

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 2001-02 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	3	123	29.71	2	3.7	-	-	-	-	125	33.41
2	Kollam	5	91	27.81	29	49.63	4	13.34	1	7	125	97.78
3	Pathanamthitta	10	113	32.43	11	15.26	1	3.79	1	8	126	59.48
4	Alappuzha	3	83	24.21	31	45.98	9	33	2	15	125	118.19
5	Kottayam	3	81	28.54	40	64.15	2	8	2	10.98	125	111.67
6	Idukki	4	28	19.35	95	150.4	2	6.45	-	-	125	176.2
7	Eranakulam	4	114	42.04	10	12.74	1	3.36	-	-	125	58.14
8	Thrissur	1	29	2.62	-	-	-	-	-	-	29	2.62
9	Palakkad	5	52	25.32	40	59.84	24	84.56	9	62.23	125	231.95
10	Malappuram	1	88	35.26	30	44.64	4	12.72	3	17.74	125	110.36
11	Kozhikode	5	59	32.57	64	101.47	1	4	1	5.3	125	143.34
12	Kannur	5	80	36.18	43	63.66	2	8.64	-	-	125	108.48
13	Kasaragod	2	77	36.17	18	19.69	2	6	-	-	97	61.86
Total		51	1018	372.21	413	631.16	52	183.86	19	126.25	1502	1313.48

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

(Area in acres)

Sl. No.	Districts	No. of control plots 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	3	25	4.75	-	-	-	-	-	-	25	4.75
2	Kollam	5	17	5.4	8	11.55	-	-	-	-	25	16.95
3	Pathanamthitta	10	46	9.99	2	3.26	-	-	-	-	48	13.25
4	Alappuzha	3	25	2.89	-	-	-	-	-	-	25	2.89
5	Kottayam	3	7	3.83	7	9.65	1	3.5	-	-	15	16.98
6	Idukki	4	7	3.9	17	27.34	1	4	-	-	25	35.24
7	Eranakulam	4	16	7.14	4	5.18	-	-	-	-	20	12.32
8	Thrissur	1	5	1.06	-	-	-	-	-	-	5	1.06
9	Palakkad	5	10	4.28	12	17.73	3	10	-	-	25	32.01
10	Malappuram	1	16	6.17	7	9.18	1	3.29	1	6.75	25	25.39
11	Kozhikode	5	16	6.96	7	9.96	2	6.7	-	-	25	23.62
12	Kannur	5	23	9.57	2	2.8	-	-	-	-	25	12.37
13	Kasaragod	2	1	0.5	4	5.38	-	-	-	-	5	5.88
Total		51	214	66.44	70	102.03	8	27.49	1	6.75	293	202.71

The total number of beneficiaries comes to 1502. About 68% of the beneficiaries are having holding less than one acre and 28% are having holdings one acre and above only 4% 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 73.04%, 23.89%, 2.73% and 0.34% 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 1175.89 acres to 1183.68 acre after the implementation of soil conservation programme. An additional area of 7.79 acre of

land has brought under cultivation which was not cultivated earlier. Hence it can be stated that 0.66% 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 89.52% to 90.12 by decreasing the current fallow.

On examining the district wise data a remarkable increase is noted in the area additionally brought under cultivation in Palakkad district. In this district the percentage increase in area under cultivations is recorded as 3.1%. In Kannur district the respective change is recorded as 2.31%

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	33.41	2208354	125	125
2	Kollam	97.78	7675954	125	125
3	Pathanamthitta	59.48	2044001	126	126
4	Alappuzha	118.19	1080921	125	125
5	Kottayam	111.67	1312938	125	125
6	Idukki	176.20	4837899	125	125
7	Eranakulam	58.14	1489563	125	125
8	Thrissur	2.62	74711	29	29
9	Palakkad	231.95	1720282	125	125
10	Malappuram	110.36	2004920	125	125
11	Kozhikkode	143.34	7952400	713	125
12	Kannur	108.48	890985	125	125
13	Kasaragod	61.86	103870	97	97
Total		1313.48	33396798	2090	1502

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	%
1	2	3	4	5	6	7	8	9	10
1	Thiruvananthapuram	33.13	99.16	33.13	99.16	0	0	0	0
2	Kollam	72.41	74.05	72.97	74.63	14.79	15.13	14.23	14.55
3	Pathanamthitta	52.37	88.05	52.6	88.43	3.78	6.36	3.55	5.97
4	Alappuzha	114.72	97.06	114.72	97.06	0.07	0.06	0.05	0.04
5	Kottayam	105.59	94.56	105.59	94.56	0.58	0.52	0.58	0.52
6	Idukki	175.23	99.45	175.23	99.45	0.70	0.4	0.70	0.4
7	Eranakulam	52.2	89.78	51.38	88.37	3.08	5.3	2.98	5.13
8	Thrissur	1.16	44.27	1.16	44.27	0.13	4.96	0.13	4.96
9	Palakkad	197.54	85.16	203.71	87.82	19.21	8.28	10.83	4.67
10	Malappuram	96.74	87.66	96.52	87.46	3.51	3.18	3.45	3.13
11	Kozhikode	133.46	93.11	133.38	93.05	0.19	0.13	0.19	0.13
12	Kannur	83.04	76.55	84.96	78.32	4.46	4.11	2.51	2.31
13	Kasaragod	58.3	94.25	58.33	94.29	1.63	2.63	1.53	2.47
Total		1175.89	89.52	1183.68	90.12	52.13	3.97	40.73	3.1

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	
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
1	2	11	12	13	14	15	16	17	18	19	20	21	22
1	Thiruvananthapuram	0.28	0.84	0.28	0.84	0	0	0	0	33.41	100	33.41	100
2	Kollam	7.01	7.17	7.01	7.17	3.57	3.65	3.57	3.65	97.78	100	97.78	100
3	Pathanamthitta	3.28	5.51	3.28	5.51	0.05	0.08	0.05	0.08	59.48	100	59.48	100
4	Alappuzha	3.34	2.83	3.36	2.84	0.06	0.05	0.06	0.05	118.19	100	118.19	100
5	Kottayam	5.26	4.71	5.26	4.71	0.24	0.21	0.24	0.21	111.67	100	111.67	100
6	Idukki	0.27	0.15	0.27	0.15	0	0	0	0	176.20	100	176.20	100
7	Eranakulam	2.83	4.87	3.75	6.45	0.03	0.05	0.03	0.05	58.14	100	58.14	100
8	Thrissur	1.33	50.76	1.33	50.76	0	0	0	0	2.62	100	2.62	100
9	Palakkad	2.47	1.06	4.80	2.07	12.73	5.49	12.61	5.44	231.95	100	231.95	100
10	Malappuram	7.77	7.04	8.05	7.29	2.34	2.12	2.34	2.12	110.36	100	110.36	100
11	Kozhikkode	5.61	3.91	5.69	3.97	4.08	2.85	4.08	2.85	143.34	100	143.34	100
12	Kannur	1.16	1.07	1.28	1.18	19.82	18.27	19.73	18.19	108.48	100	108.48	100
13	Kasaragod	1.24	2	1.31	2.12	0.69	1.12	0.69	1.12	61.86	100	61.86	100
Total		41.85	3.19	45.67	3.48	43.61	3.32	43.40	3.30	1313.48	100	1313.48	100

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

(Area in Acres)

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	4.75	100.00	0.00	0.00	0.00	0.00	0.00	0.00	4.75	100
2	Kollam	14.3	84.37	0.95	5.60	1.50	8.85	0.20	1.18	16.95	100
3	Pathanamthitta	10.18	76.83	.012	0.91	2.90	21.89	0.05	0.38	13.25	100
4	Alappuzha	2.19	75.78	0.04	1.38	0.66	22.84	0.00	0.00	2.89	100
5	Kottayam	16.18	95.29	0.00	0.00	0.80	4.71	0.00	0.00	16.98	100
6	Idukki	33.78	95.86	0.50	1.42	0.85	2.41	0.11	0.31	35.24	100
7	Eranakulam	11.71	95.05	0.00	0.00	0.61	4.95	0.00	0.00	12.32	100
8	Thrissur	0.72	67.92	0.00	0.00	0.34	32.08	0.00	0.00	1.06	100
9	Palakkad	30.31	94.69	0.00	0.00	1.60	5.00	0.10	0.31	32.01	100
10	Malappuram	22.86	90.04	0.16	0.63	2.32	9.14	0.05	0.20	25.39	100
11	Kozhikkode	22.36	94.67	0.00	0.00	1.17	4.95	0.09	0.38	23.62	100
12	Kannur	11.41	92.24	0.25	2.02	0.71	5.74	0.00	0.00	12.37	100
13	Kasaragod	5.03	85.54	0.00	0.00	0.75	12.76	0.10	1.70	5.88	100
Total		185.78	91.65	2.02	1.00	14.21	7.01	0.70	0.35	202.71	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 869.98acre to 958.9 acre. It showed an increase of 10.22%. At the same time the percentage change occurred in the cultivation of seasonal crops

recorded as 2.3%. 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 and tapioca are exhibited increases. The respective percentage changes are recorded as 57.59% and 4.31%. The plantain cultivation percentage increase recorded as 45.39%. At the same time in paddy cultivation percentage variation is in a negative trend. It is recorded as -10.84%. 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 9.14%. Coconut comes next with an increase of 11.65%. The area under pepper has increased to 3.16% 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	1	2	3	4	5	6	7	8
1	Thiruvananthapuram	14.07	38.21	21.54	44.29	22.75	61.79	27.09	55.71
2	Kollam	60.65	92.22	71.03	93.44	5.12	7.78	4.99	6.56
3	Pathanamthitta	45.48	78.04	47.93	79.87	12.80	21.96	12.08	20.13
4	Alappuzha	4.91	4.27	5.59	4.90	110.11	95.73	108.49	95.10
5	Kottayam	133.48	96.94	137.63	96.83	4.21	3.06	4.50	3.17
6	Idukki	126.34	79.12	142.60	78.95	33.34	20.88	38.03	21.05
7	Eranakulam	12.38	19.63	16.99	27.57	50.69	80.37	44.64	72.43
8	Thrissur	0.84	75.68	0.96	77.42	0.27	24.32	0.28	22.58
9	Palakkad	103.55	49.13	126.59	53.33	107.20	50.87	110.76	46.67
10	Malappuram	97.30	89.63	99.79	89.40	11.26	10.37	11.83	10.60
11	Kozhikkode	140.28	97.28	151.54	96.37	3.92	2.72	5.71	3.63
12	Kannur	68.41	98.06	75.49	97.82	1.35	1.94	1.68	2.18
13	Kasaragod	62.29	96.44	61.22	94.36	2.30	3.56	3.66	5.64
Total		869.98	70.43	958.90	71.95	365.32	29.57	373.74	28.05

Table – 4 Contd..

Sl. No	Districts	Total Gross area cropped			
		Before SC work	%	After SC work	%
1	2	11	12	13	14
1	Thiruvananthapuram	36.82	100	48.63	100
2	Kollam	65.77	100	76.02	100
3	Pathanamthitta	58.28	100	60.01	100
4	Alappuzha	115.02	100	114.08	100
5	Kottayam	137.69	100	142.13	100
6	Idukki	159.68	100	180.63	100
7	Eranakulam	63.07	100	61.63	100
8	Thrissur	1.11	100	1.24	100
9	Palakkad	210.75	100	237.35	100
10	Malappuram	108.56	100	111.62	100
11	Kozhikode	144.20	100	157.25	100
12	Kannur	69.76	100	77.17	100
13	Kasaragod	64.59	100	64.88	100
Total		1235.3	100	1332.64	100

Table 5 – Area under selected perennial crops

(Area in acres)

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	13.57	19.51	43.77	0.09	0.28	211.11	0	0.29	-
2	Kollam	13.15	13.84	5.25	0.76	0.81	6.58	0.62	0.62	0.00
3	Pathanamthitta	4.67	6.7	43.47	0.21	0.27	28.57	0.84	0.85	1.19
4	Alappuzha	4	4.31	7.75	0.21	0.35	66.67	0.01	0.01	0.00
5	Kottayam	9.72	12.84	32.10	0.49	0.71	44.90	0.3	0.31	3.33
6	Idukki	17.74	16.84	(--) 5.07	3.87	3.41	(--) 11.89	3.84	3.96	3.13
7	Eranakulam	9.25	11.78	27.35	0.31	0.65	109.68	0.06	0.12	100.00
8	Thrissur	0.8	0.9	12.50	0	0.01	-	0.01	0.01	0.00
9	Palakkad	53.51	63.53	18.73	8.88	10.43	17.45	1.05	0.64	(-) 39.05
10	Malappuram	67.93	69.79	2.74	7.73	7.83	1.29	4.82	4.97	3.11
11	Kozhikode	52.44	56.71	8.14	20.08	22.43	11.70	3.60	3.99	10.83
12	Kannur	13.76	16.2	17.73	1.97	2.21	12.18	17.64	18.53	5.05
13	Kasaragod	17.96	17.99	0.17	5.11	5.06	(-) 0.98	4.36	4.16	(-) 4.59
Total		278.5	310.94	11.65	49.71	54.45	9.54	37.15	38.46	3.53

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	22	23
1	Thiruvananthapuram	0	0.58	-	0.29	0.61	110.34	0.12	0.2	66.67	0	0.04	
2	Kollam	36.79	46.21	25.60	7.85	8.01	2.04	1.27	1.33	4.72	0.21	0.21	0.00
3	Pathanamthitta	38.78	38.63	(-)0.39	0.17	0.37	117.65	0.5	0.7	40.00	0.16	0.26	62.50
4	Alappuzha	-	-	-	0.05	0.11	120.00	0.3	0.36	20.00	0.3	0.39	30.00
5	Kottayam	116.25	116.44	0.16	4.65	5.22	12.26	0.1	0.1	0.00	0.21	0.21	0.00
6	Idukki	8.71	10.1	15.96	57.69	68.29	18.37	2.57	3.1	20.62	--	--	--
7	Eranakulam	2.03	3.29	62.07	0.13	0.44	238.46	0.07	0.07	0.00	--	--	--
8	Thrissur	-	-	-	0.03	0.04	33.33	--	--	-	--	--	--
9	Palakkad	25.56	32.46	27.00	8.79	9.61	9.33	2.39	2.32	(-)2.93	2.15	5.97	177.67
10	Malappuram	8.13	8.13	0.00	4.12	4.22	2.43	2.15	2.23	3.72	2.23	2.4	7.62
11	Kozhikkode	27.61	34.06	23.36	17.27	7.89	(-)54.31	5.28	7.26	37.50	2.69	3.66	36.06
12	Kannur	25.4	28.56	12.44	5.99	6.15	2.67	2.5	2.69	7.60	0.98	0.96	(-)2.04
13	Kasaragod	24.48	23.95	(-)2.17	7.72	7.42	(-)3.89	2.1	2.15	2.38	--	--	--
Total		313.74	342.41	9.14	114.75	118.38	3.16	19.35	22.51	16.33	8.93	14.1	57.89

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	18	19	20	21	22	23
1	Thiruvananthapuram	0	0.01	--	--	--	--	0	0.02	--	14.07	21.54	53.09
2	Kollam	--	--	--	--	--	--	--	--	--	60.65	71.03	17.11
3	Pathanamthitta	0.15	0.15	0.00	--	--	--	--	--	--	45.48	47.93	5.39
4	Alappuzha	0.04	0.04	0.00	--	--	--	0	0.02	--	4.91	5.59	13.85
5	Kottayam	1.59	1.63	2.52	0.11	0.11	0.00	0.06	0.06	--	133.48	137.63	3.11
6	Idukki	11	10.86	(-)1.27	11.4	14.37	26.05	9.52	11.67	22.58	126.34	142.6	12.87
7	Eranakulam	0.01	0.04	300.00	--	--	--	0.52	0.6	15.38	12.38	16.99	37.24
8	Thrissur	--	--	--	--	--	--	--	--	--	0.84	0.96	14.29
9	Palakkad	--	--	--	--	--	--	1.22	1.63	33.61	103.55	126.59	22.25
10	Malappuram	0.01	0.01	0.00	--	--	--	0.18	0.21	16.67	97.3	99.79	2.56
11	Kozhikkode	5.51	9.1	65.15	0.52	0.65	25.00	5.28	5.79	0.96	140.28	151.54	8.03
12	Kannur	--	--	--	0.03	0.03	0.00	0.14	0.16	14.29	68.41	75.49	10.35
13	Kasaragod	0.5	0.47	(-)6.00	0.06	0.02	(-)66.67	--	--	--	62.29	61.22	(-)1.72
Total		18.81	22.31	18.61	12.12	15.18	25.08	16.92	20.16	19.15	869.98	958.90	10.22

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	6.14	5.47	(-)10.91	3.86	4.31	11.66	5.67	7.64	34.74
2	Kollam	-	-	-	3.64	3.47	(-)4.67	1.37	1.39	1.46
3	Pathanamthitta	10.28	9.53	(-)7.30	2.03	1.57	(-)22.66	0.16	0.31	93.75
4	Alappuzha	109.73	107.93	(-)1.64	0.11	0.23	109.09	0.18	0.23	27.78
5	Kottayam	-	-	-	1.44	1.51	4.86	0.93	0.98	5.38
6	Idukki	-	-	-	18.44	19.62	6.40	7.99	9.84	23.15
7	Eranakulam	27.04	15.61	(-)42.27	12.07	12.4	2.73	8.63	9.42	9.15
8	Thrissur	-	-	-	-	-	-	0.27	0.28	3.70
9	Palakkad	90.44	78.39	(-)13.32	0.2	0.2	0.00	4.68	13.99	198.93
10	Malappuram	2.69	2.69	0.00	0.44	0.38	(-)13.34	3.05	3.39	11.15
11	Kozhikkode	-	-	-	0.58	1.08	86.21	1.25	2.07	65.60
12	Kannur	-	-	-	0.58	0.32	(-)44.83	0.56	0.96	71.43
13	Kasaragod	0	0.01	-	0.28	0.46	64.29	1.1	1.61	46.36
Total		246.32	219.63	(-)10.84	43.67	45.55	4.31	35.84	52.11	45.40

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	0.11	-	6.98	8.36	19.77	0	0.53		0.1	0.25	150.00
2	Kollam	-	-	-	0.02	0.03	50.00	0.09	0.1	11.11	--	--	--
3	Pathanamthitta	-	-	-	0.07	0.2	185.71	--	--	--	--	--	--
4	Alappuzha	-	-	-	0.08	0.09	12.50	--	--	--	--	--	--
5	Kottayam	0.02	0.02	0.00	1.36	1.46	7.35	--	--	--	0.01	0.06	500.00
6	Idukki	4.04	5.98	48.02	1.14	1.41	23.68	--	--	--	0.50	0	(-)100
7	Eranakulam	-	-		2.28	5.05	121.49	0.19	0.35	84.21	0.48	1.41	193.75
8	Thrissur	-	-	-	--	--	--	-	--	--	--	--	--
9	Palakkad	-	-	-	4.14	9.15	121.01	0.24	1.12	366.67	0	0	--
10	Malappuram	0.21	0.21	0.00	0.57	0.6	5.26	1.24	1.44	16.13	0.09	0.09	0.00
11	Kozhikode	0.74	0.47	(-)36.49	0.39	0.59	51.28	0	0.03	--	0.11	0.21	90.91
12	Kannur	0.01	0.03	200.00	0.05	0.06	20.00	0.08	0.14	75.00	0.07	0.15	114.29
13	Kasaragod	0.07	0.34	385.71	0.23	0.28	21.74	0.38	0.54	42.11	0.1	0.17	70.00
Total		5.09	7.16	40.67	17.31	27.28	57.60	2.22	4.25	91.44	1.46	2.34	60.27

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	0.15	--	0	0.08	--	0	0.19	--	22.75	27.09	19.07
2	Kollam	--	--	--	--	--	-	--	--	--	5.12	4.99	(-)2.54
3	Pathanamthitta	0.18	0.36	100.00	--	--	--	0.08	0.11	37.50	12.8	12.08	(-)5.6
4	Alappuzha	0.01	0.01	0.00	--	--	--	--	--	--	110.11	108.49	(-)1.47
5	Kottayam	0.45	0.47	4.44	--	--	--	--	--	--	4.21	4.5	6.89
6	Idukki	0.2	0.15	(-)25.00	--	--	--	1.03	1.03	0.00	33.34	38.03	14.07
7	Eranakulam	--	--	--	--	--	--	0	0.4	0	50.69	44.64	(-)11.94
8	Thrissur	--	--	--	--	--	--	--	--	--	0.27	0.28	3.70
9	Palakkad	0	0.33		0.55	0.65	18.18	6.95	6.93	-0.29	107.2	110.76	3.32
10	Malappuram	0.07	0.08	14.29	0.36	0.4	11.11	2.54	2.55	0.39	11.26	11.83	5.06
11	Kozhikode	0.52	0.69	32.69	0.05	0.07	40.00	0.28	0.5	78.57	3.92	5.71	45.66
12	Kannur	--	--	--	--	--	--	0	0.02	0	1.35	1.68	24.44
13	Kasaragod	--	--	--	--	--	--	0.14	0.25	78.57	2.3	3.66	59.13
Total		1.43	2.24	56.64	0.96	1.2	25.00	11.02	11.98	8.71	365.32	373.74	2.30

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. All most all perennial crops have also shown a marked improvement.

For example in Palakkad district total area before soil conservation works was 210.74acres. It increases to 237.35acres after the implementation of soil conservation measures. The increase in area is accounted as 26.61acres. The percentage increase recorded as 12.63%. 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 district before soil conservati0on work the area was 69.8 acres. It increased to77.18 acres after the implementation of soil conservation work. Increase in area accounted as 7.38 acres. Production impact reveals that output and area of coconut, arecanut and pepper increased.

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 and tapioca area and production decreased. Whereas banana and other plantain, 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.	40699.00	100995	56002.00	282188	205078
	Arecanut	Nos.	8850.00	5664	15150.00	7425	4337
	Jack	Qtl.	2.93	580	2.80	1125	1177
	Pepper	Qtl.	1.01	5738	0.68	3797	5640
	Mango	Qtl.	0.00	0	1.00	830	0
	Tamarind	Qtl.	0.00	0	0.07	154	0
	Total			112977		295519	216232
Kollam	Coconut	Nos.	22102.00	70525	22986.00	138393	133071
	Arecanut	Nos.	20045.00	9222	23155.00	12505	10825
	Cashew	Qtl.	1.30	3053	1.75	5163	3835
	Pepper	Qtl.	3.48	44616	4.99	30517	21282
	Rubber	Qtl.	190.85	489197	207.18	1478578	1362036
	Jack	Qtl.	58.89	13080	273.67	39340	8465
	Mango	Qtl.	0.20	110	0.25	150	120
	Total			629803		1704646	1539635
Pathanamthitta	Coconut	Nos.	14983.00	48704	18505.00	104558	84658
	Arecanut	Nos.	10742.00	5105	12695.00	6593	5579
	Cashew	Qtl.	0.06	135	0.07	237	203
	Pepper	Qtl.	0.78	9460	1.21	7228	4659
	Rubber	Qtl.	216.65	586637	219.70	1565141	1543413
	Jack	Qtl.	30.52	5350	61.86	11445	5647
	Mango	Qtl.	3.70	3226	5.32	3185	2215
	Coco	Qtl.	7	9296	8.30	14608	12320
	Tamarind	Qtl.	0.18	504	0.23	805	630
	Kudampuli	Qtl.	3	1800	4	3200	2400
	Total			670217		1717000	1661724
Alappuzha	Coconut	Nos.	9379.00	26544	13565.00	72305	49993
	Arecanut	Nos.	6477.00	3368	9380.00	3566	2462
	Cashew	Qtl.	8.00	16953	11.00	31477	22892
	Pepper	Qtl.	0.03	279	0.03	198	198
	Mango	Qtl.	36.45	13773	40.57	27626	24821
	Jack	Qtl.	5.36	854	102.28	30684	1608
	Coco	Qtl.	0.72	855	0.84	1560	1337
	Kudampuli	Qtl.	0.00	0	0.04	162	0
	Total			62626		167578	103311

(Table 7 Contd..)

1	2	3	4	5	6	7	8
Kottayam	Coconut	Nos.	15717.00	48728	16468.00	94198	89902
	Arecanut	Nos.	25410.00	11437	27825.00	12799	11688
	Cashew	Qtl.	2.94	6730	3.31	9841	8741
	Pepper	Qtl.	35.40	447056	39.73	242586	216148
	Rubber	Qtl.	1313.00	3561051	1421.00	10513469	9714416
	Jack	Qtl.	0.18	36	0.20	40	36
	Mango	Qtl.	5.21	3202	6	5251	4560
	Coffee	Qtl.	8.10	24408	8.85	26468	24225
	Coco	Qtl.	31.05	38209	33.39	57685	53642
		Total			4140857		10962337
Idukki	Coconut	Nos.	57325.00	197785	66745.00	421826	362292
	Arecanut	Nos.	161518.00	77529	256977.00	107930	67837
	Cashew	Qtl.	15.27	38146	25.68	70357	41836
	Pepper	Qtl.	193.57	2228377	385.00	2365748	1189449
	Rubber	Qtl.	34.04	90796	68.30	490808	244614
	Coffee	Qtl.	122.44	280511	250.83	1100359	537129
	Coco	Qtl.	44.13	57676	98.42	210799	94519
	Cardamum	Qtl.	0.06	1108	0.03	627	1254
	Tea	Qtl.	2066.00	997878	2810.00	1506160	1107376
		Total			3969806		6274614
Ernakulam	Coconut	Nos.	27230.00	77333	31260.00	171305	149221
	Arecanut	Nos.	6035.00	2414	9630.00	4815	3018
	Cashew	Qtl.	0.28	684	0.85	2309	761
	Nutmeg	Qtl.	1.17	2340	4.02	8040	2340
	Rubber	Qtl.	26.00	69767	31.00	226173	189693
		Total			152538		412642
Thrissur	Coconut	Nos.	3610.00	9676	5408.00	22174	14802
	Pepper	Qtl.	0.03	390	0.04	236	177
		Total			10066		22410
Palakkad	Coconut	Nos.	167975.00	404630	209038.00	802359	644747
	Arecanut	Nos.	298911.00	137591	442093.00	145956	98685
	Cashew	Qtl.	4.01	10269	1.25	3182	10208
	Pepper	Qtl.	8.32	103737	9.09	53582	49043
	Rubber	Qtl.	154.15	418172	183.69	1336474	1121550
	Jack	Qtl.	8.99	1652	29.45	8672	2647
	Mango	Qtl.	78.35	33061	103.40	59392	45004
	Tamarind	Qtl.	4.90	3186	7.15	4648	3185
		Total			1112298		2414265
Malappuram	Coconut	Nos.	302559.00	650512	312481.00	1212427	1173930
	Arecanut	Nos.	1400582.00	476198	1520165.00	547259	504209
	Cashew	Qtl.	41.23	57722	43.14	124777	119253
	Pepper	Qtl.	29.81	257606	33.58	183641	163024
	Rubber	Qtl.	84.00	249194	80.00	577380	606249
	Pappaya	Qtl.	4.19	1445	4.55	1595	1469
	Jack	Qtl.	125.87	24964	284.31	28431	12587
	Mango	Qtl.	87.75	40981	95.43	71444	65694
		Total			1758622		2746954

(Table 7 Contd..)

1	2	3	4	5	6	7	8
Kozhikode	Coconut	Nos.	172712.00	469272	220358.00	948049	743061
	Arecanut	Nos.	1146515.00	385607	1901945.00	751677	453120
	Cashew	Qtl.	9.82	19900	51.90	70667	13371
	Pepper	Qtl.	24.54	238038	7.94	45101	139393
	Rubber	Qtl.	132.85	366892	146.83	1026634	928886
	Jack	Qtl.	125.35	9989	155.08	18610	15042
	Mango	Qtl.	38.20	22541	88.35	80828	34948
	Coffee	Qtl.	0.82	647	2.45	6797	2275
	Coco	Qtl.	6.44	7106	28.21	44845	10238
	Vanila	Qtl.	0.00	0	2.64	898	0
	Nutmeg	Qtl.	0.02	48	.03	62	41
	Tamarind	Qtl.	0.16	144	0.24	216	144
	Total			1520184		2994384	2340518
Kannur	Coconut	Nos.	34387.00	92500	48986.00	207521	145675
	Arecanut	Nos.	101604.00	37438	169647	64575	38675
	Cashew	Qtl.	71.06	198968	95.89	317221	235079
	Pepper	Qtl.	13.01	164131	25.05	148728	77244
	Rubber	Qtl.	95.25	263391	161.75	1174633	691708
	Mango	Qtl.	10.50	6439	17.50	12266	7360
	Total			762867		1924944	1195740
Kasaragod	Coconut	Nos.	85249.00	231873	130275.00	604477	395556
	Arecanut	Nos.	560913.00	246802	871333.00	331106	213147
	Cashew	Qtl.	271.80	718234	366.86	1295017	959455
	Pepper	Qtl.	352.57	4357169	637.10	3758890	2080163
	Rubber	Qtl.	351.15	957716	466.20	3201862	2411699
	Vanila	Qtl.	0.00	0	40.00	6025	0
	Total			6511794		9197377	6060020

(Table 7 Contd..)

STATE	Coconut	Nos	953927.00	2429077	1152077.00	5081780	4191986
	Arecanut	Nos.	3747602.00	1398375	5259995.00	1996206	1413582
	Cashew	Qtl.	425.77	1070794	601.70	1930248	1415634
	Pepper	Qtl.	662.55	7856597	1144.44	6840252	3946420
	Rubber	Qtl.	2597.94	7052813	2985.65	21591152	18814264
	Pappaya	Qtl	4.19	1445	4.55	1595	1469
	Jack	Qtl	358.09	56505	909.65	138347	47209
	Mango	Qyl	260.36	123333	357.82	260972	184722
	Coffee	Qtl	131.36	305566	262.13	1133624	563629
	Coco	Qtl	89.34	113142	169.16	329497	172056
	Vanila	Qtl	0.00	0	42.64	6923	0
	Cardamum	Qtl	0.06	1108	0.03	627	1254
	Nutmeg	Qtl	1.19	2388	4.05	8102	2381
	Tamarind	Qtl	5.24	3834	7.69	5823	3959
	Kudampuli	Qtl	3.00	1800	4.04	3362	2400
	Tea	Qtl	2066	997878	2810	1506160	1107376
	Total			21414655		40834670	31868341

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	76.62	48189	94.16	56026	45590
	Tapioca	Qtl	227.00	81812	328.00	131330	90890
	Banana	Qtl	497.60	519349	630.10	859934	679104
	other plantain	Qtl	354.35	266863	502.33	372174	262536
	Ginger	Qtl	0.00	0	2.55	6018	0
	Peas	Qtl	1.00	1180	1.70	2329	1370
	Vegitables	Qtl	0.00	0	21.40	8560	0
	Pineapple	Qtl	0.00	0	1.30	806	0
	Chenai	Qtl	0.00	0	1.12	830	0

Table – 8 Contd.

1	2	3	4	5	6	7	8
	Turmeric	Qtl	0.00	0	0.40	1680	0
	Total			9,17,393		14,39,687	10,79,490
Kollam	Paddy	Qtl	--	--	--	--	--
	Tapioca	Qtl	76.90	28939	93.55	35880	29494
	Banana	Qtl	0.60	687	0.70	883	757
	other plantain	Qtl	60.48	35464	67.63	46297	41402
	Ginger	Qtl	--	--	--	--	--
	Others	Qtl					--
	Total			65,090		83,060	71,653
Pathanamthitta	Paddy	Qtl	176.96	109347	180.36	112421	110302
	Tapioca	Qtl	229.85	79164	193.75	82698	98107
	Banana	Qtl	0.00	0	6.50	8862	0
	other Plantain	Qtl	13.00	8602	21.29	14098	8608
	Chennai	Qtl	4.92	2795	28.10	17677	3095
	Other Tuber crops	Qtl	23.00	1100	9.5	484	1171
	Total			2,01,008		2,36,240	2,21,283
Alappuzha	Paddy	Qtl	1993.16	1275426	2135.94	1360067	1269151
	Tapioca	Qtl	8.00	3204	21.90	9417	3440
	Banana	Qtl	--	--	--	--	--
	other Plantain	Qtl	7.14	4153	10.53	6286	4262
	Ginger	Qtl	--	--	--	--	--
	Others	Qtl					
	Total			12,82,783		13,75,770	12,76,853
Kottayam	Pineapple	Qtl	0.22	113	1.65	930	124
	Tapioca	Qtl	161.40	53507	182.20	99171	87850
	Banana	Qtl	64.44	71103	72.68	97657	86585
	Other Plantain	Qtl	343.44	200206	46.72	29569	217363
	Ginger	Qtl	0.37	1000	0.60	3025	1865
	Chennai	Qtl	20.20	9983	22.17	12109	11033
	Total			335,912		2,42,461	4,04,820
Idukki	Paddy	Qtl	--	--	--	--	--
	Tapioca	Qtl	1063.27	338121	1374.95	625143	483433
	Banana	Qtl	46.00	47932	63.20	72776	52970
	Other Plantain		331.90	166296	462.25	257203	184674
	Ginger	Qtl	212.45	690887	499.45	2553245	1086068
	Others	Qtl	4.15	5602	3.90	5850	6225
	Total			1248838		3514217	1813370

Table – 8 Contd..

1	2	3	4	5	6	7	8
Eranakulam	Paddy	Qtl	697.75	447343	238.80	150444	439583
	Tapioca	Qtl	967.10	296050	1057.90	431930	394857
	Banana	Qtl	186.90	195375	503.80	629417	233501
	OtherPlantain	Qtl	55.60	24080	163.10	91095	31054
	Ginger	Qtl	--	--	--	--	--
	Others		--	--	--	--	--
	Total			962848		1302886	1098995
Thrissur	Paddy	Qtl	--	--	--	--	--
	Tapioca	Qtl	--	--	--	--	--
	Banana	Qtl	--	--	--	--	--
	Other Plantain	Qtl	4.54	1816	4.81	2515	2374
	Ginger	Qtl	--	--	--	--	--
	Others	Qtl	--	--	--	--	--
	Total			1816		2515	2374
Palakkad	Paddy	Qtl	1162.15	688259	1146.30	649804	658789
	Tapioca	Qtl	3.50	1050	63.00	22680	1260
	Banana	Qtl	0.00	0	87.75	91988	0
	Other Plantain	Qtl	31.55	16209	315.15	166110	16629
	Ginger	Qtl	0.00	0	1.20	5388	0
	Others	Qtl	2450.63	15230	2951.53	254824	211578
	Vegitables	Qtl	2.00	800	38.40	15360	800
	Pineapple	Qtl	0.00	0	0.30	88	0
	Chennai	Qtl	0.00	0	19.05	15956	0
	Kolacasia	Qtl	0.00	0	4.50	4334	0
	Groundnut	Qtl	25.70	242223	15.50	240250	398350
	Turmeric	Qtl	0.00	0	7.55	29150	0
	Total			963776		1495932	1287406
Malappuram	Paddy	Qtl	46.60	26049	46.70	26510	26453
	Tapioca	Qtl	104.40	26935	99.00	43073	45422
	Banana	Qtl	60.56	58036	64.99	69865	65103
	Other Plantain	Qtl	96.64	46113	106.45	77470	70331
	Pineapple	Qtl	4.96	2677	6.10	5286	4298
	Kolacasia	Qtl	12.7	7862	15.14	10968	9200
	Others	Qtl	1935.55	131426	1331.92	157645	229090
	Total			299098		390817	449897

Table – 8 Contd..

1	2	3	4	5	6	7	8
Kozhikode	Vegetables	Qtl	0.00	0	1.16	1392	1140
	Tapioca	Qtl	34.55	13771	33.71	15978	16376
	Banana	Qtl	18.37	20086	32.83	37306	20875
	Other Plantain	Qtl	42.26	26997	72.19	55312	32380
	Ginger	Qtl	14.04	8424	9.25	12205	18252
	Pineapple	Qtl	0.69	379	7.52	3669	337
	Chennai	Qtl	0.02	11	11.12	8812	16
	Kolacasia	Qtl	0.82	820	1.34	1340	820
	Turmeric	Qtl	0.30	992	0.2	607	911
	Total			71480		136441	89965
Kannur	Paddy	Qtl	--	--	--	--	--
	Tapioca	Qtl	12.50	5466	18.50	9418	6364
	Banana	Qtl	1.85	1215	3.30	4146	2324
	Other Plantain	Qtl	27.05	17893	56.05	43279	20887
	Vegetables	Qtl	1.25	1064	8.60	7740	1125
	Pineapple	Qtl	0.70	368	3.20	2474	541
	Total			26006		67057	31241
Kasaragod	Paddy	Qtl	--	--	--	--	--
	Tapioca	Qtl	--	--	--	--	--
	Banana	Qtl	24.94	24550	21.31	26659	31200
	Other Plantain	Qtl	29.78	20628	29.05	22363	22925
	Ginger	Qtl	--	--	--	--	--
	Others	Qtl	--	--	--	--	--
	Total			45178		49022	54125
STATE	Paddy	Qtl	4153.24	2594613	3842.26	2355272	2549868
	Tapioca	Qtl	2888.47	928019	3466.46	1506718	1257493
	Banana	Qtl	901.26	938333	1487.16	1899493	1172419
	Other Plantain	Qtl	1397.73	835320	1857.55	1183771	915425
	Ginger	Qtl	226.86	700311	513.05	2579881	1106185
	Others	Qtl	4390.33	229058	4287.35	418319	446893
	Groundnut	Qtl	25.70	242223	15.50	240250	398350
	Turmeric	Qtl	0.3	992	8.15	31437	1157
	Vegetables	Qtl	3.25	1864	69.56	33052	3065
	Pineapple	Qtl	6.57	3537	20.07	13253	5300
	Chennai	Qtl	25.81	12789	81.56	55384	14144
	Other tuber	Qtl	23	1100	9.5	484	1171
	Kolacasia	Qtl	13.52	8682	20.98	16642	10020
	Peas(pulses)	Qtl	1.00	1180	1.70	2329	1370
	Total			6498022		1,03,36,10	78,85,985

Table 9

Quantity and Value of Selected perennial and seasonal crops for the years 2005-06

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	953929.00	2429077	1152077.00	5081780	4191988
	Arecanut	''	3747603.00	1398375	5259997.00	1996206	1413582
	Cashew	Qtl	425.00	1070794	602.00	1930248	1415634
	Pepper	''	663.00	7856597	1145.00	6840252	3946420
	Rubber	''	2598.00	7052813	2986.00	21591152	18814264
	Nutmeg	''	1	2388	4	8102	2381
	Coffee	..	131.00	305566	262.00	1133624	563629
	Jack	..	358	56505	910	138347	54461
	Kudampuli	..	30.0	1800	40	3362	2400
	Tamarind	..	5.00	3834	7.00	5823	3959
	Vanila	..	0.00	0	43.00	6923	0
	Coco	..	89.00	113142	168.00	329497	172056
	Mango	..	260.00	123333	357.00	260972	184722
	Pappaya	..	4.00	1445	5.00	1595	1469
	Tea	..	2066.00	997878	2810.00	1506160	1107376
	Cardamum	..	0.06	1108	0.03	627	1254
Total A				2,14,14,655		4,08,34,670	3,18,75,595
B. Seasonal Crops	Paddy	Qtl	4154.00	2594613	3842.00	2355272	2549868
	Tapioca	''	2889.00	928019	3468.00	1506718	1257493
	Banana	''	902.00	938333	1488.00	1899493	1172419
	Other plantain	''	1398.00	835320	1857.00	1183771	915425
	Ginger	''	226.00	700311	513.00	2579701	1106185
	Vegitables	''	4.00	1865	70.00	33052	3065
	Groundnut	..	26.00	242223	16.00	240250	398350
	Others	..	4391.00	229058	4288.00	418319	446893
	Peas(pulses)	..	1.00	1180	2.00	2329	1370
	Other tuber crops	..	23.00	1100	9.00	484	1132
	Kolacasia	..	14.00	8682	21.00	16642	10724
	Chenai	..	26.00	12789	82.00	55384	17526
	Pineapple	..	7.00	3537	20.00	13253	4338
	Turmeric	..	0.3	992	8.15	31437	1157
	Total B			6498022		10336105	7885985
All Crops (A+B)			2,79,12,677		5,11,70,775	3,97,61,540	

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 interms 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 Rs.3,36,96,798/-

The total area under cultivation after soil conservation work was 1183.68 acres. The value of crops before the soil conservation programme comes to Rs.2,79,72,677. The value of crops after the implementation of soil conservation programme has also been calculated as Rs. 5,11,70,775/- Thus the additional benefits due to the implementation of soil conservation programme is worked out to be Rs.2,31,98,098. It is estimated that the value at constant price as Rs. 3,84,91,580/- This shows that 70% of the cost of soil conservation programme (including maintenance) has benefited in the year under study itself.

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 7.79 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 21%, cashew 42% etc. As a seasonal crop productivity of tapioca increased to 20%.

(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 (10.22%). Growing of perennial crops will accelerate conservation of soil more affectively.

Occupational Profile

The occupational profile of the selected beneficiaries reveals that 33% included agriculture job, 31% are accounted as non-agriculture; 18% agricultural labourers and 18% 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	1030223	1735206	233534	581053	796689	1154153
2	Kollam	720110	1791850	241689	890386	478421	901464
3	Pathanamthitta	871327	1953240	269366	859075	601961	1094165
4	Alappuzha	1703857	2101459	480745	651468	1223112	1449991
5	Kottayam	4977348	11057488	927265	3617215	4050083	7440273
6	Idukki	5174250	9750333	1066557	2181899	4107693	7568434
7	Eranakulam	1115447	1715528	596176	976715	519271	738813
8	Thrissur	11807	24925	5070	14095	6737	10830
9	Palakkad	2265405	3983656	1207351	2005495	1058054	1978161
10	Malappuram	1990552	3060040	542020	893783	1448532	2166257
11	Kozhikkode	1577576	3093341	485135	1040172	1092441	2053169
12	Kannur	788322	1992001	0	752212	788322	1239789
13	Kasaragod	7035947	9459409	281780	810192	6754167	8649217
State		2,92,62,171	5,17,18,476	63,36,688	1,52,73,760	2,29,25,483	3,64,44,716

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	85263	17740	67523
2	Kollam	187656	75800	111856
3	Pathanamthitta	291960	91067	200893
4	Alappuzha	59593	21075	38518
5	Kottayam	1349071	156750	1192321
6	Idukki	1577231	389520	1187711
7	Eranakulam	560452	159145	401307
8	Thrissur	12859	4270	8589
9	Palakkad	420136	229005	191131
10	Malappuram	366600	188100	178500
11	Kozhikkode	440804	127403	313401
12	Kannur	189294	80400	108894
13	Kasaragod	176205	93097	83108
State		57,17,124	16,33,372	40,83,752

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	33.13	796689	24047	33.13	1154153	34837
2	Kollam	72.41	478421	6607	72.97	901464	12354
3	Pathanamthitta	52.37	601961	11494	51.78	1094165	21131
4	Alappuzha	114.72	1223112	10662	113.72	1449991	12751
5	Kottayam	105.59	4050083	38357	105.59	7440273	70464
6	Idukki	175.23	4107693	23442	175.23	7568434	43191
7	Eranakulam	52.20	519271	9948	47.11	738813	15683
8	Thrissur	1.16	6737	5808	1.16	10830	9336
9	Palakkad	197.54	1058054	5356	202.86	1978161	9751
10	Malappuram	96.74	1448532	14973	96.48	2166257	22453
11	Kozhikkode	133.46	1092441	8186	133.38	2053169	15393
12	Kannur	83.04	788322	9493	84.96	1239789	14593
13	Kasaragod	58.30	6754167	115852	58.33	8649217	148281
State		1175.89	229,25,483	19,496	1176.70	3,64,44,716	30,972

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	4.75	67523	14215
2	Kollam	14.30	111856	7822
3	Pathanamthitta	10.18	200893	19734
4	Alappuzha	2.19	38518	17588
5	Kottayam	16.18	1192321	73691
6	Idukki	33.78	1187711	35160
7	Eranakulam	11.71	401307	34270
8	Thrissur	0.72	8589	11929
9	Palakkad	30.31	191131	6306
10	Malappuram	22.86	178500	7808
11	Kozhikkode	22.36	313401	14016
12	Kannur	11.41	108894	9544
13	Kasaragod	5.03	83108	16522
State		185.78	40,83,752	21,982

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 68% of the beneficiary holding belongs to less than one acre, 28% have holding area between one acre to 3 acre. And above 3 acre were 4 % respectively..

The opinion of selected beneficiaries are collected. Out of that 9% of the beneficiaries reported that contour bunds effectively control soil erosion while about 81 percent opinioned that it moderately controls soil erosion. The rest 10% are of opinion that it has no effect.

About the fertility of the soil 7% are of the view that the conservation measures have improved the fertility of the soil remarkably. While 90% reported that the fertility of the soil has improved moderately and 3% opinioned that it has no effect on the fertility of the soil.

Similarly regarding the moisture retention 5% reported that the scheme has substantially increased moisture retention while 90% reported that the scheme has caused moisture retention moderately only. 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	125	0	0	125	0	1	122	2	125
2	Kollam	1	4	120	5	115	5	3	120	2	125
3	Pathanamthitta	2	124	0	0	126	0	2	123	1	126
4	Alappuzha	5	120	0	6	119	0	6	118	1	125
5	Kottayam	13	109	3	34	90	1	9	113	3	125
6	Idukki	3	120	2	0	125	0	0	125	0	125
7	Eranakulam	0	110	15	0	102	23	1	77	47	125
8	Thrissur	0	29	0	0	29	0	0	29	0	29
9	Palakkad	0	124	1	0	124	1	0	124	1	125
10	Malappuram	2	117	6	1	115	9	2	110	13	125
11	Kozhikkode	23	100	2	2	106	7	6	104	15	125
12	Kannur	50	75	0	0	116	0	7	118	0	125
13	Kasaragod	42	55	0	0	58	1	33	64	0	97
State		141	1212	149	105	1350	47	70	1347	85	1502

Table 13
Conditions of Bund
(Scheme Area)

Sl	Name of District	Good	Partially	Seriously	Total
1	2	3	4	5	6
1	Thiruvananthapuram	17	107	1	125
2	Kollam	84	40	1	125
3	Pathanamthitta	126	0	0	126
4	Alappuzha	34	91	0	125
5	Kottayam	109	16	0	125
6	Idukki	47	78	0	125
7	Eranakulam	123	2	0	125
8	Thrissur	29	0	0	29
9	Palakkad	114	10	1	125
10	Malappuram	27	77	21	125
11	Kozhikkode	115	10	0	125
12	Kannur	97	28	0	125
13	Kasaragod	97	0	0	97
State		1019	459	24	1502

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	36	14	17	58	125
2	Kollam	29	45	43	8	125
3	Pathanamthitta	17	72	11	26	126
4	Alappuzha	35	55	21	14	125
5	Kottayam	38	26	36	25	125
6	Idukki	95	15	12	3	125
7	Eranakulam	29	53	13	30	125
8	Thrissur	0	1	19	9	29
9	Palakkad	63	40	14	8	125
10	Malappuram	25	62	27	11	125
11	Kozhikkode	67	29	19	10	125
12	Kannur	22	47	12	44	125
13	Kasaragod	42	13	24	18	97
State		498	472	268	264	1502

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	0	0	1	24	25
2	Kollam	9	7	9	0	25
3	Pathanamthitta	3	23	3	19	48
4	Alappuzha	0	12	3	10	25
5	Kottayam	6	3	3	3	15
6	Idukki	20	2	3	0	25
7	Eranakulam	4	13	1	2	20
8	Thrissur	1	0	4	0	5
9	Palakkad	15	5	4	1	25
10	Malappuram	6	15	1	3	25
11	Kozhikkode	10	4	8	3	25
12	Kannur	7	13	5	0	25
13	Kasaragod	1	2	1	1	5
Total		82	99	46	66	293

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 68% are in good condition 30% are partially damaged and 2% 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 2006-07. 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 fiftyone schemes were selected. The total number of beneficiaries comes to 2096. Out of this 1502 number of beneficiaries were selected for the detailed study (72%). 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 7.79 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 59%. It is estimated that the percentage increase of net income per acre in beneficiary plots of the scheme area as 59%

Analysis of data collected from the beneficiary and control plots reveals that the net income per acre, received from the beneficiary plot is Rs.30972/- and from the control plot is Rs.21982/- 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 72% recorded in the case of pepper even though the area under pepper showed a increase of 3.2% . Production of coconut also increased 21%. Whereas the percentage increase of area was 11.65%. Likewise in rubber production the percentage increase is recorded as 15%. Whereas the area increase was only 9.14%.

Cost benefit analysis of the collected data reveals that 70% 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	33.13	33.13	36.82	48.63	111.14	146.79
2	Kollam	72.41	72.97	65.77	76.01	90.83	104.17
3	Pathanamthitta	52.37	52.60	58.28	60.03	111.29	114.13
4	Alappuzha	114.72	114.72	115.01	114.06	100.25	99.42
5	Kottayam	105.59	105.59	137.70	142.12	130.41	134.60
6	Idukki	175.23	175.23	159.70	180.63	91.14	103.08
7	Eranakulam	52.20	51.38	63.10	61.62	120.88	119.93
8	Thrissur	1.16	1.16	1.11	1.24	95.69	106.90
9	Palakkad	197.54	203.71	210.74	237.35	106.68	116.51
10	Malappuram	96.74	96.52	108.56	111.62	112.22	115.64
11	Kozhikkode	133.46	133.38	144.23	157.27	108.07	117.91
12	Kannur	83.04	84.96	69.80	77.18	84.06	90.84
13	Kasaragod	58.30	58.33	64.59	64.88	110.79	111.23
State		1175.89	1183.68	1235.41	1332.64	105.06	112.58

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 are increased from 105% to 112%.Districtwise details are presented in Table No.15.