

Sl no.
2205



GOVERNMENT OF KERALA

***Evaluation Study on Soil Conservation in
Kerala 2009-10***

**Department of Economics & Statistics
Thiruvananthapuram**

2012

*Evaluation Study on Soil Conservation in
Kerala 2009-10*

Department of Economics & Statistics
Thiruvananthapuram

2012



PREFACE

One of the most valuable gifts of nature to mankind is soil. For the maintenance of soil, adequate protection and conservation is necessary. Due to the peculiarity of the rainfall and topography of the state, soil conservation assumes importance in our planning process. Heavy soil erosion results in the loss of fertility and moisture content of the earth's surface and diminishing rate of agricultural production. Hence Government is implementing various soil conservation measures through the soil conservation department, local bodies etc for maintaining the fertility and moisture content of the surface soil.

The Evaluation study of these schemes has been done by the Directorate of Economics and Statistics for all districts except Wayanad where the direct implementation and evaluation of the schemes are done by the Central Agency.

This report relates to the survey results of 49 schemes completed by the Soil Conservation Department and various agencies. The field survey was conducted during the agricultural year 2009-10. The schemes implemented and completed before five years are taken up for study so that full benefit of the scheme could be evaluated and assessed. This evaluation study results may be much of use to Administrators, Statisticians, Research Scholars and Agricultural Geologists and others interested in the subject.

The tabulation was done in the Evaluation Division of this Directorate. The Report of the survey has been prepared by Sri. Suresh Kumar N, Deputy Director, Sri. Gopa kumar R, Research Officer, Smt. Nazeema Begum.Z, Research Assistant, Smt. Minimole S, Statistical Assistant Gr I and Smt Gracy K K, Statistical Assistant Gr I under the guidance of Smt. K. Sathiabhama, Additional Director. In this context I acknowledge my thanks to the staff of Soil Conservation Department and other local bodies for their valuable suggestion and whole hearted co-operation in the successful conduct of the survey.

Thiruvananthapuram,
03-10-2012

V RAMACHANDRAN
DIRECTOR

CONTENTS

	Pages
Chapter – I	
1.1 Introduction	1
1.2 Objectives and Methodology	1
1.3 Problems of Soil Erosion	4
1.4 Methods of Soil Conservation Programmes	5
1.5 Land Use Pattern of the State	5
Chapter – II	
2.1 Impact of Soil Conservation Programmes on Land use and crop pattern	6
2.2 Cost Benefit Analysis of the Soil Conservation Programmes	31
Chapter – III	
3.1 General Observations	36
3.2 Occupational Profile	39
3.3 Summary of Findings	40

Chapter – I

1.1 Introduction

Land is one of the basic resources of a nation. Productive land is the source of human sustenance and security. The future of the country and its teeming millions depend to a large extent, the conservation of its fertile soil through the proper land use and scientific agricultural practices.

Soil conservation means applying of all necessary practices to maintain the capability of land for which it is suited and to improve the productivity of agricultural land. Considering the importance of soil conservation our plan provisions enhanced for optimizing the use of land resources. An evaluation study in this front can be helpful for developing much more suitable conservation measures for the State

1.2 Objectives and Methodology of the Survey:-

The main objectives of the evaluation study are:

1. To assess the benefit of the programme particularly in relation to the cultivation of seasonal and perennial crops.
2. To throw light on various aspects like cost benefit analysis, production potential etc
3. To estimate the extent of additional area brought under cultivation consequent on the implementation of the programme.
4. To study the effects of the work carried out by the Soil Conservation Department in this direction

For this schemes were selected which were executed five years before ie during 2003-04 in the State by the Soil Conservation Department and other local bodies. 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 and other local bodies. The beneficiaries are selected by stratified random sampling method on the basis of the area of the holding. The holdings are stratified in to four viz.

Holdings with less than 1 acre	- Stratum I
Holdings with 1 acre or more but less than 3 acres	- Stratum II
Holdings with 3 acre or more but 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 and from other local bodies. A total number of 25 beneficiaries are selected from each scheme by simple random sampling covering all the above 4 stratum 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 the shortfall is compensated from another stratum with the nearest area of the 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 - 1

Statement showing stratum wise distribution of selected beneficiaries

(Area in Acres)

Sl. No	Districts	No. of schemes 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	106	39.94	17	24.66	2	6.10	0	0	125	70.70
2	Kollam	5	120	19.41	5	8.76	0	0	0	0	125	28.17
3	Pathanamthitta	5	125	16.23	0	0	0	0	0	0	125	16.23
4	Alappuzha	3	77	6.16	0	0	0	0	0	0	77	6.16
5	Kottayam	5	31	19.68	69	124.48	20	73.74	5	37.38	125	255.28
6	Idukki	3	59	30.63	66	102.55	0	0	0	0	125	133.18
7	Eranakulam	2	73	32.41	52	81.45	0	0	0	0	125	113.86
8	Thrissur	2	50	28.81	66	86.92	8	31.08	1	6.61	125	153.42
9	Palakkad	5	34	13.41	74	120.88	9	33.53	8	49.00	125	216.82
10	Malappuram	4	61	31.74	64	99.59	0	0	0	0	125	131.33
11	Kozhikode	5	83	32.61	40	65.39	2	7.05	0	0	125	105.05
12	Kannur	4	45	19.70	80	142.07	0	0	0	0	125	161.77
13	Kasaragod	1	35	19.47	90	130.99	0	0	0	0	125	150.46
Total		49	899	310.20	623	987.74	41	151.5	14	92.99	1577	1542.43

Table I (a)

Statement showing stratum wise distribution of selected Control Plots

(Area in acres)

Sl. No	Districts	No. of schemes 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	5.25	4	4.9	0	0	0	0	25	10.15
2	Kollam	5	25	2.98	0	0	0	0	0	0	25	2.98
3	Pathanamthitta	5	23	3.63	2	2.58	0	0	0	0	25	6.21
4	Alappuzha	3	15	1.38	0	0	0	0	0	0	15	1.38
5	Kottayam	5	8	4.68	13	23.64	3	11.46	1	5.91	25	45.69
6	Idukki	3	16	9.75	9	15.25	0	0	0	0	25	25
7	Eranakulam	2	6	2.31	4	6.4	0	0	0	0	10	8.71
8	Thrissur	2	5	2.36	5	6.23	0	0	0	0	10	8.59
9	Palakkad	5	2	0.5	21	25.63	1	3	1	5.00	25	34.13
10	Malappuram	4	12	5.11	13	17.34	0	0.00	0	0	25	22.45
11	Kozhikode	5	11	6.74	11	19.23	2	7.5	1	5	25	38.47
12	Kannur	4	8	4.95	16	25.89	2	6.15	0	0	26	36.99
13	Kasaragod	1	5	2.30	0	0	0	0	0	0	5	2.30
Total		49	157	51.94	98	147.09	8	28.11	3	15.91	266	243.05

The total number of beneficiaries comes to 1577. About 57.01% of the beneficiaries are having holding less than one acre, 39.51% are having holdings one acre or more but less than 3 acres, 2.59% are having holding 3 acre or more but less than 5 acres and only 0.89% of the beneficiaries are having holdings of more than 5 acres. In order to compare the benefits of the implementation of Soil Conservation Programmes, control plots were also selected. Its

distribution is 59.02%, 36.84%, 3.01% and 1.13% respectively under stratum I, II, III and IV.

Following schedules were 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 topsoil by the action of wind and water. Ultimately soil erosion leads the desertification of land. Degradation of natural resources has led to many indirect damages, such as increasing extent of wasteland, soil erosion, land sliding, etc. all these cumulatively or independently has affected agricultural or independently has affected agricultural productivity. Unlike other parts of the country, Kerala has some unique land form related aspects such as over 90% of the geographical area is either in midland or high land category. The average rate of soil erosion in the country, to the tune of 16.3 t/ha/yr – has been alarming and has to be checked. In hilly areas, the rate is much higher, i.e. about 30 to 50 t/ha/yr/, considering that about 5 to 10 cm of the top soil (ranging from 0.3 to 1.0 m depth) is being lost every year due to lead management practices. It has been estimated 9-5 lakh hectares of cultivated land in the State is having soil erosion problems.

Responsibility for prevention of erosion

Land which is one of the precious gift of the nature embodies soil, water and associated flora and fauna involving the total ecosystem. The topography of the land plays the most important role in soil erosion. Kerala is a narrow strip of land (width varies from 15 to 120 Km) situated on the Western Slopes of the Western Ghats (the Sahyadri). The very steep slopes facilitate quick run off of the rainfall resulting in low time of concentration poor ground water recharge. This high velocity of the surface flow causes soil displacement and movement. The surface soil gets washed away along with the running water. The major

portion of the state is laterite and as such are more prone are erosion. The different forms of soil erosion causes huge damage to Kerala's economy every year. Many people die every year due to land slides.

1.4 Methods of Soil Conservation Programme

Soil Conservation practices are mainly grouped into two categories viz. Agronomical and Engineering measures. Agronomic measures are comparatively low costly such as contour ploughing / optimal fertilizing organic farming, etc. Engineering measures include contour bunding, land leveling, construction of check dams and water harvesting structure, etc. At present various watershed programmes are being implemented in the state for effective preservation and management of the natural resources.

1.5 Land Use Particulars of the State

There has been a significant change in the land use of the state over the years. On many occasions the change is adversely affecting the environment by way of intensified soil erosion, water logging, conversion of paddy lands, etc. are some of the examples. Cultivation of very steep lands without adopting scientific conservation practices lead to heavy soil erosion. Use of chemicals on a large scale for agricultural productions leave dangerous quantities of the residues in the soil and the water sources.

Chapter - II

2.1 Impact of Soil Conservation Programme on Land use and Crop Pattern

Before 1994-95, soil conservation programme was executed by Department of Agriculture/Soil and Water conservation, etc. There was increased employment to rural people due to soil and water conservation works and this improved income of people and reduced migration of labour from these places to outside. Soil and water conservation structures in arable and non arable lands reduced soil erosion, soil loss, run-off water, etc. and increased rainwater infiltration, ground water table, surface storage, cropping intensity, productivity of crops, etc. As long as works were carried out based on funding by Government and subsidies provided for supporting income generating enterprises, there was positive impact.

After 1994-95, there was a proposal from the Government that people should contribute 5-10% or more towards soil and water conservation works. Farmers contributed in some of the watersheds based on the direct benefits derived from such activities;

Soil can be well maintained through bunding (mechanical and mechanical-cum-vegetative barriers), deep ploughing, leveling, smoothening, etc. Bunding was accepted by farmers to strengthen existing bunds without any obstruction in their plot. Moisture conservation on measures increased yield magically.

Farmers in different parts reported that the fact that the sustainability of agriculture is only possible by soil and water conservation measures. They also reported that soil erosion can be minimized and irrigation potentials can be improved through soil and water conservation measures. In addition, vegetation covering the soil is a must for minimizing soil loss even further.

Land Use particulars of Beneficiary plots

Table Nos. 3 and 3(a) reveals the land use particulars of beneficiary plots and control plots respectively. It gives us certain positive trends while comparing with the area before and after soil conservation programme. Area increased from 1303.62 acres to 1341.02 acre after the implementation of soil conservation programme. An additional area of 37.40 acre of

land has brought under cultivation which was not cultivated earlier. Hence it can be stated that 2.86% of area over the area cultivated before soil conservation programme is due to the implementation of soil conservation measures. In other words area under cultivation has increased from 84.52% to 86.94% by decreasing the current fallow.

On examining the district wise data a marginal increase is noted in the area additionally brought under cultivation in Thiruvananthapuram, Pathanamthitta, Kottayam, Idukki, Palakkad, Kannur and Kasaragod district.

In control plots also the land use is more or less same as in the area of beneficiary plots, before soil conservation programme. Hence it is suited for a comparison with the beneficiary plots.

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

Sl No.	District	Area (Acres)	Cost (Rs.)	Number of beneficiaries	
				Total	Selected
1	2	3	4	5	6
1	Thiruvananthapuram	70.7	1155000	125	125
2	Kollam	28.17	1484217	125	125
3	Pathanamthitta	16.23	1362197	125	125
4	Alappuzha	6.16	1725944	77	77
5	Kottayam	255.28	2583867	125	125
6	Idukki	133.18	225000	125	125
7	Eranakulam	113.86	7476254	125	125
8	Thrissur	153.42	4382214	125	125
9	Palakkad	216.82	3842279	125	125
10	Malappuram	131.33	993731	125	125
11	Kozhikkode	105.05	3927301	905	125
12	Kannur	161.77	16602956	201	125
13	Kasaragod	150.46	5453098	125	125
	Total	1542.43	51214058	2433	1577

Table - 3 Land use particulars of Beneficiary Plots

(Area in Acres)

Sl. No	Districts	Area cultivated						Current fallow					
		Before SC Work			After SC Work			Before SC Work			After SC Work		
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
1	2	3	4	5	6	7	8						
1	Thiruvananthapuram	65.29	92.35	70.6	99.86	1.86	2.63	0	0.00				
2	Kollam	21.66	76.89	21.66	76.89	0.85	3.02	0.85	3.02				
3	Pathanamthitta	3.46	21.32	5.61	34.57	6.87	42.33	4.92	30.31				
4	Alappuzha	4.44	72.08	4.60	74.68	0.35	5.68	0.20	3.25				
5	Kottayam	242.85	95.13	243.05	95.21	0.2	0.08	0	0.00				
6	Idukki	132.88	99.77	133.18	100.00	0.30	0.23	0	0.00				
7	Eranakulam	110.26	96.84	108.84	95.59	0	0.00	1.42	1.25				
8	Thrissur	143.09	93.27	143.02	93.22	0	0.00	0	0.00				
9	Palakkad	190.7	87.95	194.51	89.71	14.25	6.57	10.5	4.84				
10	Malappuram	113.05	86.08	112.51	85.67	1.91	1.45	2.41	1.84				
11	Kozhikode	95.33	90.75	94.17	89.64	1.72	1.64	3.08	2.93				
12	Kannur	131.00	80.98	138.73	85.76	11.49	7.10	5.49	3.39				
13	Kasaragod	49.61	32.97	70.54	46.88	2.28	1.52	0.55	0.37				
	Total	1303.62	84.52	1341.02	86.94	42.08	2.73	29.42	1.91				

Table - 3 Contd..

Sl. No	Districts	Other use						Area not cultivated						Total	
		Before SC Work		After SC Work		Before SC Work		After SC Work		Before SC Work		After SC Work		Before SC Work	After SC Work
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
1	2	11	12	13	14	15	16	17	18	19	20	21	22		
1	Thiruvananthapuram	0.44	0.62	0	0.00	3.11	4.40	0.1	0.14	70.70	100	70.70	100		
2	Kollam	5.33	18.92	5.33	18.92	0.33	1.17	0.33	1.17	28.17	100	28.17	100		
3	Pathanamthitta	5.44	33.52	5.25	32.35	0.46	2.83	0.45	2.77	16.23	100	16.23	100		
4	Alappuzha	1.33	21.59	1.32	21.43	0.04	0.65	0.04	0.65	6.16	100	6.16	100		
5	Kottayam	10.72	4.20	10.72	4.20	1.51	0.59	1.51	0.59	255.28	100	255.28	100		
6	Idukki	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	133.18	100	133.18	100		
7	Eranakulam	3.51	3.08	3.51	3.08	0.09	0.08	0.09	0.08	113.86	100	113.86	100		
8	Thrissur	10.33	6.73	10.4	6.78	0	0.00	0	0.00	153.42	100	153.42	100		
9	Palakkad	6.50	3.00	6.49	2.99	5.37	2.48	5.32	2.45	216.82	100	216.82	100		
10	Malappuram	6.43	4.90	6.47	4.93	9.94	7.57	9.94	7.57	131.33	100	131.33	100		
11	Kozhikkode	5.59	5.32	5.54	5.27	2.41	2.29	2.26	2.15	105.05	100	105.05	100		
12	Kannur	9.66	5.97	8.06	4.98	9.62	5.95	9.49	5.87	161.77	100	161.77	100		
13	Kasaragod	9.22	6.13	9.12	6.06	89.35	59.38	70.25	46.69	150.46	100	150.46	100		
	Total	74.5	4.83	72.21	4.68	122.23	7.92	99.78	6.47	1542.43	100	1542.43	100		

Table 3(a) Land Use particulars (Control Plots)

Sl. No	Districts	Area cultivated		Current follow		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	8.67	85.42	0.64	6.31	0.84	8.28	0	0.00	10.15	100
2	Kollam	2.01	67.45	0.10	3.36	0.87	29.19	0	0.00	2.98	100
3	Pathanamthitta	3.33	53.62	1.41	22.71	1.47	23.67	0	0.00	6.21	100
4	Alappuzha	1.26	91.30	0	0.00	0.12	8.70	0	0.00	1.38	100
5	Kottayam	43.79	95.84	0	0.00	1.85	4.05	0.05	0.11	45.69	100
6	Idukki	25.00	100.00	0	0.00	0	0.00	0	0.00	25.00	100
7	Eranakulam	8.40	96.44	0	0.00	0.31	3.56	0	0.00	8.71	100
8	Thrissur	8.00	93.13	0	0.00	0.59	6.87	0	0.00	8.59	100
9	Palakkad	33.37	97.77	0	0.00	0.58	1.70	0.18	0.53	34.13	100
10	Malappuram	19.08	84.99	0.40	1.78	1.12	4.99	1.85	8.24	22.45	100
11	Kozhikkode	27.89	72.50	7.25	18.85	3.30	8.58	0.03	0.08	38.47	100
12	Kannur	34.15	92.32	1.16	3.14	1.48	4.00	0.20	0.54	36.99	100
13	Kasaragod	2.30	100.00	0	0.00	0	0.00	0	0.00	2.30	100
	Total	217.25	89.38	10.96	4.51	12.53	5.16	2.31	0.95	243.05	100

Crop Pattern

In order to reduce the soil loss an appropriate cropping pattern is essential. The selection of suitable vegetation that form good canopy can reduce erosion since soil loss is governed by the extent of exposed land surface. The binding force of the roots also offers good resistance to erosion. Grass roots have excellent soil binding property. Legumes are also good soil binders. The grasses, legumes and tree crops are classified as erosion preventing or soil conserving crops while cereals, tapioca, ginger, etc. are erosion permitting/erosion favouring crops.

Depending upon the capability class to which a land belongs and the socio-economic needs of the people, the appropriate crops can be selected to achieve maximum conservation of soil and water.

Contour Farming

Contour farming refers to village practices of applying all treatments along contour; i.e. across the direction of the slope. The crops are cultivated along contour ridges and furrows. In regions of low rainfall contour farming helps in the conservation of rainwater and in human areas it reduces soil loss and increases recharge of aquifers. This practice can minimize the effects of flash floods and droughts.

Mixed farming, intercropping, mixed cropping; multistoried cropping, etc. are also beneficial in controlling soil erosion.

The growing of perennial horticultural crops, including plantation crops will give a permanent protective cover for the soil. In high rainfall areas of the humid tropics this higher level tree cover for the soil helps in reducing the erosive action of highly intensive rainfall.

Consequent in the introduction of the soil conservation programmes significant changes in the cropping pattern occurred which favours perennial crops. The area under perennial crops has increased from 1191.51 acre to 1261.84 acre. It showed an increase of 5.90%. At the same time the percentage change occurred in the cultivation of seasonal crops

recorded as 18.30 %. From this we can arrive at the conclusion that the farmers have shown a tendency to cultivate perennial crops in sloppy regions where the soil conservation measures are carried out. The cultivation of seasonal crops in such regions is likely to increase soil erosion. In seasonal crops the cultivation of banana tapioca and plantain are exhibited increases. The respective percentage changes are recorded as 41.84 % and 28.11 %. The plantain cultivation percentage increase recorded as 136 % At the same time in paddy cultivation percentage variation is in a negative trend. It is recorded as -12.71 %. In perennial crops all are shown an increasing trend.

Table No. 5 reveals that after the introduction of soil conservation programmes, Rubber has occupied the largest area under perennial crops; the percentage increase is 13.16 %. Coconut comes next with an increase of 3.48%. The area under pepper has decreased to -0.92 % after the Soil Conservation Programme.

On going through the district wise data, it is noted that the cropping area under different crops are interchanged according to the suitability of land.

Table - 4
Crop Pattern (Area wise)

Sl. No.	Districts	Perennial crops			Seasonal Crops				
		Before SC work	%	After SC work	Before SC work	%	After SC work		
1	2	3	4	5	6	7	8	9	10
1	Thiruvananthapuram	11.60	18.57	12.57	16.84	50.87	81.43	62.06	83.16
2	Kollam	22.94	95.9	25.71	95.29	0.98	4.10	1.27	4.71
3	Pathanamthitta	4.01	91.76	4.40	68.01	0.36	8.24	2.07	31.99
4	Alappuzha	5.23	95.44	6.79	93.14	0.25	4.56	0.50	6.86
5	Kottayam	256.36	99.15	257.71	98.10	2.21	0.85	5.00	1.9
6	Idukki	208.32	89.96	207.71	89.81	23.26	10.04	23.56	10.19
7	Eranakulam	85.18	91.39	85.43	92.84	8.02	8.61	6.59	7.16
8	Thrissur	130.78	98.84	130.65	96.21	1.53	1.16	5.15	3.79
9	Palakkad	132.45	69.44	136.19	68.98	58.3	30.56	61.25	31.02
10	Malappuram	87.60	77.09	98.81	82.69	26.04	22.91	20.69	17.31
11	Kozhikkode	97.5	87.13	103.03	87.34	14.4	12.87	14.93	12.66
12	Kannur	112.56	97.05	135.54	86.43	3.42	2.95	21.28	13.57
13	Kasaragod	36.98	100	57.30	100	0	0	0	0
	Total	1191.51	86.27	1261.84	84.9	189.64	13.73	224.35	15.10

Table - 4 Confd..

Sl. No	Districts	Total Gross area cropped			
		Before SC work	%	After SC work	%
1	2		12	13	14
1	Thiruvananthapuram	62.47	100	74.63	100
2	Kollam	23.92	100	26.98	100
3	Pathanamthitta	4.37	100	6.47	100
4	Alappuzha	5.48	100	7.29	100
5	Kottayam	258.57	100	262.71	100
6	Idukki	231.58	100	231.27	100
7	Eranakulam	93.20	100	92.02	100
8	Thrissur	132.31	100	135.80	100
9	Palakkad	190.75	100	197.44	100
10	Malappuram	113.64	100	119.50	100
11	Kozhikode	111.90	100	117.96	100
12	Kannur	115.98	100	156.82	100
13	Kasaragod	36.98	100	57.30	100
	Total	1381.15	100	1486.19	100

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	10.71	10.9	1.77	0.1	0.1	0	0	0	0
2	Kollam	5.44	5.91	8.64	0.32	0.36	12.5	0.5	0.55	10.00
3	Pathanamthitta	0.91	1.27	39.56	0.1	0.09	-10		0	0
4	Alappuzha	4.39	5.46	24.37	0.28	0.48	71.43	0.11	0.16	45.45
5	Kottavam	18.26	18.84	3.18	0.3	0.32	6.67	1.06	1.08	1.89
6	Idukki	7.84	7.86	0.26	1.29	1.35	4.65	2.07	2.07	0
7	Ernakulam	11.34	11.55	1.85	1.74	1.74	0	0	0	0
8	Thrissur	49.13	49.19	0.12	1.72	1.72	0	0.31	0.23	-25.81
9	Palakkad	45.58	50.12	9.96	0.25	0.29	16	0	0	0
10	Malappuram	58.05	57.88	-0.29	5.21	5.31	1.92	6.93	9.74	40.55
11	Kozhikode	60.6	61.37	1.27	9.43	8.79	-6.79	6.92	5.45	-21.24
12	Kannur	16.98	17.97	5.83	4.35	3.73	-14.25	47.05	32.97	-29.93
13	Kasaragod	22.47	24.24	7.88	5.31	5.45	2.64	0.5	0.81	62.00
	Total	311.7	322.56	3.48	30.4	29.73	-2.2	65.45	53.06	-18.93

Table - 5 Contd..

Sl. No	Districts	Rubber			Pepper			Jack			Mango		
		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	2	12	13	14	15	16	17	18	19	20	21		
1	Thiruvananthapuram	0	0.74	0	0.55	0.58	5.45	0.20	0.02	0.02	0		
2	Kollam	11.53	13.31	15.44	1.53	1.78	16.34	2.7	0.50	0.59	18.00		
3	Pathanamthitta	3.00	3.03	1.00	0	0.01	0				0		
4	Alappuzha	0	0	0	0.04	0.10	150.00	0.13	0.22	0.34	-100		
5	Kottayam	214.69	214.69	0	18.74	19.28	2.88	0.88			0		
6	Idukki	0.30	0.30	0	116.28	115.24	-0.89	2.38			0		
7	Eranakulam	66.58	66.68	0.15	3.71	3.68	-0.81	0.88			0		
8	Thrissur	79.41	79.31	-0.13	0	0	0	0.13	0.08	0.08	0		
9	Palakkad	85.24	84.01	-1.44	0.23	0.38	65.22	0.95	0.20	0.40	100.00		
10	Malappuram	10.79	18.5	71.46	2.02	2.18	7.92	3.02	1.55	1.77	14.19		
11	Kozhikkode	5.69	9.25	62.57	5.52	6.43	16.49	4.56	2.52	2.79	10.71		
12	Kannur	31.76	69.09	117.54	6.99	4.38	-37.34	3.36	1.08	1.06	-1.85		
13	Kasaragod	6.96	24.93	258.19	1.74	1.87	7.47				0		
	Total	515.95	583.84	13.16	157.35	155.91	-0.92	19.08	6.17	7.05	10.9	14.26	

Table - 5 Contd..

Sl. No	Districts	Coco			Coffee			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	2	12	13	14	15	16	17			20	21	22	23
1	Thiruvananthapuram	0	0	0	0	0	0	0.03	0.03	0	11.60	12.57	8.36
2	Kollam	0	0	0	0	0	0	0.52	0.51	-1.92	22.94	25.71	12.07
3	Pathanamthitta	0	0	0	0	0	0	0	0	0	4.01	4.40	9.73
4	Alappuzha	0	0	0	0	0	0	0.06	0.08	33.33	5.23	6.79	29.83
5	Kottayam	2.4	2.52	5.00	0.03	0.03	0	0	0	0	256.36	257.71	0.53
6	Idukki			0	29.45	29.2	-0.85	48.71	49.29	1.19	208.32	207.71	-0.29
7	Ernakulam	0.73	0.71	-2.74	0.2	0.19	-5.00	0	0	0	85.18	85.43	0.29
8	Thrissur	0	0	0	0	0	0	0	0	0	130.78	130.65	-0.1
9	Palakkad	0	0	0	0	0	0	0	0	0	132.45	136.19	2.82
10	Malappuram	0.03	0.03	0	0	0	0	0	0	0	87.60	98.81	12.80
11	Kozhikkode	0.94	3.00	219.15	0.92	0.23	-75.00	0.40	0.65	132.14	97.50	103.03	5.67
12	Kannur	0.79	1.82	130.38	0.12	0.16	33.33	0.08	0.08	0	112.56	135.54	20.42
13	Kasaragod	0	0	0	0	0	0	0	0.02	0	36.98	57.30	54.95
	Total	4.89	8.08	65.24	30.72	29.81	-2.96	49.80	50.66	1.97	1191.51	1261.84	5.90

Table 6 – 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	1	2	3	5	6	7	8	9	10
1	Thiruvananthapuram	7.00	5.98	-14.57	13.21	14.86	12.49	5.77	6.45	11.79
2	Kollam				0.16	0.31	93.75	0.56	0.62	10.71
3	Pathanamthitta	0.00	0.05	0.00	0.30	1.24	313.33	0.02	0.19	850.00
4	Alappuzha				0.10	0.29	190.00	0.04	0.08	100.00
5	Kottayam				0.60	2.70	350.00	1.18	1.59	34.75
6	Idukki	23.26	23.56	1.29						
7	Eranakulam	5.46	4.04	-26.01	1.32	1.08	-18.18	0.90	0.97	7.78
8	Thrissur				0.20	1.60	700.00	0.48	1.96	308.33
9	Palakkad	49.39	40.66	-17.68				0.02	0.10	400.00
10	Malappuram	0.01	0.01	0.00	0.33	0.33	0.00	1.14	1.16	1.75
11	Kozhikkode				3.55	2.57	-27.61	3.89	5.78	48.59
12	Kannur				0.26	0.68	161.54	1.30	17.26	1227.69
13	Kasaragod									
Total		85.12	74.30	-12.71	20.03	25.66	28.11	15.30	36.16	136.34

Table - 6 Contd..

Sl. No	Districts	Ginger			Banana			Vegetables			Pineapple		
		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	2	12	13	14	15	16	17	18	19	20	21	22	23
1	Thiruvananthapuram		0.35		23.87	32.82	37.49				0.40	0.40	0.00
2	Kollam		0.01		0.04	0.04	0.00	0.04	0.04	0.00	0.08	0.10	25.00
3	Pathanamthitta	0.01	0.01		0.01	0.28	2700.00	0.00	0.14				
4	Alappuzha				0.10	0.10	0.00						
5	Kottayam				0.43	0.71	65.12						
6	Idukki												
7	Ernakulam				0.34	0.50	47.06						
8	Thrissur				0.75	1.37	82.67	0.10	0.22	120.00			
9	Palakkad							0.03	0.28	833.33			
10	Malappuram	0.01	0.01	0.00	0.35	0.35	0.00	0.31	0.31	0.00	0.09	0.13	44.44
11	Kozhikode	0.77	0.69	-10.39	1.10	1.54	40.00	0.24	0.19	-20.83	3.28	1.76	-46.34
12	Kannur	0.05	0.25	400.00	1.50	2.70	80.00	0.04	0.05	25.00	0.17	0.25	47.06
13	Kasaragod												
	Total	0.84	1.32	57.14	28.49	40.41	41.84	0.76	1.23	61.84	4.02	2.64	-34.33

Table - 6 Contd..

Sl. No	Districts	Chennai			Kolacasia			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	2	12	13	14	15	16	17	18	19	20	21	22	23
1	Thiruvananthapuram							0.62	1.20	93.55	50.87	62.06	22.00
2	Kollam	0.02	0.02	0	0.01	0.06	500.00	0.07	0.07	0	0.98	1.27	29.59
3	Pathanamthitta							0.02	0.16	700.00	0.36	2.07	475
4	Alappuzha				0.01	0.01	0	0	0.02	0	0.25	0.5	100.00
5	Kottayam							0	0		2.21	5	126.24
6	Idiukki							0	0		23.26	23.56	1.29
7	Eranakulam							0	0		8.02	6.59	-17.83
8	Thrissur							0	0		1.53	5.15	236.6
9	Palakkad							8.86	20.21	128.1	58.3	61.25	5.06
10	Malappuram	0.01	0.01	0	0.43	0.43	0	23.36	17.95	-23.16	26.04	20.69	-20.55
11	Kozhikode	0.39	0.86	120.51	0.21	0.34	61.9	0.97	1.20	23.71	14.4	14.93	3.68
12	Kannur	0.04	0.01	-75				0.06	0.08	33.33	3.42	21.28	522.22
13	Kasaragod							0	0		0	0	
Total		0.46	0.9	95.65	0.66	0.84	27.27	33.96	40.89	20.41	189.64	224.35	18.30

Impact of Soil Conservation Treatment on the Yield of Crops

For studying the impact of soil conservation treatment on the yield of crops a detailed survey was conducted following the "Before" and "After" method. Details regarding the yield and value of crops are collected from the beneficiaries in the scheme area. District wise details are presented in table No. 7 and 8 Survey results reveals that in most cases, the crop yields after the implementation of the programme were higher than that of before. Therefore the total output from crops represented a big increase. As much as major portion of this output came from perennial crops indicating improved stability in output. Almost all perennial crops have also shown a marked improvement.

For example in Palakkad district total cropped area before soil conservation works was 190.75 acres. It increases to 197.44 acres after the implementation of soil conservation measures. The increase in area is accounted as 6.69 acres. The percentage increase recorded as 3.51 %. When we analyse the yield of perennial crops in this district it can be seen that production of arecanut, rubber, pepper, etc. increased. Production of coconut also increased.

In Kannur, Kasargod, Thiruvananthapuram and Kozhikode districts before soil conservation work the area were 115.98 acres, 36.98 acres, 62.47 acres and 111.90 acres respectively. It increased to 156.82, 57.30, 74.63 and 117.96 acres after the implementation of soil conservation work. Increase in area accounted as 40.84 in Kannur. In Kasargod it increases 20.32 arecas, in Thiruvananthapuram it increases 12.16 acres, in Kozhikode it increases 6.06 acres.

Production impact is also commendable. Output of all perennial crops increased after soil conservation works.

The production details of seasonal crops of these districts shows that paddy area and production decreased. Whereas banana, other plantain and tapioca area and production increased.

Table 7
Crop wise yield and value of perennial crops in scheme area.

District	Name of Crop	Unit	Before SC work		After SC work		
			Quantity	Value	Quantity	Value	Value at constant price
1	2	3	4	5	6	7	8
Thiruvananthapuram	Coconut	Nos	39354.00	217631	43865.00	230729	207001
	Arecanut	Nos.	3500.00	1505	2700.00	1593	2065
	Pepper	Qtl.	1.23	8039	1.04	13000	15375
	Jack	Qtl	3.00	2400	1.80	725	1208
	Mango	Qyl	0.15	169	0.15	300	300
	Tamarind	Qtl	7.00	12754	3.00	11100	25900
	Total			242498		257447	251849
	Kollam	Coconut	Nos	3478.00	21282	4500.00	28519
Arecanut		Nos.	1412.00	484	2697.00	1507	789
Cashew		Qtl.	1.86	5212	2.81	15224	10077
Pepper		Qtl.	1.47	9973	2.09	26455	18607
Rubber		Qtl.	70.46	343000	87.44	805762	649291
Pappaya		Qtl	2.00	400	2.74	822	600
Jack		Qtl	18.90	13230	31.36	3764	2268
Mango		Qyl	2.93	1445	3.64	2248	1810
Tamarind		Qtl	1.56	2652	2.14	4280	3120
Total				397678		888581	708604
Pathanamthitta	Coconut	Nos	578.00	3790	1440.00	9779	3925
	Arecanut	Nos.	3035.00	1032	3547.00	1880	1609
	Pepper	Qtl.			0.08	270	0
	Rubber	Qtl.	29.48	147343	42.26	396865	276848
	Total			152165		408794	282382

(Table 7 Contd..)

1	2	3	4	5	6	7	8
Alappuzha	Coconut	Nos	16115.00	93465	23699.00	147175	100077
	Arecanut	Nos.	10995.00	3521	14964.00	6738	4951
	Cashew	Qtl.	0.42	1153	0.82	2963	1518
	Pepper	Qtl.	0.12	860	0.28	1069	458
	Jack	Qtl	5.16	4644	23.35	4857	1073
	Mango	Qyl	4.78	3082	5.58	4970	4257
	Tamarind	Qtl	0.57	1127	0.77	2504	1854
	Total			107852		170276	114188
Kottayam	Coconut	Nos	36962.00	240991	44459.00	293429	243949
	Arecanut	Nos.	14200.00	5964	19400.00	12028	8804
	Pepper	Qtl.	35.57	241417	44.33	361113	289754
	Rubber	Qtl.	1934.35	9696898	2233.80	21013363	18196436
	Coffee	Qtl	0.60	1522	0.74	4168	3379
	Coco	Qtl	29.40	59036	37.70	102734	80116
	Total			10245828		21786835	18822438
Idukki	Coconut	Nos	2668.00	18599	3670.00	26570	19316
	Pepper	Qtl.	64.80	437792	103.80	1157066	722330
	Rubber	Qtl.	6.00	29778	6.00	58674	58674
	Jack	Qtl	1.00	500	1.50	203	135
	Coffee	Qtl	13.65	37401	23.25	170748	100246
	cardamum	Qtl	100.3	3580710	168.45	10056465	5987910
	Total			4104780		11469726	6888611

(Table 7 Contd..)

1	2	3	4	5	6	7	8
Ernakulam	Coconut	Nos	59798.00	367761	64210.00	380780	354616
	Arecanut	Nos.	598400.00	203456	674300.00	337150	299200
	Pepper	Qtl.	6.90	45673	8.66	95719	76266
	Rubber	Qtl.	513.77	2538023	609.68	5720626	4820703
	Coffee	Qtl	8.69	10428	9.99	12388	10776
	Coco	Qtl	4.20	8753	4.72	11947	10631
	Total			3174094		6558610	5572192
Thrissur	Coconut	Nos	219543.00	1128450	273681.00	1395773	1119669
	Arecanut	Nos.	91423.60	35657	143570.00	78966	50285
	Cashew	Qtl.	7.20	20137	5.95	21544	26070
	Rubber	Qtl.	1094.80	5525460	1229.60	11254538	10020713
	Pappaya	Qtl					
	Jack	Qtl	24.30	2916	24.50	4410	4374
	Mango	Qyl	16.00	16016	17.10	13664	12785
	Total			6728636		12768895	11233896
Palakkad	Coconut	Nos	136030.00	707356	147235.00	689060	636621
	Arecanut	Nos.	9150.00	2837	10160.00	3556	3203
	Pepper	Qtl.	0.30	2070	0.67	2921	1308
	Rubber	Qtl.	1029.15	5138554	1115.50	10586106	9766644
	Jack	Qtl	0.20	180	2.60	666	51
	Mango	Qyl	13.10	6617	14.25	10745	9878
	Total			5857614		11293054	10417705
Malappuram	Coconut	Nos	294348.00	1406984	298368.00	1312820	1295132
	Arecanut	Nos.	699070.00	188753	684108.00	259962	265648
	Cashew	Qtl.	29.14	86487	11.64	35233	88204
	Pepper	Qtl.	3.62	24616	4.26	49171	41784
	Rubber	Qtl.	151.50	735533	153.80	1423113	1401831
	Mango	Qyl	3.50	1243	3.25	1563	1683
Total			2443616		3081862	3094282	

(Table 7 Contd..)

1	2	3	4	5	6	7	8
Kozhikode	Coconut	Nos	152592.00	795014	178139.00	741062	634786
	Arecanut	Nos.	374810.00	97452	468699.00	168731	134931
	Cashew	Qtl.	58.28	172973	66.92	270627	235687
	Pepper	Qtl.	3.25	22011	5.91	67304	37012
	Rubber	Qtl.	39.25	184908	39.08	360200	361767
	Mango	Qyl	3.00	2286	5.00	4080	2448
	Coffee	Qtl	0.94	2433	4.95	23737	4508
	Coco	Qtl	1.00	2182	13.50	36101	2674
	Total			1279259		1671842	1413813
Kannur	Coconut	Nos	35057.00	185803	44898.00	177360	138485
	Arecanut	Nos.	223872.00	76120	210550.00	86336	91799
	Cashew	Qtl.	191.66	544517	119.13	508926	818776
	Pepper	Qtl.	12.98	88100	9.63	110511	148955
	Rubber	Qtl.	108.35	546196	195.41	1815951	1006900
	Jack	Qtl	0.50	135	0.75	300	200
	Mango	Qyl	1.25	1490	4.00	2864	895
	Coco	Qtl	0.50	1061	0.56	1249	1115
	Total			1443422		2703497	2207125
Kasaragod	Coconut	Nos	97500.00	501150	113965.00	524239	448500
	Arecanut	Nos.	589300.00	241617	758750.00	402139	312330
	Cashew	Qtl.	3.57	10703	4.32	18797	15534
	Pepper	Qtl.	9.48	63531	13.29	152526	108800
	Rubber	Qtl.	168.50	842839	199.39	1736688	1467636
	Total			1659840		2834389	2352800
STATE	Coconut	Nos	1094023.0	5688276	1242129.0	5957295	5224119
	Arecanut	Nos.	2619167.6	858398	2993445.0	1360586	1175614
	Cashew	Qtl.	292.13	841182	211.59	873314	1195866
	Pepper	Qtl.	139.72	944082	194.04	2037125	1460649
	Rubber	Qtl.	5145.61	25728532	5911.96	55171886	48027443
	Pappaya	Qtl	2.00	400	2.74	822	600
	Jack	Qtl	53.06	24005	85.86	14925	9309
	Mango	Qyl	44.71	32348	52.97	40434	34056
	Coffee	Qtl	23.88	51784	38.93	211041	118909
	Coco	Qtl	35.10	71032	56.48	152031	94536
	Tamarind	Qtl	9.13	16533	5.91	17884	30874
	cardamum	Qtl	100.30	3580710	168.45	10056465	5987910
	Total			37837282		75893808	63359885

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

District	Name of Crop	Unit	Before SC work		After SC work			
			Quantity	Value	Quantity	Value	Value at constant price	
1	2	3	4	5	6	7	8	
Thiruvananthapuram	Paddy	Qtl	115.20	79257	68.34	66223	111631	
	Tapioca	Qtl	894.39	364911	916.05	464439	453457	
	Banana	Qtl	2001.25	2797749	2515.05	4333434	3448156	
	Other Plantain	Qtl	464.50	381819	542.14	472203	404579	
	Ginger	Qtl			5.00	19945	0	
	Turmeric	Qtl						
	Vegitables	Qtl						
	Pineapple	Qtl	2.00	1580	1.00	900	1800	
	Chennai	Qtl						
	Others	Qtl	2.00	1400	4.65	3720	1600	
	Total				3626716		5360864	4421223
	Kollam	Paddy	Qtl					
		Tapioca	Qtl	3.63	1171	4.70	2563	1980
Banana		Qtl	0.43	517	0.53	889	721	
Other Plantain		Qtl	12.33	7305	14.57	12311	10418	
Ginger		Qtl	0.18	1110	0.20	800	720	
Turmeric		Qtl						
Vegitables		Qtl	0.49	248	0.65	442	333	
Pineapple		Qtl	0.67	247	0.91	759	559	
Chennai		Qtl	0.66	471	0.85	702	545	
Others		Qtl	0.39	198	0.57	388	265	
Total				11267		18854	15541	

Table – 8 Contd.

1	2	3	4	5	6	7	8	
Pathanamthitta	Paddy	Qtl			1.52	1490	0	
	Tapioca	Qtl	28	10902	84	50159	16422	
	Banana	Qtl	0.38	479	15.47	27661	679	
	Other Plantain	Qtl	2.11	1358	9.07	6890	1603	
	Ginger	Qtl			0.35	1259	0	
	Turmeric	Qtl						
	Vegitables	Qtl			2.30	4600	0	
	Others	Qtl	0.75	367	2.15	1613	563	
	Total				13106		93672	19267
		Tapioca	Qtl	16.00	6448	21.81	12737	9344
Banana		Qtl	3.08	3634	5.12	9019	5425	
Other Plantain		Qtl	2.48	1501	5.50	4345	1959	
Others		Qtl	0.45	380	1.10	1112	612	
Total					11963		27213	17340
		Tapioca	Qtl	81.00	32481	165.00	107415	52731
	Banana	Qtl	662.00	889066	756.00	1267813	1110175	
	Other Plantain	Qtl	75.20	52265	110.60	86381	58733	
	Total				973812		1461609	1221639
Idukki	Paddy	Qtl	241.30	186284	386.85	377565	235508	
	Total				186284		377565	235508
Ernakulam	Paddy	Qtl	69.40	46637	55.26	52608	66069	
	Tapioca	Qtl	79.75	29909	75.57	41414	43705	
	Banana	Qtl	17.44	19150	28.07	43621	27102	
	Other Plantain	Qtl	53.08	29140	63.14	43562	36621	
	Total				124836		181205	173497
	Tapioca	Qtl	7.50	3188	65.50	36287	4155	
	Banana	Qtl	48.00	57312	112.90	166415	70752	
	Other Plantain	Qtl	33.90	17256	133.40	82043	20849	
	Others	Qtl	2.00	2190	4.30	3010	1400	
	Total				79946		287755	97156
Palakkad	Paddy	Qtl	617.25	464172	546.25	514569	581451	
	Other Plantain	Qtl	1.05	574	3.25	2510	811	
	Total			464746		517079	582262	

Table - 8 Contd..

1	2	3	4	5	6	7	8
Malappuram	Paddy	Qtl					
	Tapioca	Qtl	31.00	11005	31.75	15272	14911
	Banana	Qtl	11.10	12521	17.00	24242	15829
	Other Plantain	Qtl	72.02	49767	75.63	59669	56821
	Total			73293		99183	87561
Kozhikode	Paddy	Qtl	0.80	572	0.90	813	723
	Tapioca	Qtl	91.78	39378	83.87	49571	54246
	Banana	Qtl	74.40	83626	123.30	193089	116511
	Other Plantain	Qtl	123.97	88022	243.34	221446	112816
	Ginger	Qtl	3.88	25233	3.91	6988	6934
	Pineapple	Qtl	3.71	2163	2.86	2229	2891
	Chennai	Qtl					
	Others	Qtl	1.50	1341	1.50	1050	1050
	Total			240335		475186	295171
	Tapioca	Qtl	12.50	5850	13.00	8542	8213
	Banana	Qtl	31.00	35681	60.75	92706	47307
	Other Plantain	Qtl	60.45	42799	112.21	105028	56581
	Ginger	Qtl	1.00	6913			2501
	Pineapple	Qtl	1.15	927	1.02	526	593
	Total			92170		206802	115195
STATE	Paddy	Qtl	1043.95	776922	1059.12	1013268.0 0	995382.00
	Tapioca	Qtl	1245.15	505243	1461.55	788399.00	659164.00
	Banana	Qtl	2849.08	3899735	3634.19	6158889.0 0	4842657.00
	Other Plantain	Qtl	901.09	671806	1312.85	1096388.0 0	761791.00
	Ginger	Qtl	5.06	33256	9.46	28992.00	10155.00
	Turmeric	Qtl	0.00	0	0.00	0.00	0.00
	Vegitables	Qtl	0.49	248	2.95	5042.00	333.00
	Pineapple	Qtl	7.53	4917	5.79	4414.00	5843.00
	Chennai	Qtl	0.66	471	0.85	702.00	545.00
	Others	Qtl	7.09	5876	14.27	10893.00	5490.00
	Total			5898474		9106987	7281360

Table 9
Quantity and Value of Selected perennial and seasonal crops for the years 2009-10

1	Name of Crops	Units	Before SC Work		After SC Work		Value at constant Price
			Quantity	Values (Rs)	Quantity	Value (Rs)	
2	3	4	5	6	7	8	
A. Perennial Crops	Coconut	Nos	1094023.00	5688276	1242129.00	5957295	5224119
	Arecanut	Nos.	2619167.60	858398	2993445.00	1360586	1175614
	Cashew	Qtl.	292.13	841182	211.59	873314	1195866
	Pepper	Qtl.	139.72	944082	194.04	2037125	1460649
	Rubber	Qtl.	5145.61	25728532	5911.96	55171886	48027443
	Pappaya	Qtl	2.00	400	2.74	822	600
	Jack	Qtl	53.06	24005	85.86	14925	9309
	Mango	Qyl	44.71	32348	52.97	40434	34056
	Coffee	Qtl	23.88	51784	38.93	211041	118909
	Coco	Qtl	35.10	71032	56.48	152031	94536
	Tamarind	Qtl	9.13	16533	5.91	17884	30874
	Cardamon	Qtl	100.30	3580710	168.45	10056465	5987910
	Total(A)			37837282		75893808	63359885
B. Seasonal Crops	Paddy	Qtl	1043.95	776922.00	1059.12	1013268.00	995382.00
	Tapioca	Qtl	1245.15	505243.00	1461.55	788399.00	659164.00
	Banana	Qtl	2849.08	3899735.00	3634.19	6158889.00	4842657.00
	Other Plantain	Qtl	901.09	671806.00	1312.85	1096388.00	761791.00
	Ginger	Qtl	5.06	33256.00	9.46	28992.00	10155.00
	Turmeric	Qtl	0.00	0.00	0.00	0.00	0.00
	Vegitables	Qtl	0.49	248.00	2.95	5042.00	333.00
	Pineapple	Qtl	7.53	4917.00	5.79	4414.00	5843.00
	Chennai	Qtl	0.66	471.00	0.85	702.00	545.00
	Others	Qtl	7.09	5876.00	14.27	10893.00	5490.00
		Total(B)			5898474		9106987
	All Crops (A+B)			43735756		85000795	70641245

2.2. Cost Benefit Analysis of the Soil Conservation Programmes

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 process. Degradation of land due to soil erosion leads to destruction 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 ratio which gives an indication of 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 into consideration.

Protective 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 it's increased productive potentialities.

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 Rs5,12,14,058/-

The total area under cultivation after soil conservation work was 1341.02 acres. The value of crops before the soil conservation programme comes to Rs.4,37,35,756/- The value of crops after the implementation of soil conservation programme has also been calculated as Rs. 8,50,00,795/- Thus the additional benefits due to the implementation of soil conservation programme is worked out to be Rs.4,12,65,039/-. It is estimated that the value at constant price as Rs. 7,06,41,245/- .

Several benefits flow from the soil conservation programme implementation. Three of them, which derive special attention, are taken up for consideration.

They are:

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

(i) Extension of area under cultivation

The study revealed that 37.40 acre of land has been additionally brought under cultivation by cultivating areas which were not cultivated before soil conservation programme. This benefit is achieved only due to the implementation of soil conservation programme.

(ii) Increase in Productivity

Productivity also increased due to the implementation of soil conservation programme. In the case of coconut it is recorded as 13.54%, cardamom 68%, Rubber 14.86%, Banana 27.68%, Pepper 38.40% etc. As a seasonal crop productivity of tapioca increased to 17.32%.

(iii) Diversification of cropping pattern

Soil Conservation Programmes increase the soil capacity and which facilitates the cultivation of more remunerative crops. This advantage can be reaped in full, only if the conservation programmes are followed properly, i.e. the dissemination of new techniques of production, adequate provision of inputs and service which will promote the land to improve production.

In the scheme area, cultivation of perennial crops have shown encouraging performance. The increase in area of perennial crops is higher over the area under same before soil conservation programme (5.90%). Growing of perennial crops will accelerate conservation of soil more affectively.

Occupational Profile

The occupational profile of the selected beneficiaries reveals that 50.41% included agriculture job, 22.13% are accounted as non-agriculture; 16.04% agricultural labourers and 11.41% are categorized as non-agricultural labourers. Details are presented in Table No. 14 and 14 (a)

Table 10 - Total Income, expenditure and Net Income of Scheme area (Rs)

Sl No	Name of District	Income (Rs)		Expenditure (Rs)		Net Income (Rs)	
		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	3869214	5618311	1390240	2956997	2478974	2661314
2	Kollam	408945	907435	149150	282960	259795	624475
3	Pathanamthitta	165271	502466	26305	81525	138966	420941
4	Alappuzha	119815	197489	58939	82045	60876	115444
5	Kottayam	11219640	23248444	2372240	5656831	8847400	17591613
6	Idukki	4291064	11847291	2664040	8124755	1627024	3722536
7	Eranakulam	3298930	6739815	1936410	4740340	1362520	1999475
8	Thrissur	6808582	13056650	4452970	8269364	2355612	4787286
9	Palakkad	6322360	11810133	2197015	2735616	4125345	9074517
10	Malappuram	2516909	3181045	1251916	1536959	1264993	1644086
11	Kozhikkode	1519594	2147028	629162	943504	890432	1203524
12	Kannur	1535592	2910299	841925	1450240	693667	1460059
13	Kasaragod	1659840	2834389	438925	479111	1220915	2355278
State		43735756	85000795	18409237	37340247	25326519	47660548

Table 10 (a) - Income, Expenditure and Net Income of Control Plots (Rs)

SI No	Name of District	Income	Expenditure	Net Income
1	2	3	4	5
1	Thiruvananthapuram	348447	101650	246797
2	Kollam	85519	68380	17139
3	Pathanamthitta	451543	115030	336513
4	Alappuzha	27601	15350	12251
5	Kottayam	2887715	889700	1998015
6	Idukki	447337	248131	199206
7	Eranakulam	433546	286170	147376
8	Thrissur	394725	299300	95425
9	Palakkad	2088705	539920	1548785
10	Malappuram	660785	263675	397110
11	Kozhikkode	417334	196725	220609
12	Kannur	949189	498055	451134
13	Kasaragod	358372	27700	330672
State		9550818	3549786	6001032

Table 11 – Income per Acre before and after soil conservation programme*(Income in Rs)*

SI No	Name of District	Before SC work			After SC work		
		Area in acre	Net Income (Rs)	Net Income per acre (Rs)	Area in acre	Net Income (Rs)	Net Income per acre (Rs)
1	2	3	4	5	6	7	8
1	Thiruvananthapuram	65.29	2478974	37969	70.60	2661314	37696
2	Kollam	21.66	259795	11994	21.66	624475	28831
3	Pathanamthitta	3.46	138966	40164	5.61	420941	75034
4	Alappuzha	4.44	60876	13711	4.60	115444	25097
5	Kottayam	242.85	8847400	36432	243.05	17591613	72379
6	Idukki	132.88	1627024	12244	133.18	3722536	27951
7	Eranakulam	110.26	1362520	12357	108.84	1999475	18371
8	Thrissur	143.09	2355612	16462	143.02	4787286	33473
9	Palakkad	190.70	4125345	21633	194.51	9074517	46653
10	Malappuram	113.05	1264993	11190	112.51	1644086	14613
11	Kozhikkode	95.33	890432	9341	94.17	1203524	12780
12	Kannur	131.00	693667	5295	138.73	1460059	10524
13	Kasaragod	49.61	1220915	24610	70.54	2355278	33389
State		1303.62	25326519	19428	1341.02	47660548	35541

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

SI No	Name of District	Area in acre	Net Income (Rs)	Net Income per acre
1	2	3	4	5
1	Thiruvananthapuram	8.67	246797	28466
2	Kollam	2.01	17139	8587
3	Pathanamthitta	3.33	336513	101055
4	Alappuzha	1.26	12251	9723
5	Kottayam	43.79	1998015	45627
6	Idukki	25.00	199206	7968
7	Eranakulam	8.40	147376	17545
8	Thrissur	8.00	95425	11928
9	Palakkad	33.37	1548785	46412
10	Malappuram	19.08	397110	20813
11	Kozhikkode	27.89	220609	7910
12	Kannur	34.15	451134	13210
13	Kasaragod	2.30	330672	143770
State		217.25	6001032	27623

Chapter III

3.1 General Observations

During the survey period the staff of this department have visited all the beneficiary plots.

The distribution of holdings of the selected beneficiaries of the soil conservation programmes reveals that 57.01% of the beneficiary holding belongs to less than one acre, 39.51% have holding area between one acre to 3 acre. And above 3 acre were 2.59% respectively..

The opinion of selected beneficiaries are collected. Out of that 17.25% of the beneficiaries reported that contour bunds effectively control soil erosion while about 74 percent opinioned that it moderately controls soil erosion. The rest 8.75% are of opinion that it has no effect.

About the fertility of the soil 14.71% are of the view that the conservation measures have improved the fertility of the soil remarkably. While 81.03% reported that the fertility of the soil has improved moderately and 4.25% opinioned that it has no effect on the fertility of the soil.

Similarly regarding the moisture retention 13.38% reported that the scheme has substantially increased moisture retention while 83.07% reported that the scheme has caused moisture retention moderately only. 3.55% are of no effect. Details are presented in table No.

12

Table 12
Opinion of cultivators about of effectiveness of bunds, Fertility of the soil and moisture retention of scheme area

Sl No	Name of District	Effectiveness of contour bunds			Fertility of soil			Moisture retention			Total
		Effectively controlled	Moderately controlled	No effect	Remarkably controlled	Moderately controlled	No effect	Substantially controlled	Moderately controlled	No effect	
1	2	3	4	5	6	7	8	9	10	11	12
1	Thiruvananthapuram	0	98	27	0	97	28	0	93	32	125
2	Kollam	0	47	78	2	115	8	1	121	3	125
3	Pathanamthitta	0	125	0	1	124	0	0	123	2	125
4	Alappuzha	1	75	1	0	76	1	0	77	0	77
5	Kottayam	102	23	0	84	41	0	73	52	0	125
6	Idukki	6	118	1	5	120	0	3	122	0	125
7	Eranakulam	1	124	0	0	125	0	1	123	1	125
8	Thrissur	2	107	16	1	107	17	0	120	5	125
9	Palakkad	1	123	1	0	124	1	0	123	2	125
10	Malappuram	2	115	8	1	116	8	0	117	8	125
11	Kozhikkode	2	118	5	0	122	3	0	123	2	125
12	Kannur	36	89	0	20	104	1	15	109	1	125
13	Kasaragod	119	5	1	118	7	0	118	7	0	125
State		272	1167	138	232	1278	67	211	1310	56	1577

Table 13
Conditions of Bund
(Scheme Area)

Sl	Name of District	Good	Partially	Seriously	Total
1	2	3	4	5	6
1	Thiruvananthapuram	82	34	9	125
2	Kollam	107	18	0	125
3	Pathanamthitta	122	3	0	125
4	Alappuzha	75	2	0	77
5	Kottayam	123	2	0	125
6	Idukki	78	47	0	125
7	Eranakulam	123	2	0	125
8	Thrissur	123	2	0	125
9	Palakkad	111	10	4	125
10	Malappuram	65	54	6	125
11	Kozhikkode	99	25	1	125
12	Kannur	96	29	0	125
13	Kasaragod	124	1	0	125
State		1328	229	20	1577

Table 14
Occupational profile

(Scheme Area)

Sl No	Name of District	Occupation				Total
		Agriculture	Non-agriculture	Agricultural Labours	Non-agriculture	
1	2	3	4	5	6	7
1	Thiruvananthapuram	74	1	50	0	125
2	Kollam	37	2	51	35	125
3	Pathanamthitta	32	38	46	9	125
4	Alappuzha	0	28	14	35	77
5	Kottayam	95	23	4	3	125
6	Idukki	121	2	0	2	125
7	Eranakulam	42	53	24	6	125
8	Thrissur	67	35	13	10	125
9	Palakkad	89	20	13	3	125
10	Malappuram	8	98	6	13	125
11	Kozhikkode	47	38	21	19	125
12	Kannur	59	11	11	44	125
13	Kasaragod	124	0	0	1	125
State		795	349	253	180	1577

Table 14 (a)

Occupational profile (Control Plots)

Sl No	Name of District	Occupation				Total
		Agriculture	Non-agriculture	Agriculture labours	Non-agriculture labours	
1	2	3	4	5	6	7
1	Thiruvananthapuram	17	2	4	2	25
2	Kollam	6	4	7	8	25
3	Pathanamthitta	9	7	9	0	25
4	Alappuzha	2	5	0	8	15
5	Kottayam	17	5	3	0	25
6	Idukki	25	0	0	0	25
7	Eranakulam	7	2	0	1	10
8	Thrissur	4	4	1	1	10
9	Palakkad	21	3	1	0	25
10	Malappuram	0	23	1	1	25
11	Kozhikkode	15	7	1	2	25
12	Kannur	15	5	2	4	26
13	Kasaragod	5	0	0	0	5
Total		143	67	29	27	266

One important finding of this study is that the concept of watershed management has been well recognized in the scheme area. Watershed management implies the wise use of soil, water and bio-resources in a watershed to obtain optimum production with minimum disturbance to the environment. Through this water and soil can be conserved. Since both of them are interdependent. The overall objective of watershed programme include, recognition of watershed as a basic unit for judicious utilization and development of all lands. The land is to be treated according to the capability and requirement by adopting suitable methods that will control soil erosion, conserve water, improve farm income control flood and droughts, etc.

There are a number of direct and indirect outcome of the project that can be associated with the impact of watershed development project. These include raising rain fed agricultural productivity changes in land use pattern, etc.

Conditions of Bund

While examining the condition of bund the study revealed that 84.21% are in good condition 14.52% are partially damaged and 1.27% is seriously damaged. District wise statement is given in Table No. 13.

Summary of Findings

The data furnished in this report are collected through the Evaluation study on soil conservation programmes conducted during 2009-10. All the district except Wayanad were covered in this study. In Wayanad the study is directly done by the Central Government. The methodology of this study was stratified sampling method on the basis of the area of the holding. For the study purpose schemes implemented by the Soil Conservation Department and other Local \Self Government were included. For the purpose of comparison control plots are also selected from the scheme area where the soil conservation works are not carried out under any scheme. In the light of the present study an attempt is made for the cost benefit analysis with the collected data. Several benefits flow from the soil conservation programme implementation. Some of the findings of the study are given below:

For the study purpose 49 schemes were selected. The total number of beneficiaries comes to 2433. Out of this 1577 number of beneficiaries were selected for the detailed study. Land use particulars of beneficiary plots gives us certain positive trends while comparing with the area before and after the soil conservation programme. The study revealed that 37.40 acre of land has been additionally brought under cultivation by cultivating area which are under the fallow land.

There is an increasing awareness of the importance of the soil conservation programme especially watershed management programme among the people in the scheme area. Besides Soil Conservation Department, Local Self Government also activated various programmes in this directions. WGDP, RIDF, TSP programmes are included under study. Tribal colonies also enjoyed benefits.

Income and Expenditure

The particulars relating to income and expenditure of beneficiary plots reveals that after implementation of SC programme net income of the beneficiaries of the scheme area increased to 87.8%. It is estimated that the percentage increase of net income per acre in beneficiary plots of the scheme area as 82.56%

Analysis of data collected from the beneficiary and control plots reveals that the net income per acre, received from the beneficiary plot is Rs.35541/- and from the control plot is Rs.27623/- The district wise details are presented in Table No. 11 and 11 (a). The higher rate of income from the scheme area is due to the positive impact of soil conservation programme.

While analysing the production details of various crops it is revealed that an increase 39% recorded in the case of pepper even though the area under pepper showed a decrease of 0.92%. Production of coconut also increased 13.54%. Whereas the percentage increase of area was 3.48%. Likewise in rubber production the percentage increase is recorded as 14.86%. Whereas the area increase was 13.16%.

Cost benefit analysis of the collected data reveals that 81% of the cost of soil conservation programme has benefited in the year under study itself.

Table 15
Cropping Intensity in Scheme area

Sl.No	District	Net area cultivated		Total Gross Area Cropped		Intensity of Cropping (%)	
		Before SC Work	After SC work	Before SC work	After SC work	Before SC work	After work
1	2	3	4	5	6	7	8
1	Thiruvananthapuram	65.29	70.60	62.47	74.63	95.68	105.69
2	Kollam	21.66	21.66	23.92	26.98	110.43	124.52
3	Pathanamthitta	3.46	5.61	4.37	6.47	126.30	115.33
4	Alappuzha	4.44	4.60	5.48	7.29	124.10	158.26
5	Kottayam	242.85	243.05	258.57	262.71	106.48	108.09
6	Idukki	132.88	133.18	231.58	231.27	174.28	173.65
7	Eranakulam	110.26	108.84	93.20	92.02	84.53	84.56
8	Thrissur	143.09	143.02	132.31	135.8	92.47	94.96
9	Palakkad	190.70	194.51	190.75	197.44	100.03	101.51
10	Malappuram	113.05	112.51	113.64	119.50	100.52	106.21
11	Kozhikkode	95.33	94.17	111.9	117.96	117.36	125.23
12	Kannur	131.00	138.73	115.98	156.82	88.53	113.04
13	Kasaragod	49.61	70.54	36.98	57.30	74.54	81.23
State		1303.62	1341.02	1381.15	1486.19	105.95	110.82

Cropping Intensity

Productivity of the land to a certain extent influenced the cropping pattern of a locality. Through this study it is seen that the cropping intensity of the scheme area increased from 99.44% to 103.78%. Districtwise details are presented in Table No.15.

323

21127937

Schedules