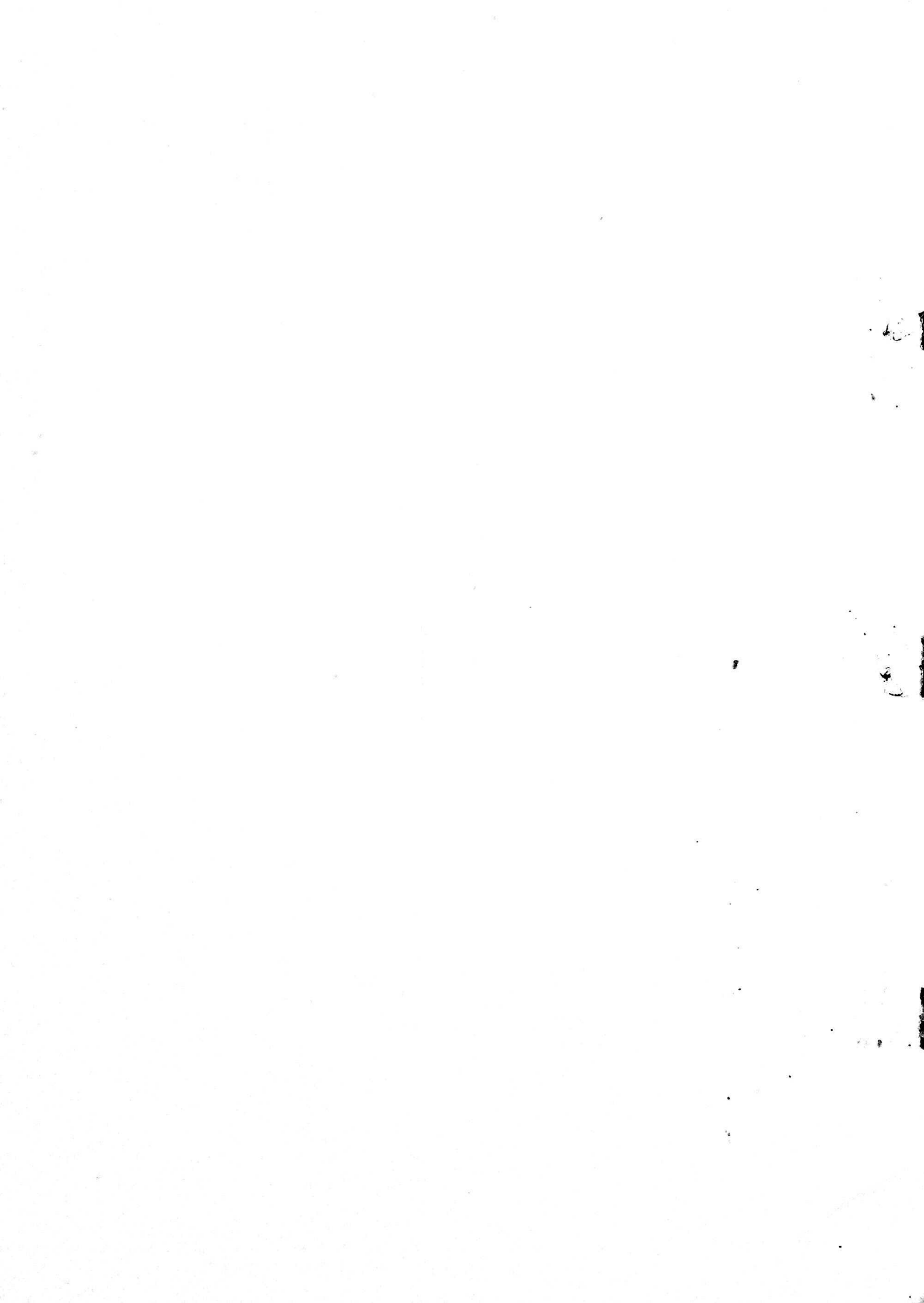


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EVALUATION STUDY
ON
SOIL CONSERVATION
1999-2000

Department of Economics & Statistics
Thiruvananthapuram
2003



PREFACE

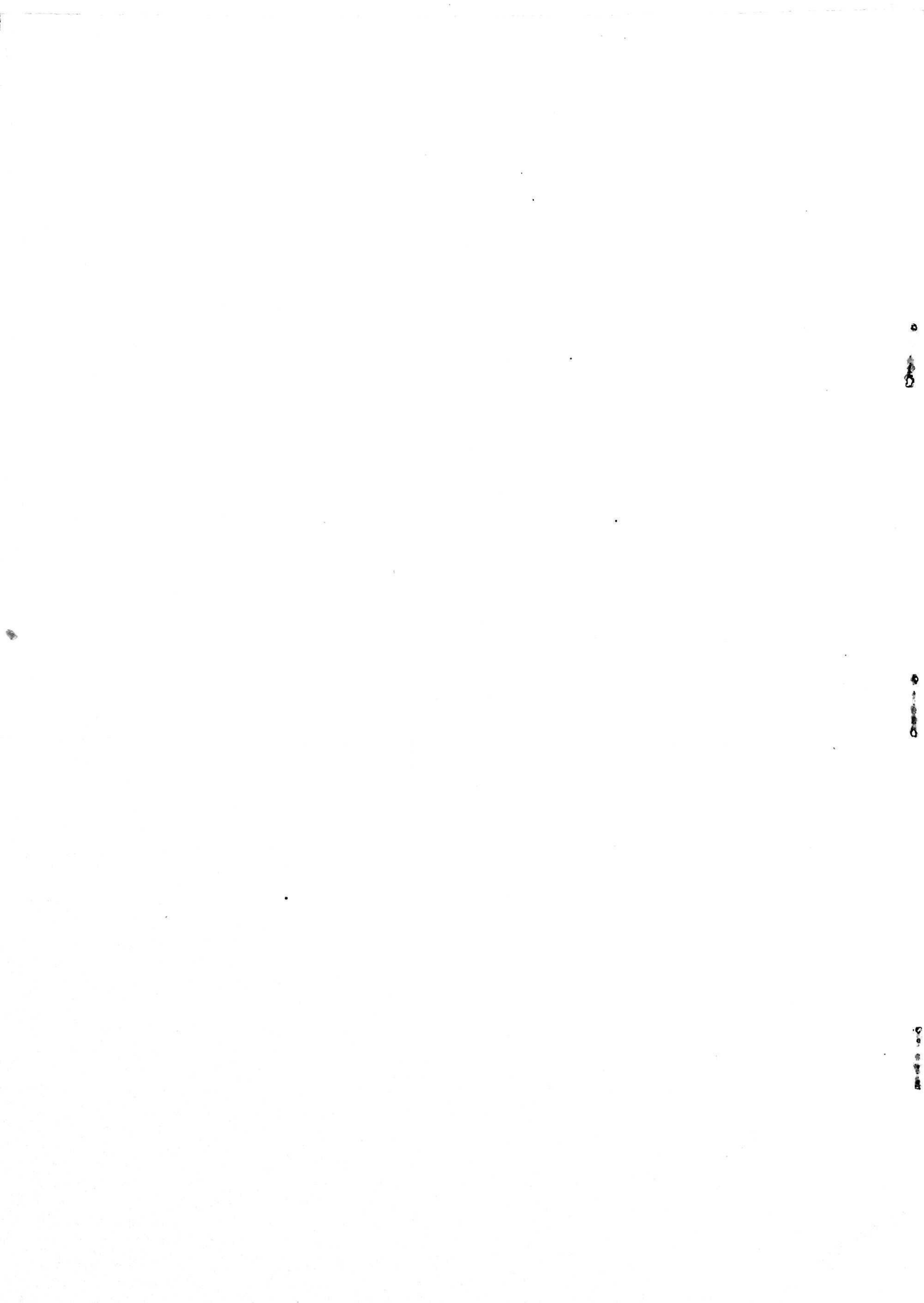
The geographical peculiarity of Kerala causes soil erosion problem in the State. Due to the loss of fertility of the surface soil agricultural production diminishes and affect the eco-system itself. Hence Government is implementing various soil conservation measures through the Soil Conservation Department.

Soil conservation schemes implemented in all districts except Wayanad during 1994-95 have been considered as the frame for the survey 1999-2000. Out of which 53 schemes were selected for the purpose of this study.

The report of the survey has been prepared by the Evaluation Division of this Directorate. In this context we also acknowledge our thanks to the staff of Soil Conservation Department for their valuable suggestion and whole hearted co-operation in the successful conduct of the survey.

A. MEERA SAHIB
DIRECTOR

Thiruvananthapuram,
26-03-2003



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EVALUATION STUDY OF SOIL CONSERVATION IN KERALA 1999-2000

Chapter – I

1.1 Introduction

Among the various factors of production, land is one of the basic resources. Soil is a natural gift which act as a medium for crop production. Due to the peculiarity of the rainfall and topography of the State soil erosion becoming a threat to crop growth. Hence soil conservation programmes are inevitable. Various programmes have been implemented in the State for soil conservation by the Soil Conservation Department. The results of the evaluation study conducted by the department of Economics and Statistics on these programmes are included in this report.

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 analyse cost, benefit, production potential etc.

For this 53 schemes were selected from the schemes completed during 1994-95 in the state by the soil conservation department representing all districts except Wayanad where the same is done by the Central Government. The list of beneficiaries under each scheme is obtained from the Soil Conservation Department. The beneficiaries are selected according to stratified random sampling method on the basis of the area of the holding. The holdings are stratified in to four strata viz.

Holdings with less than 1 acre	- Stratum – I
Holdings with 1 acre to less than 3 acres	- Stratum II
Holdings with 3 acres to less than 5 acres	- Stratum III
Holdings with 5 acres and above	- 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 I & I(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	5	90	12.83	3	5.49	1	4.75	1	8.25	95	31.32
2	Kollam	4	72	17.46	8	9.39					80	26.85
3	Pathanamthitta	4	61	16.49	7	8.76					68	25.25
4	Allappuzha	5	74	17.74							74	17.74
5	Kottayam	5	69	16.81							69	16.81
6	Idukki	4	31	12.77	51	93.65	8	28.50	10	63.75	100	198.67
7	Eranakulam	5	122	18.00	1	1.07					123	19.07
8	Thrissur	5	64	15.77	1	1.20					65	16.97
9	Palakkad	5	106	15.73	1	3.00					107	18.73
10	Malappuram	5	91	16.10	1	1.25					92	17.35
11	Kozhikode	4	66	20.80	14	21.03					80	41.83
12	Kannur	1	14	5.38	11	11.00					25	16.38
13	Kasaragod	1	4	3.05	9	15.50	8	32.10			21	50.65
	Total	53	864	188.93	107	171.34	17	65.35	11	72.00	999	497.62

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

(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	5	21	4.17	4	5.00	-	-	-	-	25	9.17
2	Kollam	4	18	5.52	2	2.82	-	-	-	-	20	8.34
3	Pathanamthitta	4	16	4.98	2	2.64	-	-	-	-	18	7.62
4	Allappuzha	5	25	2.87	2	3.50	-	-	3	16.35	30	22.72
5	Kottayam	5	25	3.23	-	-	-	-	-	-	25	3.23
6	Idukki	4	10	5.35	8	13.50	1	3.00	1	5.00	20	26.85
7	Eranakulam	5	25	4.11	-	-	-	-	-	-	25	4.11
8	Thrissur	5	24	5.62	1	1.00	-	-	-	-	25	6.62
9	Palakkad	5	24	6.31	1	1.48	-	-	-	-	25	7.79
10	Malappuram	5	25	3.35	-	-	-	-	-	-	25	3.35
11	Kozhikode	4	20	3.19	-	-	-	-	-	-	20	3.19
12	Kannur	1	4	1.80	1	1.00	-	-	-	-	5	2.80
13	Kasaragod	1	-	-	5	8.47	-	-	-	-	5	8.47
	Total	53	237	50.50	26	39.41	1	3.00	4	21.35	268	114.26

CHAPTER - II

2.1 Classification of Area

The following tables reveals the land use particulars of the beneficiary plots and control plots respectively. Classification of area details shows certain positive trends while comparing with the area before and after the soil conservation programme. Area under cultivation before soil conservation programme has increased from 410.53 acres to 424.94 acres after the programme. An addition area of 14.41 acres of land has brought under cultivation which was not cultivated earlier. The percentage increase is 3.51 and it is due to the implementation of soil conservation programme. This area increase has occurred mainly by decreasing the area not cultivated from 41.70 acres to 31.21 acres.

Table-2- Land use particulars of Beneficiary plots

(Area in Acres)

Sl. No	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	14
1	Thiruvananthapuram	27.93	89	28.40	91	1	3	1	3	3.07	10	2.60	8
2	Kollam	22.01	82	24.65	92	-	-	-	-	2.20	8	2.20	8
3	Pathanamthitta	19.62	77	20.32	80	-	-	-	-	3.68	15	3.25	13
4	Allappuzha	12.91	73	13.15	74	-	-	-	-	3.86	22	3.70	21
5	Kottayam	13.91	83	14.30	85	-	-	-	-	2.04	12	1.93	11
6	Idukki	183.32	92	186.25	94	0.52	0.26	0.52	0.26	9.20	5	7.47	4
7	Eranakulam	15.70	82	16.10	84	0.03	0.15	0.40	2	2.06	11	2.46	13
8	Thrissur	10.19	60	11.63	69	1.36	8	1.36	8	4.63	27	3.48	20
9	Palakkad	11.85	63	12.46	67	0.10	0.53	0.10	0.53	4.49	24	4.49	24
10	Malappuram	12.13	70	12.40	71	1.24	7	0.94	5	3.06	18	3.09	18
11	Kozhikode	29.68	71	30.25	72	3.82	9	1.90	5	5.05	12	4.92	12
12	Kannur	14.51	89	14.71	90	4.05	25	1.65	10	1.06	6	0.86	5
13	Kasaragod	36.77	73	40.32	80	7.17	14	4.92	10	0.99	2	1.02	2
	Total	410.53	83	424.94	85	18.29	4	11.79	2	45.39	9	41.47	8

(contd.)

Sl. No	Districts	Area Not cultivated				Total			
		Before		After		Before		After	
		Area	%	Area	%	Area	%	Area	%
1	2	15	16	17	18	19	20	21	22
1	Thiruvananthapuram	0.32	1	0.32	1	31.32	100	31.32	100
2	Kollam	2.64	10	-	-	26.85	100	26.85	100
3	Pathanamthitta	1.95	8	1.68	7	25.25	100	25.25	100
4	Allappuzha	0.97	5	0.89	5	17.74	100	17.74	100
5	Kottayam	0.86	5	0.58	4	16.81	100	16.81	100
6	Idukki	6.15	3	4.95	2	198.67	100	198.67	100
7	Eranakulam	1.31	7	0.51	3	19.07	100	19.07	100
8	Thrissur	2.15	13	1.86	11	16.97	100	16.97	100
9	Palakkad	2.39	13	1.78	9	18.73	100	18.73	100
10	Malappuram	2.16	12	1.86	11	17.35	100	17.35	100
11	Kozhikode	7.10	17	6.66	16	41.83	100	41.83	100
12	Kannur	0.81	5	0.81	5	16.38	100	16.38	100
13	Kasaragod	12.89	25	9.31	18	50.65	100	50.65	100
	Total	41.70	8	31.21	7	497.62	100	497.62	100

Table-2 (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	8.20	89			0.54	6	0.43	5	9.17	100
2	Kollam	7.75	93			0.43	5	0.16	2	8.34	100
3	Pathanamthitta	7.28	96			0.24	3	0.10	1	7.62	100
4	Allappuzha	21.75	96			0.54	2	0.43	2	22.72	100
5	Kottayam	2.56	79	0.20	74	0.58	17	0.15	4	3.23	100
6	Idukki	22.61	84	0.70	17	0.89	3	3.35	13	26.85	100
7	Eranakulam	3.51	85			0.48	12	0.12	3	4.11	100
8	Thrissur	3.99	60			1.00	15	1.63	25	6.62	100
9	Palakkad	5.75	74			1.59	20	0.45	6	7.79	100
10	Malappuram	2.12	63	1.42	42	0.38	11	0.85	26	3.35	100
11	Kozhikode	2.59	81			0.50	16	0.10	3	3.19	100
12	Kannur	1.75	63	0.50	18	0.23	8	0.82	29	2.80	100
13	Kasaragod	7.35	87	1.50	18	0.09	1	1.03	12	8.47	100
	Total	97.15	85	4.32	4	7.49	7	9.62	8	114.26	100

Cropping Pattern

The study results shows that certain significant changes in cropping pattern of the scheme area. This phenomenon shows an increasing trend towards the cultivation of perennial crops. The area under perennial crops has increased after the soil conservation programme by decreasing the area under seasonal crops. The area under perennial crops has increased from 341.18 acres to 359.72 acres in the scheme area after the implementation of the programme. This indicates that the farmers have a tendency to cultivate perennial crops in the scheme area which helps to restrict soil erosion. Whereas the cultivation of seasonal crops in such regions may adversely affect soil erosion. District wise details are given below.

The trend in the cropping pattern of seasonal crops showed a decrease of 4.13% over the area before soil conservation programme. District wise details are presented separately. While analyzing the degree of change in the cropping pattern it is seen that after the introduction of soil conservation programme among perennial crops rubber has occupied the largest area and the percentage increase is 23.

Table - 3 – 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	18.42	66	19.81	70	9.51	34	8.59	30	27.93	100	28.40	100
2	Kollam	13.37	61	16.02	65	8.64	39	8.63	35	22.01	100	24.65	100
3	Pathanamthitta	12.26	62	14.14	70	7.36	38	6.18	30	19.62	100	20.32	100
4	Allappuzha	10.46	81	11.66	89	2.45	19	1.49	11	12.91	100	13.15	100
5	Kottayam	7.07	51	7.13	50	6.84	49	7.17	50	13.91	100	14.30	100
6	Idukki	166.55	91	168.69	91	16.77	9	17.56	9	183.32	100	186.25	100
7	Ernakulam	9.36	60	10.28	64	6.34	40	5.82	36	15.70	100	16.10	100
8	Thrissur	9.78	96	11.16	96	0.41	4	0.47	4	10.19	100	11.63	100
9	Palakkad	8.57	72	9.41	76	3.28	28	3.05	24	11.85	100	12.46	100
10	Malappuram	9.91	82	9.89	80	2.22	18	2.51	20	12.13	100	12.40	100
11	Kozhikode	29.29	99	29.30	97	0.39	1	0.95	3	29.68	100	30.25	100
12	Kannur	10.17	70	13.32	91	4.34	30	1.39	9	14.51	100	14.71	100
13	Kasaragod	35.97	98	38.91	97	80	2	1.41	3	36.77	100	40.32	100
	Total	341.18	83	359.72	85	69.35	17	65.22	15	410.53	100	424.94	100

Table - 4 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	9.01	13.99	54.27	0.06	0.01	-83.33	1.13	1.30	15.04
2	Kollam	8.67	11.28	30.10	0.11	0.29	163.63	1.56	1.65	5.76
3	Pathanamthitta	4.68	5.32	13.68	0.04	0.07	75.00	0.11	0.11	0.00
4	Allappuzha	10.02	11.14	11.18	0.05	0.14	180.00	-	-	-
5	Kottayam	1.08	1.19	10.18	0.32	0.32	0	0.13	0.13	0.00
6	Idukki	48.98	52.66	7.51	11.55	12.68	9.78	4.98	4.98	0.00
7	Eranakulam	5.88	5.99	1.87	0.02	0.05	150.00	0.05	0.15	200.00
8	Thrissur	5.26	6.45	22.62	0.13	0.15	15.38	0.66	0.65	-1.50
9	Palakkad	3.09	3.15	1.94	0.01	0.02	100.00	0.28	0.26	-7.14
10	Malappuram	6.91	7.06	2.17	0.34	0.49	44.12	0.43	0.48	11.62
11	Kozhikode	16.68	17.52	5.03	0.81	1.09	34.57	6.98	7.43	6.44
12	Kannur	3.83	6.53	70.49	2.52	3.49	38.49	3.25	2.73	-16.00
13	Kasaragod	12.46	12.55	0.72	3.36	3.57	6.25	19.68	22.02	11.89
	Total	136.55	154.83	13.38	19.32	22.47	16.30	39.24	41.89	6.75

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	0.94	0.96	2.12	1.30	2.37	82.30
2	Kollam	1.95	1.94	-5.1	0.40	0.62	55.00
3	Pathanamthitta	0.14	0.13	-7.14	6.01	7.28	21.13
4	Allappuzha	0.15	0.18	20.00	0.18	0.20	11.11
5	Kottayam	0.28	0.32	14.28	2.11	2.32	9.95
6	Idukki	10.56	11.89	12.59	19.85	23.65	19.14
7	Eranakulam	0.58	1.19	105.17	1.57	2.57	63.69
8	Thrissur	0.14	0.16	14.28	-	-	-
9	Palakkad	0.01	0.01	0.00	0.01	0.01	0.00
10	Malappuram	0.17	0.22	29.41	0.53	0.42	-20.75
11	Kozhikode	0.38	0.37	-2.63	0.15	0.15	0.00
12	Kannur	0.57	0.57	0.00	-	-	-
13	Kasaragod	0.47	0.77	63.82	-	-	-
	Total	16.34	18.71	14.50	32.11	39.57	23.23

Table - 5 (Contd.)

Sl. No.	Districts	Others			Total		
		Before SC work	After SC work	% increase	Before SC work	After SC work	% increase
1	2	3	4	5	6	7	8
1	Thiruvananthapuram	5.98	1.08	-81.93	18.42	19.81	7.54
2	Kollam	0.68	0.24	-64.70	13.37	15.02	19.22
3	Pathanamthitta	1.28	1.23	-3.90	12.26	14.14	15.53
4	Alappuzha	0.06	-	-	10.46	11.66	11.47
5	Kottayam	3.15	2.85	-9.52	7.07	7.13	0.84
6	Idukki	70.63	62.83	-11.04	166.55	168.69	1.28
7	Eranakulam	1.26	0.33	-73.80	9.36	10.28	9.82
8	Thrissur	3.59	3.75	4.45	9.78	11.16	14.11
9	Palakkad	5.17	5.96	15.28	8.57	9.41	9.80
10	Malappuram	1.53	1.22	-20.26	9.91	9.89	-0.20
11	Kozhikode	4.29	2.74	-36.13	29.29	29.30	0.03
12	Kannur	-	-		10.17	13.32	30.97
13	Kasaragod	-	-		35.97	38.91	8.17
	Total	97.62	82.23	-15.76	341.18	359.72	5.43

Table - 5 Area under selected Seasonal Crops

(Area in Acres)

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				7.62	6.28	-17.58	1.28	1.29	0.78
2	Kollam				5.58	6.14	10.03	1.86	2.22	19.35
3	Pathanamthitta				3.98	4.02	1.01	0.44	0.61	38.63
4	Allappuzha				0.72	0.92	27.77	0.11	0.28	154.54
5	Kottayam				2.82	3.12	10.63	1.06	1.28	20.75
6	Idukki	0.35	0.35		7.11	6.40	-9.98	4.30	6.38	48.37
7	Eranakulam				3.08	1.81	-41.23	0.96	1.01	5.20
8	Thrissur				-	0.20	-	0.14	-	-
9	Palakkad				1.18	1.08	-8.47	0.21	0.26	23.80
10	Malappuram				0.29	0.46	58.62	0.34	0.41	20.58
11	Kozhikode	0.02		-	0.06	0.22	266.66	0.22	0.55	150.00
12	Kannur				3.50	0.65	-81.42	0.54	0.74	37.03
13	Kasaragod	-	0.65		0.48	0.02	-95.83	0.32	0.74	131.25
	Total	0.37	1.00	170.27	36.42	31.32	-14.00	11.78	15.77	33.87

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	-	0.02		0.61	1.00	63.93	9.51	8.59	-9.67
2	Kollam	-	0.08		1.20	0.19	-84.16	8.64	8.63	0.11
3	Pathanamthitta	0.12	0.14	16.66	2.82	1.41	-50	7.36	6.18	-16.03
4	Allappuzha	0.12	0.22	83.33	1.50	0.07	-95.33	2.45	1.49	-39.18
5	Kottayam	1.03	1.20	16.50	1.93	1.57	-18.65	6.84	7.17	4.82
6	Idukki	1.15	1.49	29.56	3.86	2.94	-23.83	16.77	17.56	4.71
7	Eranakulam	-	0.05		2.30	2.95	28.26	6.34	5.82	-8.20
8	Thrissur	0.09	0.09	0.00	0.18	0.18	0.00	0.41	0.47	14.63
9	Palakkad				1.89	1.71	-9.52	3.28	3.05	-7.01
10	Malappuram				1.59	1.64	3.14	2.22	2.51	13.06
11	Kozhikode				0.09	0.18	100.00	0.39	0.95	143.58
12	Kannur				0.30	-		4.34	1.39	-67.97
13	Kasaragod				-	-		0.80	1.41	76.25
	Total	2.51	3.29	31.07	18.27	13.84	-24.24	69.35	65.22	-5.95

Impact of Soil Conservation measures on the yield of crops

Details regarding yield and value of crops are also collected from the beneficiaries in the scheme area. District wise data are furnished in the following tables.

An increasing trend has noted in the yield of the perennial crops during the period under report. Among perennial crops after the implementation of soil conservation 5% area effect has been occurred. At the same time yield effect has been recorded as 65% after the implementation of Soil Conservation programme.

The area effect and yield effect of seasonal crops shows that even after a decrease in area of 4.13% the yield has been recorded as an encouraging trend. For example ginger and plantain showed an increase of 32 and 35% respectively. This is due to the change in productivity of soil through the implementation of soil conservation programme.

Table - 6 - Crop wise yields and value of perennial crops in scheme area.

District	Name of Crop	Unit	Before SC work		After SC work		Value at constant price	Percentage increase/decrease
			Quantity	Value	Quantity	Value		
1	2	3	4	5	6	7	8	9
Thiruvananthapuram	Coconut	Nos.	4774	56258	49081	226445	125452	125
	Arecanut	Nos.	5450	2344	15750	12650	5913	8
	Cashew	Qtl.	4.71	10833	6.06	21791	13938	29
	Pepper	Qtl.	4.38	29324	4.51	90565	30194	30
	Rubber	Qtl.	4.23	20761	10.31	26466	50602	144
	Others		15.13	4839	4.16	1260		
	Total					373177		
Kollam	Coconut	Nos.	10490	33463	21905	108430	69558	105
	Arecanut	Nos.	10175	3867	31175	23381	11848	206
	Cashew	Qtl.	5.05	12564	6.19	21956	15400	23
	Pepper	Qtl.	6.05	40898	7.28	143212	49213	20
	Rubber	Qtl.	1.52	7398	2.36	6558	11486	55
	Others		2.80	480	1.60	640		
	Total					304177		
Pathanamthitta	Coconut	Nos.	7025	23042	11762	54576	38579	67
	Arecanut	Nos.	3680	1325	8400	5964	3024	128
	Cashew	Qtl.	.25	625	.39	1206	975	56
	Pepper	Qtl.	.75	4988	.74	15473	4921	-1
	Rubber	Qtl.	15.45	78702	18.93	52682	96429	23
	Others		3.40	810	10.10	4250		
	Total					134151		
Allappuzha	Coconut	Nos.	12775	63364	21467	103900	106476	68
	Arecanut	Nos.	4675	3553	16940	12366	12874	262
	Cashew	Qtl.	-	-	-	-	-	-
	Pepper	Qtl.	.51	3233	.64	12720	4057	25
	Rubber	Qtl.	.60	2880	.70	1933	3360	16
	Others		.80	222	-	-	-	
	Total					130919		
Kottayam	Coconut	Nos.	1405	5830	2254	8971	9353	60
	Arecanut	Nos.	29600	9768	39200	29008	12606	116
	Cashew	Qtl.	.36	798	.37	1130	820	3
	Pepper	Qtl.	.56	3779	.91	18790	6141	63
	Rubber	Qtl.	7.39	37800	8.47	23716	43324	15
	Others		10.60	3672	9.04	3720		
	Total	Qtl.		61647		85335		
Idukki	Coconut	Nos.	11270	38769	174252	665643	599430	55
	Arecanut	Nos.	1056825	359321	1515260	1242513	515189	43
	Cashew	Qtl.	16.73	39951	17.83	54650	42577	7
	Pepper	Qtl.	33.69	228890	42.09	887720	285960	25
	Rubber	Qtl.	70.99	365243	88.69	248332	456309	25
	Others	Qtl.	151.50	33206	161.15	48345		
	Total	Qtl.		1065380		3147203		
Ernakulam	Coconut	Nos.	8573	30091	12723	50892	44657	48
	Arecanut	Nos.	1850	629	6100	4270	2074	230
	Cashew	Qtl.	.12	298	.43	1457	1067	258
	Pepper		1.43	9708	3.28	67985	22267	129
	Rubber		5.89	30562	9.89	27741	50981	68
	Others	Qtl.	2.82	805	1.42	548		
	Total	Qtl.		71893		152893		

1	2	3	4	5	6	7	8	9
Thrissur	Coconut	Nos.	8500	27880	15570	72868	51069	83
	Arecanut	Nos.	12220	5255	18375	18008	7902	50
	Cashew	Qtl.	2.13	5338	2.24	8232	5614	5
	Pepper	Qtl.	.29	1922	.45	9221	2982	55
	Rubber	Qtl.	-	-	-	-	-	-
	Others		6.02	2430	7.45	3218		
	Total			42825		111547		
Palakkad	Coconut	Nos.	4681	20128	6845	28338	29433	46
	Arecanut	Nos.	925	296	2230	1539	714	141
	Cashew	Qtl.	.90	2219	.90	3139	2219	0
	Pepper	Qtl.	.04	265	.04	802	265	0
	Rubber	Qtl.	.04	218	.04	112	218	0
	Others	Qtl.	13.07	2786	15.23	6525		
	Total			25912		40455		
Malappuram	Coconut	Nos.	9785	21723	16012	70933	35547	64
	Arecanut	Nos.	32130	11246	61250	44100	21438	91
	Cashew	Qtl.	1.38	3777	1.66	6253	4543	20
	Pepper	Qtl.	.60	3991	.96	19514	6386	60
	Rubber	Qtl.	1.65	8869	1.47	4035	7901	-11
	Others	Qtl.	3.48	1065	3.28	1212		
	Total			50671		146047		
Kozhikode	Coconut	Nos.	31942	109880	49161	165673	169113	51
	Arecanut	Nos.	70875	20554	132435	86083	38406	87
	Cashew	Qtl.	15.71	39542	21.17	78181	53285	35
	Pepper	Qtl.	1.33	9017	1.52	31114	10305	14
	Rubber	Qtl.	.52	2791	.55	1508	2952	68
	Others	Qtl.	8.95	4232	8.42	4512		
	Total			186016		367071		
Kannur	Coconut	Nos.	6300	18270	16723	77762	48497	165
	Arecanut	Nos.	225540	67662	407055	276797	122117	80
	Cashew	Qtl.	9.20	24702	8.14	31933	21856	-12
	Pepper	Qtl.	1.56	10499	1.80	37364	12114	15
	Rubber	Qtl.	-	-	-	-	-	-
	Others	Qtl.	-	-	-	-	-	-
	Total			121133		423856		
Kasaragod	Coconut	Nos.	26178	122251	39859	194512	186141	52
	Arecanut	Nos.	317520	149234	462315	443822	217287	46
	Cashew	Qtl.	57.47	153043	70.90	257722	188807	23
	Pepper	Qtl.	2.28	15287	3.81	79138	25545	67
	Rubber	Qtl.	-	-	-	-	-	-
	Others	Qtl.	-	-	-	-	-	-
	Total			439815		975194		
STATE	Coconut		156898	570949	428614	1822943	1559718	173
	Arecanut	Nos.	1771465	635054	2714485	2200501	973117	53
	Cashew	Qtl.	114.01	293690	136.28	487650	351057	20
	Pepper	Qtl.	53.47	361801	68.03	1413618	460320	27
	Rubber	Qtl.	108.28	55024	141.41	393083	724842	31
	Others		218.57	54547	221.85	74230		
	Total			2471065		6392025	4069054	65

Table - 7 - Crop wise yields and value of perennial crops in ~~SC work~~

District	Name of Crop	Unit	Before SC work		After SC work		Value	Percentage
			Quantity	Value	Quantity	Value		
1	2	3	4	5	6	7	8	9
Thiruvananthapuram	Paddy	Qtl	-	-	-	-	-	-
	Tapioca	Qtl	526	178840	433	129900	147220	-18
	Ginger	Qtl	-	-	.38	2394	-	-
	Plantain	Qtl	41	16523	41	24600	16523	-
	Others	Qtl	65.40	13080	68.9	17225	-	-
	Total	Qtl		208443		174119		
Kollam	Paddy	Qtl	-	-	-	-	-	-
	Tapioca	Qtl	474	82950	522	150858	91350	10
	Ginger	Qtl	-	-	1.70	10809	-	-
	Plantain	Qtl	55	28875	69	28875	36225	25
	Others	Qtl	24.15	8018	42.30	19035	-	-
	Total	Qtl		119843		209577		
Pathanamthitta	Paddy	Qtl	-	-	-	-	-	-
	Tapioca	Qtl	346	104146	349	120754	105049	1
	Ginger	Qtl	2.35	12587	2.95	20355	15801	26
	Plantain	Qtl	15	7350	21	9300	10290	40
	Others	Qtl	28.62	9050	32.30	10982	-	-
	Total	Qtl		133133		161391		
Allappuzha	Paddy	Qtl	-	-	-	-	-	-
	Tapioca	Qtl	48	13056	61	20679	16592	27
	Ginger	Qtl	2.42	13068	4.80	25949	25920	98
	Plantain	Qtl	4	2100	9	4365	4725	125
	Others	Qtl	15.25	6503	10.83	5198	4618	-29
	Total	Qtl		34727		56191		
Kottayam	Paddy	Qtl	-	-	-	-	-	-
	Tapioca	Qtl	330	91410	365	109865	101105	11
	Ginger	Qtl	25.15	135961	28.16	188644	152233	12
	Plantain	Qtl	39	14742	47	21620	17766	21
	Others	Qtl	15.40	3304	21.84	5460	-	-
	Total	Qtl		245417		325589		
Idukki	Paddy	Qtl	525	2625	5.60	4043	2800	7
	Tapioca	Qtl	1337	268737	1203	295938	241803	-10
	Ginger	Qtl	25.68	132406	34.80	179324	179429	36
	Plantain	Qtl	202	94738	300	118200	140700	49
	Others	Qtl	50.70	10500	65.25	16313	-	-
	Total	Qtl		509006		613818		
Eranakulam	Paddy	Qtl	-	-	-	-	-	-
	Tapioca	Qtl	363	107811	214	91592	63558	-41
	Ginger	Qtl	-	-	.75	4865	-	-
	Plantain	Qtl	34	15674	35	13580	16135	3
	Others	Qtl	48.00	7800	49.01	9900	-	-
	Total	Qtl		131285		119937		
Thrissur	Paddy	Qtl	-	-	-	-	-	-
	Tapioca	Qtl	-	-	20	6780	-	-
	Ginger	Qtl	1.75	9011	1.92	12134	9886	10
	Plantain	Qtl	.4	2128	-	-	-	-
	Others	Qtl	2.11	1250	3.08	2002	-	-
	Total	Qtl		12389		20916		

1	2	3	4	5	6	7	8	9
Palakkad	Paddy	Qtl	-	-	-	-	-	-
	Tapioca	Qtl	97	30749	89	25187	28213	-8
	Ginger	Qtl	-	-	-	-	-	-
	Plantain	Qtl	7	4842	7	2905	4842	-
	Others	Qtl	10.11	2350	12.06	3196	-	-
	Total	Qtl		37941		31288		
Malappuram	Paddy	Qtl						
	Tapioca	Qtl	28	4480	46	12788	7360	64
	Ginger	Qtl						
	Plantain	Qtl	6	3048	7	3381	3556	17
	Others	Qtl	4.14	1672	6.15	3382		
	Total	Qtl		9200		19551		
Kozhikode	Paddy	Qtl	28	153	-	-	-	-
	Tapioca	Qtl	5	1150	19	7030	4370	280
	Ginger	Qtl						
	Plantain	Qtl	4	1540	11	5500	4235	175
	Others	Qtl	1.04	2000	4.20	3360		
	Total	Qtl		4843		15890		
Kannur	Paddy	Qtl	-	-	-	-	-	-
	Tapioca	Qtl	322	64400	60	22500	12000	-81
	Ginger	Qtl						
	Plantain	Qtl	12	5040	16	7808	6720	33
	Others	Qtl	8.65	6400	4.65	4185		
	Total	Qtl		75840		34493		
Kasaragod	Paddy	Qtl	-	-	9.75	6669	-	-
	Tapioca	Qtl	39	40500	2	1000	2077	-95
	Ginger	Qtl						
	Plantain	Qtl	9	3564	21	12600	8316	133
	Others	Qtl	1.28	580	3.12	1404		
	Total	Qtl		44644		21673		
STATE	Paddy	Qtl	5.53	2778	15.35	10712	7711	178
	Tapioca	Qtl	3915	988229	3383	994871	853941	-14
	Ginger	Qtl	57.35	303033	75.46	444474	398725	32
	Plantain	Qtl	432.00	200164	584	252734	270592	35
	Others	Qtl	274.85	72507	323.69	101642		
	Total	Qtl		1566711		1804433	1530969	-2

2.2 Cost Benefit Analysis of Soil Conservation Programme

In order to analyse the cost benefit of Soil conservation programme percentage rate of return implicit in the flows of benefits and cost of the project has to be assessed (IRR-Internal Rate of Return). Flows of ^{benefit - to be assessed in terms of production} approach. These benefits are to be further compared with the investments to arrive at benefit cost ratio, which gives an indication of the viability of the programme implemented. For getting a clear picture of the NPV (Net Present Value) productive benefits (direct ^{benefits from agricultural land - soil conservation} and after values) are taken into consideration. For calculating after values price changes due to inflation has also considered.

By considering the above factors an attempt is made for cost benefit analysis with the collected data.

In the present study the cost incurred for soil conservation programme including the maintenance work collected from 999 beneficiaries is Rs.3901586 which is shown below.

Table – 8 – District wise details of area cost and number of beneficiaries.

Sl No.	District	Area (Acre)	Cost (Rs)	No. of beneficiaries	
				Total	Selected
1	2	3	4	5	6
1	Thiruvananthapuram	31.32	85555	123	95
2	Kollam	26.85	75656	160	80
3	Pathanamthitta	25.25	148362	68	68
4	Allappuzha	17.74	52852	74	74
5	Kottayam	16.81	78688	69	69
6	Idukki	198.67	589948	119	100
7	Eranakulam	19.07	452627	222	123
8	Thrissur	16.97	475524	65	65
9	Palakkad	18.73	398686	133	107
10	Malappuram-ram	17.35	387522	108	92
11	Kozhikode	41.83	75625	83	80
12	Kannur	16.38	592874	25	25
13	Kasaragod	50.65	486327	21	21
	STATE	497.62	3901584	1350	999

The productive benefits obtained from the cultivation of land with various 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			Value increase/decrease in production
			Area Acre	Qty	Value Income	Area Acre	Qty	Value Income	
1	2	3	4	5	6	7	8	9	10
A. Perennial Crops	Coconut	Nos.	136.65	156898	570949	154.83	428614	1822943	1559718
	Areca nut	Nos.	19.32	1771465	635054	22.47	2714485	2200501	973117
	Cashew	Qtl.	39.24	114.01	293690	41.89	136.28	487650	351057
	Pepper	Qtl.	16.34	53.47	361801	18.71	68.03	1413618	460320
	Rubber	Qtl.	32.11	108.28	555024	39.57	141.41	393083	724842
	Others	Qtl.	97.62	218.57	54547	82.23	221.85	74230	
	Total A	Qtl.	341.18		2471065	359.72		6392025	4069054
B. Seasonal Crops	Paddy	Qtl.	0.37	5.53	2778	1.00	15.35	10712	7711
	Tapioca	Qtl.	36.42	39.15	988229	31.32	3383	994871	853941
	Ginger	Qtl.	2.51	57.35	303033	3.29	75.46	444474	398725
	Plantain	Qtl.	11.78	432.00	200164	15.77	584	252734	270592
	Others	Qtl.	18.27	275.21	72507	13.84	323.69	101642	
	Total B	Qtl.	69.35		1566711	65.22		1804433	1530969
Grand Total A+B			410.53		4037776	424.94		8196458	5600023

The total area under cultivation have been calculated to 424.94 acres. The value of crops before the SCP comes to Rs.4037776. The value of crops after Soil Conservation Programme has also calculated as Rs.5600023 (Value at Constant price). Thus the additional benefit due to implementation of Soil Conservation Programme is worked out as Rs.1562244. This shows that 40 % of the cost of SCP (including maintenance) has benefited in the scheme area. It implies that IRR is greater than in investment.

Main benefits derived from the Soil Conservation Programme are:-

(i) Extension of area:

It is observed that 14.41 acres of land has been additionally brought under cultivation. This benefit is achieved only due to the implementation of soil conservation measures.

(ii) Diversification of Cropping pattern:

In the scheme area cultivation of perennial crops have shown an encouraging performance. The increase in area of perennial crop is 5% higher over the area under the same before Soil Conservation programme.

(iii) Increase in Productivity:

The productivity of perennial as well as seasonal crops increased after the Soil Conservation Programme. The area effect after implementation of Soil Conservation Programme is 3.5 % where as the yield effect has been recorded as 38%.

A comparison of income, expenditure and net income from the beneficiary holdings in the scheme area and control plots will clearly indicate the benefits derived through the implementation of Soil Conservation Programme. These particulars are given in the following tables.

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

Sl.No	Name of District	Net Income		Expenditure		Net Income/ acre	
		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	97252	215953	93770	208349	3482	7604
2	Kollam	100717	176715	96141	169546	4576	7169
3	Pathanamthitta	106320	141447	100901	134486	5419	6961
4	Allappuzha	41789	81240	38552	75062	3237	6178
5	Kottayam	67199	85285	62368	79321	4831	5964
6	Idukki	869303	1431517	864561	1423831	4742	7686
7	Eranakulam	67902	90691	63577	85058	4325	5633
8	Thrissur	39404	67314	35537	61526	3867	5788
9	Palakkad	45586	86958	41739	79979	3847	6979
10	Malappuram	81368	99014	74660	91029	6708	7985
11	Kozhikode	96875	156301	93611	151134	3264	5167
12	Kannur	56023	96674	52162	90102	3861	6572
13	Kasaragod	145903	241395	141935	235408	3968	5987
	Total	1815641	2970904	1759514	2884931	4423	6990

The net income received from the beneficiary plot per acre is Rs.4423 before Soil Conservation work and Rs.6990 after Soil Conservation work.

Table 11 – 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	70453	23484	5728
2	Kollam	60858	20289	5156
3	Pathanamthitta	51765	17235	4735
4	Allappuzha	114774	38258	5518
5	Kottayam	13972	4657	3639
6	Idukki	163266	54442	4814
7	Ernakulam	20875	6958	3965
8	Thrissur	9663	3221	4121
9	Palakkad	32964	10988	3822
10	Malappuram	11934	3978	3753
11	Kozhikode	16378	5459	4216
12	Kannur	12657	4219	4822
13	Kasaragod	54948	18319	4985
	Total	697293	232431	4785

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	21	74	-	15	78	2	14	80	1
2	Kollam	20	60	-	14	65	1	12	68	-
3	Pathanamthitta	19	48	1	15	52	1	11	57	-
4	Allappuzha	18	54	2	12	60	2	8	65	1
5	Kottayam	16	52	1	13	55	1	10	58	1
6	Idukki	15	85	-	4	95	1	3	97	-
7	Eranakulam	13	110	-	3	120	-	5	118	-
8	Thrissur	9	55	1	5	60	-	10	55	-
9	Palakkad	7	100	-	2	105	-	5	100	2
10	Malappuram	17	75	-	8	82	2	6	86	-
11	Kozhikode	10	68	2	5	75	-	15	65	-
12	Kannur	9	15	1	4	20	1	6	18	1
13	Kasaragod	4	15	2	6	15	-	3	18	-
	Total	178	811	10	106	882	11	108	885	6

Table – 13 – Conditions of Bund

Sl.No	Name of Districts	Good	Partially Damaged	Seriously Damaged
1	2	3	4	5
1	Thiruvananthapuram	76	15	4
2	Kollam	60	20	-
3	Pathanamthitta	7	58	3
4	Allappuzha	66	7	1
5	Kottayam	59	8	2
6	Idukki	80	18	2
7	Eranakulam	100	21	2
8	Thrissur	52	10	3
9	Palakkad	90	10	7
10	Malappuram	86	6	-
11	Kozhikode	59	20	1
12	Kannur	20	5	-
13	Kasaragod	17	4	-
	TOTAL	772	202	25

Table – 14 – Occupational Profile

Sl. No.	Name of District	Occupation			Non-Agricultural Labours	Total
		Agriculture	Non-Agriculture	Agricultural Labours		
1	2	3	4	5	6	7
1	Thiruvananthapuram	35	5	50	6	95
2	Kollam	25	17	35	3	80
3	Pathanamthitta	45	2	13	8	68
4	Allappuzha	35	19	16	4	74
5	Kottayam	47	9	10	3	69
6	Idukki	30	15	45	10	100
7	Ernakulam	45	20	55	3	123
8	Thrissur	20	5	30	10	65
9	Palakkad	40	10	50	7	107
10	Malappuram	20	2	40	30	92
11	Kozhikode	20	7	35	18	80
12	Kannur	12	3	5	5	25
13	Kasaragod	8	2	10	1	21
	TOTAL	382	116	394	107	999

Chapter III

General Observation.

The distribution of holding of the selected beneficiaries of the Soil Conservation reveals that 86% of the beneficiaries have less than one acre and 11% have holding area between one acre to 3 acre. It is noted that only 2% of beneficiaries were possessing over 3 acre to 5 acre and the rest 1% have more than 5 acre.

The opinion of 999 selected beneficiaries are collected. Out of that 18% of the beneficiaries reported that contour bunds effectively controlled soil erosion while 81% opinioned that it moderately controls erosion of the soil. The rest 1 percent only opinion that contour bunds has no effect.

About the fertility of the soil about 11% are of the view that the conservation measures have improved the fertility remarkably. While 88% reported that the fertility of the soil has improved moderately and the rest 1 percent opinioned that it has no effect on fertility of soil.

In the case of moisture retention 10% reported that the scheme has substantially increased moisture retention while 89% reported that the scheme has caused moisture retention moderately only. About one percent only reported that it has not effected only change in moisture condition.

The district wise opinion about the effectiveness of bunds, fertility of the soil and moisture retention is given in the following tables.

Table 15 -Occupational Profile (Control Plots)

Sl. No.	Name of District	Occupation			Non-Agricultural Labours	Total
		Agriculture	Non-Agriculture	Agricultural Labours		
1	2	3	4	5	6	7
1	Thiruvananthapuram	15	7	2	1	25
2	Kollam	13	5	1	1	20
3	Pathanamthitta	10	5	2	1	18
4	Allappuzha	17	11	1	1	30
5	Kottayam	16	6	1	2	25
6	Idukki	12	4	2	2	20
7	Ernakulam	14	9	1	1	25
8	Thrissur	16	7	1	1	25
9	Palakkad	8	12	3	2	25
10	Malappuram	9	13	1	2	25
11	Kozhikode	6	10	2	2	20
12	Kannur	1	2	1	1	5
13	Kasaragod	2	1	1	1	5
	TOTAL	139	92	19	18	268

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Summary and conclusion

In the scheme area under Soil Conservation Programme stone pitched contour bunding has been done for preventing soil erosion. Considering the soil characteristics, precipitation and topography it is a popular method. Mostly the availability of local materials are used for this purpose. Small bunds are constructed across the slope of land along the contour lines at different vertical intervals. A series of such bunds split the area into small strips, thereby a major part of the rainfalling on the land between the two contour bounds is retained there itself. The wastage is thereby minimized, as the soil absorbs more water and moisture is retained for a long period. The water entering the soil surface spreads to the lower strata. This underground movement of water benefits the crops on the lands, as the soil retains more water preserving the soil temperature favourably. Flooding and siltation to the rivers and reservoirs are also controlled by adoption of soil conservation contour bunds.

The study reveals that there is a clear need for combined effort of soil conservation machinery and evaluation unit at the district level for the success of this programme.
