



Government of Kerala

**Evaluation study on
Soil Conservation
1996-97**

Department of Economics & Statistics

Thiruvananthapuram

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Preface

As per the 1991 Census, out of 83.01 lakh working population in Kerala more than 39 lakhs depend on agriculture and allied sectors for livelihood and employment. Eventhough agriculture thus constitutes the largest provider of employment, production front exhibits a diminishing trend year after year. This is due to certain problems faced in the agricultural front such as degradation of soil fertility, climate, topography, etc. The contrasting natural divisions of the state such as low lands, midlands and high lands contribute to soil erosion and loss of soil fertility. The high rainfall pattern and undulating topography of the State calls for the importance of soil and water conservation measures. By realising this importance both State and Central Governments have implemented various schemes to prevent soil erosion in the state through Soil Conservation Department every year

The Evaluation Study of schemes implemented by Soil Conservation Department has been done by the staff of Evaluation Division of Directorate of Economics & Statistics Department 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 49 schemes already completed by the Soil Conservation Department. The field survey was conducted during the aagricultural year 1996-97. 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.

It is hoped that 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' and Smt. T. Bhavana, Deputy Director, prepared the report.

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

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Thiruvananthapuram
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Chapter I

I.1 Introduction

Due to the peculiarity of the rainfall and topography of the State, Soil Conservation assumes importance in the planning process. 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 clayey. 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 spill ways.

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 benefits from investment on land.

I.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.

In order to attain better results of the evaluation study it should be required to re-evaluate the expected efficiency benefits of the project using current techniques –i.e. to compare the position at the time of project construction and the performance of the project from the date of project completion. With this end in view 49 schemes already completed by the Soil Conservation Department during the year 1991-92 were selected for the survey

conducted during 1996-97. 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 namely:

Holdings with less than 1 acre	- Stratum - I
Holdings with 1 acre to less than 3 acres	- Stratum - II
Holdings with 3 acre to less than 5 acres	- Stratum - III
Holdings with 5 acre 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 1 - Statement showing Stratum wise Distribution of Selected Beneficiaries

Sl. No.	District	No of Schemes Selected	Stratum-I		Stratum-II		Stratum-III		Stratum-IV		Total	
			No.	Area (Acre.)	No.	Area (Acre.)	No.	Area (Acre.)	No.	Area (Acre.)	No.	Area (Acre.)
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Thiruvananthapuram	4	59	11.73	3	6.10	-	-	-	-	62	17.83
2	Kollam	3	67	13.52	8	7.99	-	-	-	-	75	21.51
3	Pathanamthitta	4	85	21.19	15	16.70	-	-	-	-	100	37.89
4	Alappuzha	3	52	4.11	-	-	-	-	-	-	52	4.11
5	Kottayam	3	36	15.00	2	2.02	-	-	-	-	38	17.02
6	Idukki	2	8	7.92	19	41.75	19	80.02	4	26.67	50	156.36
7	Ernakulam	2	50	18.95	-	-	-	-	-	-	50	18.95
8	Thrissur	5	81	16.03	6	7.65	-	-	-	-	87	23.68
9	Palakkad	6	90	18.12	-	-	-	-	-	-	90	18.12
10	Malappuram	6	92	27.87	7	12.57	6	24.15	6	36.16	111	100.75
11	Kozhikode	2	47	6.39	3	3.00	-	-	-	-	50	9.39
12	Kannur	6	50	18.79	23	36.36	3	10.00	4	20.00	80	85.15
13	Kasargod	3	14	7.83	27	40.65	2	7.80	-	-	43	56.28
Total		49	731	187.45	113	174.79	30	121.97	14	82.83	888	567.04

Table 1(a) - Statement showing Stratum wise distribution of Control Plots

(Area in Acres)

Sl. No.	District	No of Schemes Selected	Stratum-I		Stratum-II		Stratum-III		Stratum-IV		Total	
			No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Thiruvananthapuram	4	19	6.04	1	2.00	-	-	-	-	20	8.04
2	Kollam	3	11	5.29	4	4.10	-	-	-	-	15	9.39
3	Pathanamthitta	4	15	4.88	5	5.30	-	-	-	-	20	10.18
4	Alappuzha	3	15	1.33	-	-	-	-	-	-	15	1.33
5	Kottayam	3	10	2.98	2	2.60	-	-	-	-	12	5.58
6	Idukki	2	4	2.78	4	9.39	1	3.50	1	8.00	10	23.67
7	Ernakulam	2	14	4.21	-	-	-	-	-	-	14	4.21
8	Thrissur	5	25	2.97	-	-	-	-	-	-	25	2.97
9	Palakkad	6	16	2.48	1	2.00	-	-	-	-	17	4.48
10	Malappuram	6	26	9.31	2	2.65	1	3.60	1	5.25	30	20.81
11	Kozhikode	2	10	2.39	-	-	-	-	-	-	10	2.39
12	Kannur	6	11	5.30	8	10.50	2	2.50	1	5.00	22	23.3
13	Kasargod	3	5	1.45	10	13.00	-	-	-	-	15	14.45
	Total	49	181	51.41	37	51.54	4	9.60	3	18.25	225	130.80

Thus from the 13 districts 49 schemes are selected. The total number of beneficiaries comes to 888. About 82% of the beneficiaries are having holding of less than one acre and only 2% of the beneficiaries are having holdings of more than 5 acre. In order to compare the benefits of the implementation of soil conservation programmes 225 control plots are also selected. Their distribution is 80%, 16%, 2% and 2% respectively under stratum I, II, III and 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

Land being the scarcest resource in Kerala needs to be handled in the most economical manner. Soil is the natural medium for crop growth and for human existence. Soil should be productive and conservation programmes are indispensable. Due to erosion topsoil may sometimes be disappeared which 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 Plan soil conservation activities in the State was confined to departmental programmes. By recognising the responsibility for prevention

of erosion soil conservation programme was rationalised. Government used to provide both loan and grant through budgetary support for soil conservation in arable lands. Central Government and NABARD 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.

I.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 Wayanad district is 3672937 hectares, of which forest occupies 1002722 hectare (27.3%) land put to non-agricultural use shares to 304975 hectares (8.3), barren and uncultivable land accounts to 42349 hectares (1.15%). Net area sown is 2147194 (58.46%). It is noticeable that land being a scarcest resource of the State, the cultivable was to shares to 44976 hectares (1.22%), fallow other than current fallow and current fallow accounts to 77420 hectares (2.10), land under miscellaneous tree crops shares to 25214 hectares.

Soil Conservation programmes

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

Earlier soil conservation programmes were carried out by individual knowledgeable farmers of the State independently. Later their programmes are carried out by different agencies like NABARD, NWDPRA, State Plan, etc. Financial assistance was also rendered by Central Government and different agencies for the implementation of the soil conservation programmes in the State. An evaluation study on the benefits derived from their 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 Wayanad district.

Chapter II

2.1 Impact of soil conservation programme on land use and cropping pattern

In order to design better land use planning and most apt manuring practices for the varied soil tracts of the State, various soil conservation schemes have been implemented in the State. Evaluations of the results of these programmes are very useful for the success of the decision process.

During the year under review 49 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	District	Area (Acre)	Cost (Rs)	No.of beneficiaries	
				Total	Selected
1	2	3	4	5	6
1	Thiruvananthapuram	17.83	64901	95	62
2	Kollam	21.51	71072	115	75
3	Pathanamthitta	37.89	138131	167	100
4	Alappuzha	4.11	3295	52	52
5	Kottayam	17.02	306784	38	38
6	Idukki	156.36	488591	50	50
7	Eranakulam	18.95	384854	70	51
8	Thrissur	23.68	74544	87	87
9	Palakkad	18.12	83434	107	90
10	Malappuram	100.75	287490	111	111
11	Kozhikode	9.39	48418	79	50
12	Kannur	85.15	483332	80	80
13	Kasaragod	56.28	275462	43	43
	Total	567.04	2710308	1094	888

Above table reveals that 888 beneficiaries were selected out total 1094 beneficiaries (81% of the total beneficiaries) and they occupy 567.04 acres of land. The cost incurred for the 49 schemes is Rs.2710308/-

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			
	Before		After		Before		After	
	Area	%	Area	%	Area	%	Area	%
1	2	3	4	5	6	7	8	9
1. Thiruvananthapuram	15.61	87.55	15.61	87.55				
2. Kollam	19.1	88.80	19.1	88.80				
3. Pathanamthitta	34.15	90.13	34.15	90.13				
4. Alappuzha	2.12	51.58	2.9	70.56				
5. Kottayam	4.24	24.91	4.24	24.91	0.01	0.06	0.01	0.06
6. Idukki	139.55	89.25	143.43	91.73				
7. Ernakulam	17.92	94.56	17.92	94.56				
8. Thrissur	19.93	84.16	19.9	84.04	0.46	1.94	0.43	1.82
9. Palakkad	14.65	80.85	14.65	80.85	0.11	0.61	0.11	0.61
10. Malappuram	88.26	87.60	88.88	88.22	0.63	0.63	0.03	0.03
11. Kozhikode	5.66	60.28	6.68	71.14	0.06	0.64	0.06	0.64
12. Kannur	71.69	84.19	75.11	88.21	18.64	21.89	13.23	15.54
13. Kasaragod	49.85	88.57	49.18	87.38	0.15	0.27		
Total	482.73	85.13	491.75	86.72	20.06	3.54	13.87	2.45

District	Other Use				Area not Cultivated				Total			
	Before		After		Before		After		Before		After	
	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
1	10	11	12	13	14	15	16	17	18	19	20	21
1. Thiruvananthapuram	1.37	7.68	1.37	7.68	0.85	4.77	0.85	4.77	17.83	100	17.83	100
2. Kollam	1.5	6.97	1.5	6.97	0.91	4.23	0.91	4.23	21.51	100	21.51	100
3. Pathanamthitta	3.44	9.08	3.44	9.08	0.3	0.79	0.3	0.79	37.89	100	37.89	100
4. Alappuzha	0.82	19.95	0.82	19.95	1.17	28.47	0.39	9.49	4.11	100	4.11	100
5. Kottayam	0.27	1.59	0.27	1.59	12.51	73.50	12.51	73.50	17.02	100	17.02	100
6. Idukki	5.49	3.51	5.49	3.51	11.32	7.24	7.44	4.76	156.36	100	156.36	100
7. Ernakulam	0.92	4.86	0.92	4.86	0.11	0.58	0.11	0.58	18.95	100	18.95	100
8. Thrissur	3.57	15.08	3.58	15.12	0.18	0.76	0.2	0.84	23.68	100	23.68	100
9. Palakkad	2.84	15.67	2.84	15.67	0.63	3.48	0.63	3.48	18.12	100	18.12	100
10. Malappuram	3.31	3.29	3.62	3.59	9.18	9.11	8.25	8.19	100.75	100	100.75	100
11. Kozhikode	0.98	10.43	0.98	10.44	2.75	29.29	1.73	18.42	9.39	100	9.39	100
12. Kannur	2.92	3.43	3.37	3.96	10.54	12.38	6.67	7.33	85.15	100	85.15	100
13. Kasaragod	1.65	2.94	1.72	3.06	4.78	8.49	5.38	9.56	56.28	100	56.28	100
Total	29.08	5.13	29.92	5.28	55.23	9.74	45.37	8.00	567.04	100	567.04	100

Above table reveals that as a result of soil conservation work, an area of 9 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 1.86.

Table 3(a) Land Use Particulars (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	6.04	75.12	-	-	0.44	5.47	1.56	19.40	8.04	100
2	Kollam	9.16	97.55	-	-	0.23	2.45	-	-	9.39	100
3	Pathanamthitta	9.36	91.94	-	-	0.82	8.06	-	-	10.18	100
4	Alappuzha	0.76	57.14	0.09	6.77	0.26	19.55	0.31	23.31	1.33	100
5	Kottayam	5.22	93.55	0.05	0.90	0.26	4.66	0.10	1.79	5.58	100
6	Idukki	15.48	92.53	-	-	0.50	2.99	0.75	4.48	16.73	100
7	Eranakulam	3.55	84.32	-	-	0.61	14.99	0.05	1.19	4.21	100
8	Thrissur	2.25	75.76	0.05	1.68	0.71	23.91	0.01	0.34	2.97	100
9	Palakkad	4.19	91.52	0.05	1.12	0.38	8.48	-	-	4.48	100
10	Malappuram	19.25	92.50	0.09	0.43	1.14	5.48	0.42	2.02	20.81	100
11	Kozhikode	1.79	74.90	-	-	0.23	9.62	0.37	15.48	2.39	100
12	Kannur	19.72	84.64	7.85	33.69	0.07	0.30	3.51	15.06	23.3	100
13	Kasaragod	14.18	98.13	-	-	0.16	1.11	0.11	0.76	14.45	100
	Total	110.86	84.76	8.18	6.18	8.81	6.66	8.13	6.21	130.80	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 85% of the area of the control plots were cultivated whereas the area not cultivated is about 6%.

The land use pattern and cropping pattern are interrelated. Implementation of soil conservation measures influences the cropping pattern of the State. The following table 4 reveals this tendency. Area under perennial crops has increased by 48.02 acres (ie.increase from 348.86 to 396.88 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. At the same time it is seen that the farmers are reluctant to cultivate seasonal crops due to various reasons such cost, expenditure and shortage of labour supply. The study reveals that the area under cultivation of seasonal crops has reduced after the implementation of soil conservation programme. There is a reduction of 39 acres in the area under seasonal crops.

Table 4 - Crop Pattern (Area wise)

Districts	Perennial Crops				Seasonal Crops			
	Before S.C Work	%	After S.C Work	%	Before S.C Work	%	After S.C Work	%
1	2	3	4	5	6	7	8	9
1. Thiruvananthapuram	11.05	70.79	11.9	76.23	4.56	29.21	3.71	23.77
2. Kollam	10.8	56.54	13.03	68.22	8.3	43.46	6.07	31.78
3. Pathanamthitta	21.35	62.52	25.8	75.55	12.8	37.48	8.35	24.45
4. Alappuzha	1.98	93.40	2.16	74.48	0.14	6.60	0.74	25.52
5. Kottayam	0.05	1.18	0.05	1.18	4.19	98.82	4.19	98.82
6. Idukki	78.83	56.49	105.79	73.76	60.72	43.51	37.64	26.24
7. Ernakulam	17.37	96.93	12.39	69.14	0.55	3.07	5.53	30.86
8. Thrissur	17.64	88.51	19.04	95.68	2.29	11.49	0.86	4.32
9. Palakkad	10.98	74.95	12.3	83.96	3.67	25.05	2.35	16.04
10. Malappuram	80.17	90.83	83.49	93.94	8.09	9.17	5.39	6.06
11. Kozhikode	4.66	82.33	5.69	85.18	1	17.67	0.99	14.82
12. Kannur	46.25	64.51	58.17	77.45	25.44	35.49	16.94	22.55
13. Kasargod	47.73	95.75	47.07	95.71	2.12	4.25	2.11	4.29
Total	348.86	72.27	396.88	80.71	133.87	27.73	94.87	19.29

Districts	Total			
	Before S.C Work	%	After S.C Work	%
1	10	11	12	13
1. Thiruvananthapuram	15.61	100	15.61	100
2. Kollam	19.1	100	19.1	100
3. Pathanamthitta	34.15	100	34.15	100
4. Alappuzha	2.12	100	2.9	100
5. Kottayam	4.24	100	4.24	100
6. Idukki	139.55	100	143.43	100
7. Ernakulam	17.92	100	17.92	100
8. Thrissur	19.93	100	19.9	100
9. Palakkad	14.65	100	14.65	100
10. Malappuram	88.26	100	88.88	100
11. Kozhikode	5.66	100	6.68	100
12. Kannur	71.69	100	75.11	100
13. Kasargod	49.85	100	49.18	100
Total	482.73	100	491.75	100

The following 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 variations has been noticed among various crops. In Thiruvananthapuram district due to soil conservation programmes land under cultivation of rubber has increased from 1 acre to 2.40 acres and in Kasaragod district from 2.00 acres to 3.4 acres contributing a percentage increase of 140 and 87 respectively. Area under coconut in Kannur district increased from 11.87 acres to 21.45 acres showing a highest percentage increase of 80.71. Though there is no change noticed in the area of coconut cultivation in Kottayam district, in all other districts changes to the effect of 5% to 81% have been noticed.

Table 5 - Area under Selected Perennial Crops

District	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
Thiruvananthapuram	5.02	7.70	53.39	-	0.05	-	0.63	0.73	15.87
Kollam	7.78	9.84	26.48	0.07	0.15	114.29	0.75	1.01	34.67
Pathanamthitta	8.14	9.00	10.57	0.07	0.03	-57.14	0.01	0.01	0.00
Alappuzha	1.70	2.02	18.82	0.07	0.08	14.29	-	0.01	-
Kottayam	0.03	0.03	0.00	-	-	-	-	-	-
Idukki	9.31	12.95	39.10	7.55	11.83	56.29	1.23	1.76	43.09
Eranakulam	7.00	7.20	2.86	1.02	0.70	-31.37	4.32	0.75	-82.64
Thrissur	14.61	16.04	9.79	0.76	0.81	6.58	0.50	0.83	66.00
Palakkad	9.00	10.81	20.11	0.03	0.09	200.00	0.25	0.47	88.00
Malappuram	45.55	47.88	5.01	10.43	11.42	9.49	1.64	1.81	10.37
Kozhikode	4.04	5.28	30.69	0.50	0.25	-50.00	-	-	-
Kannur	11.87	21.45	80.71	1.28	2.33	82.03	7.37	12.52	69.88
Kasaragod	7.50	9.53	27.07	2.60	3.67	41.15	27.75	19.15	-30.99
Total	131.62	159.68	21.32	24.38	31.41	28.84	44.45	39.05	-12.15

Table 5 - Area under Selected Perennial Crops (Contd.)

Districts	Pepper			Rubber			Others			Total		
	Before SC Work	After SC Work	% increase	Before SC Work	After SC Work	% increase	Before SC Work	After SC Work	% increase	Before SC Work	After SC Work	% increase
1	11	12	13	14	15	16	17	18	19	20	21	22
Tvm.	0.53	1.02	92.45	1.00	2.40	140.00	3.87	-		11.05	11.9	7.69
Klm	1.57	1.78	13.38	0.13	0.25	92.31	0.50	-		10.8	13.03	20.65
Pta	0.23	0.23	0.00	12.29	16.37	33.20	0.61	0.16	-73.77	21.35	25.8	20.84
Alp	0.08	0.05	-37.50	0.13	-		-			1.98	2.16	9.09
Ktm	0.02	0.02	0.00	-	-		-			0.05	0.05	0.00
Idk	55.39	71.11	28.38	5.35	8.14	52.15	-			78.83	105.79	34.20
Ekm	1.02	1.37	34.31	3.93	2.35	-40.20	0.01	0.02	100.00	17.37	12.39	-28.67
Tsr	1.04	1.33	27.88	0.03	0.03	0.00	0.70		-100.00	17.64	19.04	7.94
Pkd	0.08	0.10	25.00	0.12	0.13	8.33	1.50	0.70	-53.33	10.98	12.3	12.02
Mlp	6.43	7.69	19.60	12.42	12.78	2.90	3.70	1.96	-47.03	80.17	83.49	4.14
Kkd	0.10	0.12	20.00	-	0.01		0.02	0.03	50.00	4.66	5.69	22.10
Knr	14.71	10.22	-30.52	9.52	10.45	9.77	1.50	1.20	-20.00	46.25	58.17	25.77
Ksd	4.38	6.38	45.66	2.00	3.74	87.00	3.50	4.60	31.43	47.73	47.07	-1.38
Total	85.58	101.42	18.51	46.92	56.65	20.74	15.91	8.67	-45.51	348.86	396.88	13.76

The above table shows that after the implementation of soil conservation programme coconut has occupied the largest area under perennial crops. The area under coconut has increased from 131.62 acres to 159.68 acres. Eventhough it occupied the largest area the percentage increase in area is recorded to the highest for arecanut, while the area occupation rank of arecanut is four. The area of arecanut increased from 24.38 acres to 31.41 acres amounting to an increase of 28.84%. While in the second place increase in area of about 21.32% is seen for coconut. In area occupation pepper stands second. The area under this crops before Soil conservation work was 85.58 acres. It increased to 101.42 acres after soil conservation work. The percentage increase is 18.51 and attains 4th rank in position. Next to pepper, rubber, occupied the largest area. It increased from 46.92 acres to 56.65 acres. The percentage increase is 20.74 shows the third position. Among the selected perennial crops the only crop which showed a negative trend after the implementation of soil conservation work is cashew. Before soil conservation work it was 44.45 acres. It decreased to 39.05 acres showing a decrease of 12.15 per cent. While evaluating the overall performance of selected perennial crops it showed a positive impact of 13.76%.

Among the seasonal crops the area under paddy, tapioca, ginger, etc. has been reduced substantially. In the scheme area in two districts paddy was seen cultivated before soil conservation work. But after soil

conservation work paddy is not seen cultivated there. Regarding tapioca the decrease in area is 38.22% and for ginger it is 48.77%.

Table 6 - Area under Selected Seasonal Crops (Area in Acres.)

District	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
Thiruvananthapuram	-	-	-	4.24	2.87	-32.31	0.29	0.20	-31.03
Kollam	-	-	-	7.02	4.71	-32.31	0.41	0.61	48.78
Pathanamthitta	-	-	-	10.24	5.87	-42.68	0.64	0.94	46.88
Alappuzha	-	-	-	0.10	0.20	100.00	0.04	0.29	625.00
Kottayam	0.58	-	-100	3.61	3.98	10.25	-	0.15	-
Idukki	6.90	-	-100	38.13	25.12	-34.12	6.90	8.29	20.14
Eranakulam	-	-	-	-	0.20	-	0.05	0.40	700.00
Thrissur	-	-	-	0.54	0.25	-53.70	0.63	0.50	-20.63
Palakkad	-	-	-	1.56	1.33	-14.74	0.85	0.98	15.29
Malappuram	-	-	-	5.39	1.08	-79.96	0.18	0.77	327.78
Kozhikode	-	-	-	-	-	-	0.50	0.80	60.00
Kannur	-	-	-	22.60	11.45	-49.34	1.74	3.99	129.31
Kasaragod	-	-	-	0.95	1.25	31.58	0.20	0.26	30.00
Total	7.48	-	-100	94.38	58.31	-38.22	12.43	18.18	46.26

District	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	11	12	13	14	15	16	17	18	19
Thiruvananthapuram	-	-	-	0.03	0.64	2033.33	4.56	3.71	-18.64
Kollam	0.12	0.15	25.00	0.75	0.60	-20.00	8.3	6.07	-26.87
Pathanamthitta	0.42	0.22	-47.62	1.50	1.32	-12.00	12.8	8.35	-34.77
Alappuzha	-	0.22	-	-	0.03	-	0.14	0.74	428.57
Kottayam	-	-	-	-	0.06	-	4.19	4.19	0.00
Idukki	7.70	2.53	-67.14	1.09	1.70	55.96	60.72	37.64	-38.01
Eranakulam	-	0.20	-	0.50	31.73	846.00	0.55	5.53	905.45
Thrissur	-	-	-	1.12	0.11	-90.18	2.29	0.86	-62.45
Palakkad	0.04	0.04	0.00	1.22	-	-100.00	3.67	2.35	-35.97
Malappuram	0.02	0.06	200.00	2.50	3.48	39.20	8.09	5.39	-33.37
Kozhikode	0.30	0.19	-36.67	0.20	-	-100.00	1	0.99	-1.00
Kannur	0.60	1.00	66.67	0.50	0.50	0.00	25.44	16.94	-33.41
Kasaragod	0.97	0.60	-38.14	-	-	-	2.12	2.11	-0.47
Total	10.17	5.21	-48.77	9.41	13.17	39.96	133.87	94.87	-29.13

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 S.C work		After S.C work		Value at constant price	% increase/decrease
			Qty	Value	Qty	Value		
1	2	3	4	5	6	7	8	9
Thiruvananthapuram	Coconut	Nos	6800	18739	18870	65309	52001	178
	Arecanut	Nos	600	152	2050	897	519	241
	Cashew	Qtl	2.63	3050	3.6	10010	4175	37
	Pepper	Qtl	2.47	7680	4.39	30130	13650	78
	Rubber	Qtl	3.25	7550	12.5	56050	29038	285
	Others	Qtl.	15.1	2536	0.6	210	101	-96
	Total			39707		162606		
Kollam	Coconut	Nos	9842	29247	15685	60348	46610	59
	Arecanut	Nos	4708	1338	12160	4729	3456	158
	Cashew	Qtl	2.43	3238	2.61	7587	3478	7
	Pepper	Qtl	4.87	15218	5.61	37901	17530	15
	Rubber	Qtl			1.8	8123		
	Others	Qtl	6.28	1300	0.02	106	4	-100
	Total			50341		118794		
Pathanamthitta	Coconut	Nos	17348	52937	19746	73512	60254	14
	Arecanut	Nos	5710	1513	3972	1759	1052	-30
	Cashew	Qtl	0.48	634	0.54	1530	713	12
	Pepper	Qtl	1.28	4135	1.66	11622	5363	30
	Rubber	Qtl	47.7	67734	65.77	300479	93393	38
	Others	Qtl	26.57	4564	9.01	1500	1548	-66
	Total			131517		390402		
Alappuzha	Coconut	Nos	3016	9235	3906	14486	11960	30
	Arecanut	Nos	2090	569	3615	1322	984	73
	Cashew	Qtl						
	Pepper	Qtl	0.27	587	0.15	971	326	-44
	Rubber	Qtl	0.43	645			0	
	Others	Qtl	0.61	152	0.4	81	100	-34
	Total			11188		16860		
Kottayam	Coconut	Nos	120	378	164	628	517	37
	Arecanut	Nos	150	38			0	
	Cashew	Qtl						
	Pepper	Qtl	0.04	129	0.09	618	290	125
	Rubber	Qtl						
	Others	Qtl		125		612		
	Total			670		1858		

(Table 7 contd.)

District	Name of Crop	Unit	Before S.C work		After S.C work		Value at constant price	% increase/decrease
			Qty	Value	Qty	Value		
1	2	3	4	5	6	7	8	9
Idukki	Coconut	Nos	22342	75357	30247	117319	102020	35
	Arecanut	Nos	859434	229813	1568199	692673	419337	82
	Cashew	Qtl	4.2	5519	5.25	14140	6899	25
	Pepper	Qtl	176.85	580487	253.87	176880	833295	44
	Rubber	Qtl	21.76	32205	29.98	137713	44371	38
	Others	Qtl	1.5	3212	1	5612	2141	-33
	Total			926593		1144337		
Eranakulam	Coconut	Nos	9177	30625	11248	42854	37536	23
	Arecanut	Nos	12000	3139	30071	11547	7866	151
	Cashew	Qtl	6.2	9210	2.75	7510	4085	-56
	Pepper	Qtl	2.51	8160	3.61	25073	11736	44
	Rubber	Qtl			11.71	53650		
	Others	Qtl				437		
	Total			51134		141071		
Thrissur	Coconut	Nos	26615	81981	38400	142502	118282	44
	Arecanut	Nos	45900	14601	68210	29419	21698	49
	Cashew	Qtl	1.61	2371	2.64	7819	3888	64
	Pepper	Qtl	2.12	6870	4.33	30198	14032	104
	Rubber	Qtl						
	Others	Qtl	2	2230		610		
	Total			108053		210548		
Palakkad	Coconut	Nos	12590	37235	22310	75687	65982	77
	Arecanut	Nos	1755	466	4930	1624	1309	181
	Cashew	Qtl	0.8	1090	1.53	4472	2085	91
	Pepper	Qtl	0.27	864	0.38	2632	1216	41
	Rubber	Qtl						
	Others	Qtl	2.1	2232		1688		
	Total			41887		86103		
Malappuram	Coconut	Nos	95417	273780	100637	319633	288758	5
	Arecanut	Nos	612852	183243	924792	299263	276513	51
	Cashew	Qtl	5.25	7722	5.82	16724	8560	11
	Pepper	Qtl	22.56	72862	33.51	229363	108227	49
	Rubber	Qtl	26.5	40545	107.4	505371	164322	305
	Others	Qtl	2.7	5156	1.1	4115	2101	-59
	Total			583308		1374469		
Kozhikode	Coconut	Nos	8720	22340	9290	33528	23800	7
	Arecanut	Nos	9950	2116	10350	3015	2201	4
	Cashew	Qtl						
	Pepper	Qtl	0.35	1157	0.45	3092	1488	29
	Rubber	Qtl						
	Others	Qtl	1.7	1732	0.9	2422	917	-47
	Total		-	27345	-	42057	-	-

(Table 7 contd.)

District	Name of Crop	Unit	Before S.C work		After S.C work		Value at constant price	% increase/decrease
			Qty	Value	Qty	Value		
1	2	3	4	5	6	7	8	9
Kannur	Coconut	Nos	15975	47126	43550	150034	128472	173
	Arecanut	Nos	116300	27796	217150	7700	51899	87
	Cashew	Qtl	20.09	30436	36.67	119177	55554	83
	Pepper	Qtl	40.23	132513	17.74	121685	58434	-56
	Rubber	Qtl	43	64500	93.3	437623	139950	117
	Others	Qtl		72	0.4	2123		
	Total			302443		838342		
Kasaragod	Coconut	Nos	10845	32320	22590	63443	67322	108
	Arecanut	Nos	120000	41052	733000	384092	250759	511
	Cashew	Qtl	81.05	120996	85.8	274828	128087	6
	Pepper	Qtl	12.35	40509	21.3	148631	69866	72
	Rubber	Qtl			11	51403		
	Others	Qtl		195		533		
	Total			235072		922930		
STATE	Coconut	Nos	238807	711300	336643	1159283	1002710	41
	Arecanut	Nos	1791449	505836	3578499	1438040	1010430	100
	Cashew	Qtl	124.74	184266	147.21	463797	217459	18
	Pepper	Qtl	266.17	871171	347.09	818796	1136021	30
	Rubber	Qtl	142.64	213179	333.46	1550412	498364	134
	Others	Qtl	58.56	23506	13.43	20049	5391	-77
	Total			2509258		5450377	3870375	54

From the above table it is seen that yield of perennial crops increased due to the implementation of soil conservation programme. While the increase in area of rubber is only 20.79%. The yield shows a substantial increase of 134% over production before soil conservation programme. Though the area under cashew has decreased by 12.15% there is an increase of 18% in the yield of cashew.

The analysis of the production details at district level shows that along with reduction in area under pepper cultivation production also has decreased in Alappuzha and Kannur districts. In Ernakulam district compared with the reduction in area under cashew production has not reduced to that extent. Similar is the case with arecanut in Pathanamthitta district. When under arecanut area has reduced by 57.14%, there is only 30% reduction in production.

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 29% (see table 6) and 13% respectively. This is mainly due to the decrease in area under paddy, tapioca and ginger in the scheme area. It is particularly noticed that no change has been recorded in the case of paddy sector after the implementation of soil conservation programmes. Out of the thirteen

districts covered under the study in eight districts there is decrease in area of tapioca and production has also come down in six districts. In the case of ginger four districts viz. Pathanamthitta, Idukki, Kozhikode, Kasaragod show reduction in area while production decrease is noticed among three districts viz. Pathanamthitta, Idukki and Kozhikode.

Due to the implementation of soil conservation measures area as well as production of plantain have benefited. In area percentage increase is recorded as 46 and in production it is 64%.

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

District	Name of Crop	Unit	Before S.C work		After S.C work		Value at constant price	% increase
			Qty	Value	Qty	Value		
1	2	3	4	5	6	7	8	9
Thiruvananthapuram	Paddy	Qtl						
	Tapioca	Qtl	64.4	8533	67.55	17393	8950	4.89
	Ginger	Qtl						
	Plantain	Qtl	15.8	3860	19.95	5237	4874	26.27
	Others	Qtl	1	200	4	1503	800	300.00
	Total		81.2	12593	91.5	24133	14190	12.68
Kollam	Paddy	Qtl						
	Tapioca	Qtl	168.5	22203	141.35	31436	18625	-16.11
	Ginger	Qtl	3.6	9427	5.28	29740	13826	46.66
	Plantain	Qtl	6.97	1568	14.2	4864	3194	103.70
	Others	Qtl	3	3305	5.5	6200	6059	83.33
	Total		182.07	36503	166.33	72240	33347	-8.65
Pathanamthitta	Paddy	Qtl						
	Tapioca	Qtl	320.7	48451	238.62	69517	36050	-25.59
	Ginger	Qtl	9.56	24896	6.98	41863	18177	-26.99
	Plantain	Qtl	19.34	5183	29.93	12271	8021	54.76
	Others	Qtl	1	246	0.9	376	221	-10.16
	Total		350.6	78776	276.43	124027	62111	-21.15
Alappuzha	Paddy	Qtl						
	Tapioca	Qtl	6	831	9.35	2746	1295	55.84
	Ginger	Qtl						
	Plantain	Qtl	0.64	272	5.21	1723	2214	713.95
	Others	Qtl			0.2	652		
	Total		6.64	1103	14.76	5121	2452	122.30
Kottayam	Paddy	Qtl						
	Tapioca	Qtl	95	15774	130	35173	21585	36.84
	Ginger	Qtl						
	Plantain	Qtl			4.15	1340		
	Others	Qtl			0.6	806		
	Total		95	15774	134.75	37319	22374	41.84
Idukki	Paddy	Qtl	43.35	14410			0	
	Tapioca	Qtl	1210.95	210956	1004.41	293808	174975	-17.06
	Ginger	Qtl	409.85	987054	165.35	765348	398217	-59.66
	Plantain	Qtl	186.75	50796	284.81	92160	77468	52.51
	Others	Qtl	2	1409	3.8	2400	2677	89.99
	Total		1852.9	1264625	1458.37	1153716	995354	-21.29

(Table 8 contd.)

District	Name of Crop	Unit	Before S.C work		After S.C work		Value at constant price	% increase
			Qty	Value	Qty	Value		
1	2	3	4	5	6	7	8	9
Ernakulam	Paddy	Qtl						
	Tapioca	Qtl						
	Ginger	Qtl			6.5	21908		
	Plantain	Qtl	0.6	199	8.4	2975	2786	1300.00
	Others	Qtl	0.5	100	80	13000	16000	15900.00
	Total		1.1	299	94.9	37883	25796	8527.42
Thrissur	Paddy	Qtl						
	Tapioca	Qtl	10.5	1642	9.25	1869	1447	-11.88
	Ginger	Qtl						
	Plantain	Qtl	9.45	2055	8.5	3455	1848	-10.07
	Others	Qtl	3	1200	1	550	400	-66.67
	Total		22.95	4897	18.75	5874	4001	-18.30
Palakkad	Paddy	Qtl						
	Tapioca	Qtl	27.89	3064	29.05	5664	3191	4.14
	Ginger	Qtl	1.2	3025	1.25	6463	3151	4.17
	Plantain	Qtl	12.12	2848	20.6	6589	4841	69.98
	Others	Qtl	0.2	231				
	Total		41.41	9168	50.9	18716	11269	22.92
Malappuram	Paddy	Qtl						
	Tapioca	Qtl	106.8	15414	33.47	7072	4831	-68.66
	Ginger	Qtl	0.7	1764	1.16	5172	2923	65.70
	Plantain	Qtl	4.73	1192	16.21	7396	4085	242.70
	Others	Qtl	0.5	298	2.15	817	1281	329.87
	Total		112.73	18668	52.99	20457	8775	-52.99
Kozhikode	Paddy	Qtl						
	Tapioca	Qtl						
	Ginger	Qtl	8.1	21026	6.25	32676	16224	-22.84
	Plantain	Qtl	7.55	2023	15.62	5519	4186	106.87
	Others	Qtl	1.5	787				
	Total		17.15	23836	21.87	38195	30396	27.52
Kannur	Paddy	Qtl						
	Tapioca	Qtl	378	62514	290	88772	47960	-23.28
	Ginger	Qtl	14	34471	24.31	120898	59856	73.64
	Plantain	Qtl	23.45	5000	45.6	14820	9723	94.46
	Others	Qtl	1.8	863	1.6	834	767	-11.12
	Total		417.25	102848	361.51	225324	89109	-13.36
Kasaragod	Paddy	Qtl						
	Tapioca	Qtl	29.5	5489	38.75	12787	7210	31.35
	Ginger	Qtl	10.75	2774	14.6	66839	3767	35.80
	Plantain	Qtl	5.3	1659	6.88	2622	2154	29.84
	Others	Qtl						
	Total		45.55	9922	60.23	82248	13120	32.23
STATE	Paddy	Qtl	43.35	14410				
	Tapioca	Qtl	2418.24	394871	1991.8	566237	325238	-17.63
	Ginger	Qtl	457.76	1084437	231.68	1090907	548852	-49.39
	Plantain	Qtl	292.7	76655	480.06	160971	125723	64.01
	Others	Qtl	14.5	8639	99.75	27138	59430	587.93
	Total		3226.55	1579012	2803.29	1845253	1371877	-13.12

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 in productive. 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 ratio, 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.2710318/-.

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 & Value of Selected Perennial Crops and Seasonal Crops

Type	Name of crop	Unit	Before S.C work.			After S.C work.			Value at constant price *
			Area Acre	Qty	Value	Area Acre	Qty	Value	
1	2	3	4	5	6	7	8	9	10
A. Perennial Crops	Coconut	Nos	131.62	238807	711300	159.68	336643	1159283	1002710
	Areca nut	Nos	24.38	1791449	505836	31.41	3578499	1438040	1010430
	Cashew	Qtl	44.45	124.74	184266	39.05	147.21	463797	217459
	Pepper	Qtl	85.58	266.17	871171	101.42	347.09	818796	1136021
	Rubber	Qtl	46.92	142.64	213179	56.65	333.46	1550412	498364
	Others	Qtl	15.91	58.56	23506	8.67	13.43	20049	5391
	Total A		348.86		2509258	396.88		5450377	3870375
B. Seasonal Crops	Paddy	Qtl	7.48	43.35	14410	-	-	-	-
	Tapioca	Qtl	94.38	2418.24	394871	58.31	1991.8	566237	325238
	Ginger	Qtl	12.43	457.76	1084437	18.18	231.68	1090907	548852
	Plantain	Qtl	10.17	292.7	76655	5.21	480.06	160971	125723
	Others	Qtl	9.41	14.5	8639	13.17	99.75	27138	59430
	Total B		133.87	3226.55	1579012	94.87	2803.29	1845253	1371877
Grand Total A+B			482.73	-	4088270	491.75	-	7295630	5242252

* Constant Price - Price before S.C work has been used.

The total area under cultivation after soil conservation work was 491.75 acres. The value of crops before the soil conservation programme comes to Rs.4088270/- the value of crop after the soil conservation programme has also been calculated as Rs.5242252/- at the rate prevailed before the soil conservation programme so as to eliminate price changes due to inflation and other factors such as demand and supply, which may affect the price level. Thus the annual additional benefits due to the implementation of soil conservation programme is worked out to be Rs.1153982/-. This shows that 43% of the cost of soil conservation programme (including maintenance) has been benefited in the year itself. 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 benefits are –

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

i) Extension of area under cultivation -

The study results shows that 9.02 acres of land has been additionally brought under cultivation by cultivating land which could not be cultivate before soil conservation programme. In other wards implementation 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 conservation programme. The above particulars are furnished in table 10 and 10 (a).

**Table 10 - Income, Expenditure and Net Income of Beneficiary Holdings
(in Rupees)**

Sl No	District	Income		Expenditure		Net Income	
		Before S.C work	After S.C work	Before S.C work	After S.C work	Before S.C work	After S.C work
1	2	3	4	5	6	7	8
1	Thiruvananthapuram	68320	220690	19725	82250	48595	138440
2	Kollam	87844	196103	54756	67647	33088	128456
3	Pathanamthitta	225966	518214	80931	284901	145035	233313
4	Alappuzha	13897	24838	-1481	-2772	15378	27610
5	Kottayam	17430	41695	5901	29500	11529	12195
6	Idukki	2229527	2338705	1522730	1128043	706797	1210662
7	Eranakulam	52354	198334	39067	122083	13287	76251
8	Thrissur	111846	218735	84985	136590	26861	82145
9	Palakkad	50978	104502	20345	44217	30633	60285
10	Malappuram	602418	1398706	519865	764815	82553	633891
11	Kozhikode	51225	80960	40240	56790	10985	24170
12	Kannur	406244	1064620	212635	322360	133609	742260
13	Kasaragod	245236	1006025	94450	695485	150786	310540
	State	4163285	7412127	2694149	3731909	1469136	3680218

Table 10(a) - Income, Expenditure and Net Income of Control Plots*(in Rupees)*

Sl No	District	Income	Expen- Diture	Net Income
1	Thiruvananthapuram	50510	18090	32420
2	Kollam	125281	68260	57021
3	Pathanamthitta	115292	61378	53914
4	Alappuzha	12587	5656	6931
5	Kottayam	18070	3195	14875
6	Idukki	238166	108170	129996
7	Eranakulam	70220	42830	27390
8	Thrissur	22172	12947	9225
9	Palakkad	38426	22108	16318
10	Malappuram	118429	57235	61194
11	Kozhikkode	8200	800	7400
12	Kannur	80432	33200	47232
13	Kasargod	40840	8430	32410
	State Total	938625	442299	496326

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.3680218/- and from the control plot is 495326/-. The district wise net income per acre is given in table 11 and 11 (a).

Table 11
Net Income per Acre Before and After Soil Conservation Programme
(Income in rupees)

Sl No	District	Before S.C Work			After S.C Work		
		Area	Income	Income/Acre	Area	Income	Income/Acre
1	2	3	4	5	6	7	8
1	Thiruvananthapuram	15.61	48595	3113	15.61	138440	8869
2	Kollam	19.10	33088	1732	19.10	128456	6725
3	Pathanamthitta	34.15	145035	4247	34.15	233313	6832
4	Alappuzha	2.12	15378	7254	2.90	27610	9521
5	Kottayam	4.24	11529	2719	4.24	12195	2876
6	Idukki	139.55	706797	5065	143.43	1210662	8441
7	Eranakulam	17.92	13287	741	17.92	76251	4255
8	Thrissur	19.93	26861	1348	19.90	82145	4128
9	Palakkad	14.65	30633	2091	14.65	60285	4115
10	Malappuram	88.26	82553	935	88.88	633891	7132
11	Kozhikode	5.66	10985	1941	6.68	24170	3618
12	Kannur	71.69	193609	2701	75.11	742260	9882
13	Kasaragod	49.85	150786	3025	49.18	310540	6314
	Total	482.73	1469136	3043	491.75	3680218	7484

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

Sl No	District	Area in Acre	Net Income (Rs)	Net Income per Acre.
1	2	3	4	5
1.	Thiruvananthapuram	6.04	32420	5368
2.	Kollam	9.16	57021	6225
3.	Pathanamthitta	9.36	53914	5760
4.	Alappuzha	0.76	6931	9120
5.	Kottayam	5.22	14875	2850
6.	Idukki	15.48	129996	8398
7.	Eranakulam	3.55	27390	7715
8.	Thrissur	2.25	9225	4100
9.	Palakkad	4.1	16318	3980
10.	Malappuram	19.25	61194	3179
11.	Kozhikkode	1.79	7400	4134
12.	Kannur	19.72	47232	2395
13.	Kasargod	14.18	32410	2286
	State	110.86	496326	4477

The survey results shows that the rate of income from the scheme are a is high when compared to the income from the holding 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.7484/- while the net income per acre received from the control plot is only Rs.4477.

Chapter III

3.1 General Observation

At 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 studies the opinion of 888 selected beneficiaries were collected. Out of this 21. % were of the opinion that construction of contour bund effectively controlled the soil erosion, 78% remarked that it is moderately helpful for soil erosion only 1% had a 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 23% of the beneficiaries' soil conservation measures have improved the fertility of the soil remarkably. While 76% reported that it moderately improved the soil fertility and the remaining 1% 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 33% of the selected beneficiaries it is seen that the scheme have sunstantially increased moisture retention while about 66% reported that it moderately increased and the remaining one per cent 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 Bund, Fertility of the Soil and Moisture Retention

Districts	Effectiveness of Contour Bund			Fertility of 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
Thiruvananthapuram	62	-	-	61	1	-	61	1	-
Kollam	-	71	4	-	71	4	-	70	5
Pathanamthitta	-	100	-	-	100		-	100	-
Alappuzha	8	44		6	44	2	44	8	-
Kottayam	7	30	1	13	24	1	4	33	1
Idukki	7	43	-	6	44	-	10	40	-
Eranakulam	-	50	-		50	-	-	50	-
Thrissur	2	85	-	19	68	-	75	12	-
Palakkad	1	89	-	2	88	-	1	89	-
Malappuram	24	87	-	24	87	-	24	87	-
Kozhikode	-	50	-	-	50	-	-	50	-
Kannur	76	4	-	76	4	-	76	4	-
Kasaragod	1	42	-	-	41	2	-	41	2
State	188	695	5	207	672	9	295	585	8

The benefit of the construction of a 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 observed that about 74% of the bunds are in good condition 25% is partially damaged and only one 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 - Condition of Bund

Sl No	District	Good	Partially Damaged	Seriously Damaged
1	2	3	4	5
1	Thiruvananthapuram	50	12	-
2	Kollam	54	21	-
3	Pathanamthitta	78	22	-
4	Alappuzha	9	43	-
5	Kottayam	22	16	-
6	Idukki	40	10	-
7	Eranakulam	25	25	-
8	Thrissur	65	22	-
9	Palakkad	66	24	-
10	Malappuram	108	3	-
11	Kozhikkode	50	-	-
12	Kannur	52	28	-
13	Kasargod	41	-	2
	Total	660	226	2

It is interesting to note that while 82% of the selected beneficiaries have holding size less than one acre. 13% have holding area between 1 acre and 3 acres the remaining 5.1 only have a large area of more than 3 acres.

3.2 Occupational Profile

The emerging cropping pattern of the state exhibits certain peculiarities. The most important is in the field of occupational pattern. Hence it is interesting to analyse the occupational profile of the selected beneficiaries. From the following table 14 it is seen that about 18% of the selected beneficiaries are engaged in agriculture and 11% in non-agriculture activities. Agricultural labourers constitutes 55% of the total beneficiaries. The percentage share of non-agricultural labourers comes to 16%.

Table 14 - Occupational Profile

Sl No	District	Occupation				
		Agriculture	Non Agriculture	Agri Labourers	Non-Agri Labourers	Total
1	2	3	4	5	6	7
1	Thiruvananthapuram	42	8	9	3	62
2	Kollam	9		48	18	75
3	Pathanamthitta	18	1	44	37	100
4	Alappuzha	4	4	43	1	52
5	Kottayam	-	1	35	2	38
6	Idukki	38	-	12	-	50
7	Eranakulam	-	-	16	34	50
8	Thrissur	2	15	32	38	87
9	Palakkad	7	2	75	6	90
10	Malappuram	22	16	65	8	111
11	Kozhikode		50	-	-	50
12	Kannur	14	-	66	-	80
13	Kasaragod	1	1	41	-	43
Total		157	98	486	147	888

The occupational profile of the control plots reveals that (table 14 (a)) 19% are engaged in agriculture, 20% in non-agriculture activities, 46% are to agricultural labourers and the remaining 15% acts as non-agricultural labourers.

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

Sl. No.	District	Occupation				
		Agriculture	Non Agriculture	Agri Labourers	Non-Agri Labours	Total
1	2	3	4	5	6	7
1	Thiruvananthapuram	7	8	3	2	20
2	Kollam	7	3	2	3	15
3	Pathanamthitta	6	-	10	4	20
4	Alappuzha	-	-	15	-	15
5	Kottayam	-	-	10	2	12
6	Idukki	5	-	5	-	10
7	Eranakulam	-	7	5	3	15
8	Thrissur	-	7	6	12	25
9	Palakkad	2	-	13	2	17
10	Malappuram	10	4	14	2	30
11	Kozhikkode	-	10	-	-	10
12	Kannur	5	6	9	2	22
13	Kasargod	2	-	13	-	15
Total		44	45	105	32	226

3.3 Summary of Findings

The data furnished in this report are collected through the Evaluation study on soil conservation 1996-97. The districts covered in this study are all the districts of the State except Wayanad. 49 schemes implemented by soil conservation department 5 years prior 1996-97 have been selected for the Evaluation Study. The summaries of findings are discussed below.

I. 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 reveals that 888 beneficiaries are selected out of total 1094 beneficiaries (81% of the total beneficiaries) and they possess 567.04 acres of land. The cost incurred for 49 schemes is Rs.2710308/-. The study results shows that the following benefits are derived from the implementation of the soil conservation measures in the State.

- (i) An area 9.02 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 two percent.
- (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 348.86 acres to 396.88 acres Coconut occupied largest area, pepper stands 2nd in the scheme area.
- (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 (rubber highest, cashew lowest).

II. Cost Benefit analysis

The cost incurred for the soil conservation works including the maintenance work, collected from the 888 beneficiaries is Rs.2710308/-

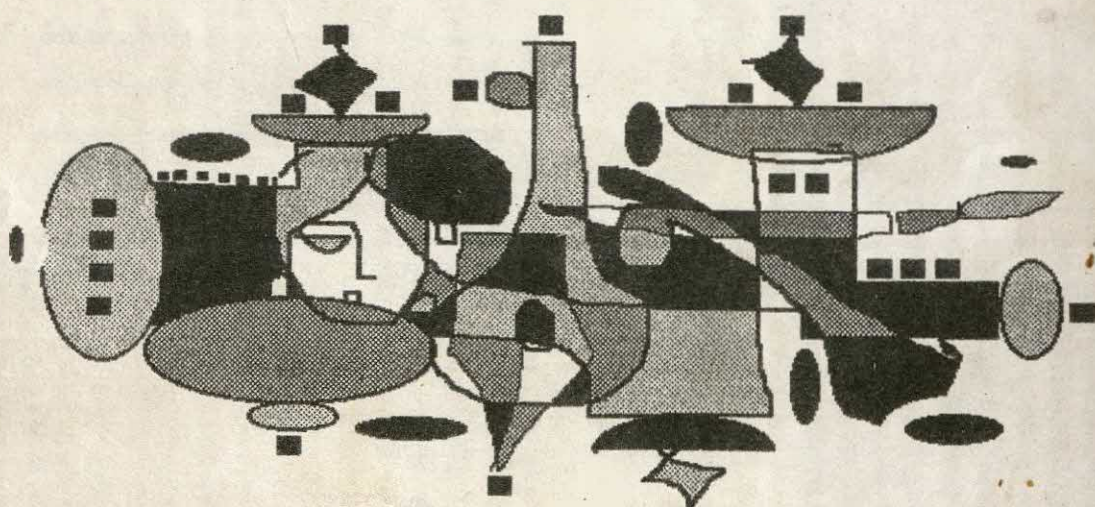
The total area under cultivation after soil conservation work was 491.75 acres. The value of crops before the soil conservation programmes comes to Rs.4088270/-. The value of crops after soil conservation programme is calculated as Rs.5242252/-. The annual additional benefits due to the implementation of soil conservation programme is worked out to be Rs.1153982. This shows that 43% of the cost of the soil conservation programme has been benefited in the year itself.

During this round it is reported that one of the soil conservation schemes implemented by the soil conservation department in Ernakulam district had benefited to the fishery sector. The area and value of output increased in lakhs through this work. The work done in that area was the construction of a retaining wall for a pond. Due to this production of fish in the pond has increased to a large extent. Since the objectives of the evaluation study is to evaluate the benefits derived from the implementation of the soil conservation measures which is suited to improve the productivity of the agricultural land, this scheme was not assessed along with other schemes.

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