31	-	4	41	-	5	40	-
12	Kannur	23	-	-	23	-	-	23	-	-
13	Kasaragod	96	-	-	68	25	-	93	-	-
	STATE	274	578	65	244	610	63	248	602	67

The benefit of the construction of bund actually derives to the cultivators when it is in a good condition. The condition of the bunds has to be watched after construction. It is deserved that about 56% of the bunds are in good condition 36% is partially damaged and eight percent are seriously damaged. In general the work is satisfactory. District wise statement of the condition of the bunds is furnished in table 13.

Table – 13 – Conditions of Bund

Sl.No	Name of Districts	Good	Partially Damaged	Seriously Damaged
1	2	3	4	5
1	Thiruvananthapuram	4	-	-
2	Kollam	6	101	2
3	Pathanamthitta	77	-	1
4	Allappuzha	-	43	-
5	Kottayam	8	22	42
6	Idukki	110	1	-
7	Eranakulam	57	-	1
8	Thrissur	67	4	22
9	Palakkad	72	33	-
10	Malappuram	61	19	3
11	Kozhikode	-	40	5
12	Kannur	19	4	-
13	Kasaragod	29	64	-
	STATE	510	331	76

It is interesting to note that while 79% of the selected beneficiaries have holding size class less than one acre. Area between 1 acre and 3 acres comes to 17%. Holding with 3 acres to less than 5 acres group forms to 3% and the remaining 1% have a large area of more than 5 acres.

### 3.2 Occupational Profile

The occupational profile of the selected beneficiaries reveals that about 13% are engaged in agriculture and 9% in non-agriculture activities. Agricultural labourers and non-agricultural labourers comes to 78%

Table – 14 – Occupational Profile

Sl. No.	Name of District	Occupation			Total
		Agriculture	Non-Agriculture	Agri./Non-Agricultural Labours	
1	2	3	4	5	6
1	Thiruvananthapuram	1	1	2	4
2	Kollam	-	35	74	109
3	Pathanamthitta	20	10	48	78
4	Allappuzha	4	10	29	43
5	Kottayam	-	7	65	72
6	Idukki	51	4	56	111
7	Ernakulam	10	5	43	58
8	Thrissur	3	12	78	93
9	Palakkad	2	-	103	105
10	Malappuram	-	2	81	83
11	Kozhikode	-	-	45	45
12	Kannur	-	-	23	23
13	Kasaragod	30	1	62	93
	TOTAL	121	87	709	917

From the following table it is seen that 16% are engaged in agriculture, 17% in non-agriculture activities and 67% act as agricultural/non-agricultural labourers.

Table 14 (a) -Occupational Profile (Control Plots)

Sl. No.	Name of District	Occupation			
		Agriculture	Non-Agriculture	Agri./Non-Agricultural Labours	Total
1	2	3	4	5	6
1	Thiruvananthapuram	1	2	2	5
2	Kollam	-	4	21	25
3	Pathanamthitta	3	12	10	25
4	Allappuzha	10	14	6	30
5	Kottayam	2	2	16	20
6	Idukki	7	-	18	25
7	Ernakulam	13	8	9	30
8	Thrissur	-	1	24	25
9	Palakkad	6	1	15	22
10	Malappuram	1	1	28	30
11	Kozhikode	2	2	21	25
12	Kannur	-	-	5	5
13	Kasaragod	-	-	20	20
	TOTAL	45	47	195	287

### 3.3 Summary of Findings

The data furnished in this report are collected through the Evaluation study on soil conservation 1998-99. The districts covered in this study are all the districts of the State except Wayanad. 59 schemes implemented by soil conservation department 5 years prior to 1998-99 have been selected for the Evaluation study. The summary of findings are discussed below:

#### Benefit of the Programme

Soil conservation generally means applying of all necessary practices to maintain the capability of the land for which it is suited and to improve the productivity of agricultural land in the State. The cropping pattern of a locality is emerged on the basis of the productivity of the land to a certain extent.

The survey results reveal that 917 beneficiaries are selected out of total 1047 beneficiaries (88 % of the total beneficiaries) and they possess 535.32 acres of land. The cost incurred for 59 schemes is Rs.3369713. The study results show that the following benefits are derived from the implementation of the soil conservation measures in the State.

- i) An area of 14.52 acres of land more could be brought under cultivation in the scheme area. In other words the percentage increase in the cultivated area due to the implementation of soil conservation measures comes to only 3%.
- ii) Significant changes occurred in the cropping pattern – increasing trend in the cultivation of perennial crops is noticed. The area of perennial crops increased from 375.04 acres to 430.02 acres. Pepper occupied largest area. The area under pepper has increased from 133.15 acres to 155.58 acres after the implementation of SC work.
- iii) Above trend is not seen in the case of seasonal crops.
- iv) There is an increasing trend with respect to the yield of perennial crops due to the implementation of SC work.

#### Cost Benefit Analysis

The cost incurred for the soil conservation works including the maintenance work collected from the 917 beneficiaries is Rs.3369713.

The total area under cultivation after soil conservation work showed an increase of 3%. The value of crops before the soil conservation programmes comes to the annual additional benefits due to the implementation of soil conservation programme is worked out to be Rs.6285891/-.

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