

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

The schemes selected which were implemented 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 in the State except Wayanad where the same is directly implemented 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	104	46.27	21	26.67	0	0	0	0	125	72.94
2	Kollam	5	102	27.44	23	31.02	0	0	0	0	125	58.46
3	Pathanamthitta	5	125	17.75	0	0	0	0	0	0	125	17.75
4	Alappuzha	5	110	16.56	13	19.45	1	3	1	5	125	44.01
5	Kottayam	6	34	21.54	70	124.04	16	61.51	5	29.52	125	236.61
6	Idukki	3	35	19.52	80	128.73	8	30.63	2	11.05	125	189.93
7	Eranakulam	3	124	20.98	1	1.5	0	0	0	0	125	22.48
8	Thrissur	3	27	10.28	12	15.49	0	0	0	0	39	25.77
9	Palakkad	4	40	23.77	79	128.65	6	23.1	0	0	125	175.52
10	Malappuram	5	66	28.48	59	100.2	0	0	0	0	125	128.68
11	Kozhikode	5	99	17.93	19	33.08	6	24.79	1	5	125	80.8
12	Kannur	5	37	18.8	60	91.73	19	76.46	9	75.36	125	262.35
13	Kasaragod	1	42	22.86	83	135.02	0	0	0	0	125	157.88
Total		55	945	292.18	520	835.58	56	219.49	18	125.93	1539	1473.18

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

(Area in acres)

Sl. No.	Districts	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	4	5	6	7	8	9	10	11	12	13
1	Thiruvananthapuram	23	4.6	1	1.32	0	0	1	5.5	25	11.42
2	Kollam	22	5.27	3	3.79	0	0	0	0	25	9.06
3	Pathanamthitta	25	3.02	0	0	0	0	0	0	25	3.02
4	Alappuzha	20	2.26	0	0	0	0	0	0	20	2.26
5	Kottayam	9	5.86	19	31.21	1	4.68	1	5.38	30	47.13
6	Idukki	6	5.1	15	23.09	2	7.07	1	5.68	24	40.94
7	Eranakulam	15	2.08	0	0	0	0	0	0	15	2.08
8	Thrissur	15	5.4	0	0	0	0	0	0	15	5.4
9	Palakkad	7	4.88	16	27.55	2	6.25	0	0	25	38.68
10	Malappuram	11	3.34	13	18.5	1	3.00	0	0	25	24.84
11	Kozhikode	22	5.92	3	6.29	0	0	0	0	25	12.21
12	Kannur	6	4.49	13	21.4	5	17.90	1	5	25	48.79
13	Kasaragod	1	0.82	3	4.69	1	3.59	0	0	5	9.1
Total		182	53.04	86	137.84	12	42.49	4	21.56	284	254.93

The total number of beneficiaries comes to 1539. About 61.40% of the beneficiaries are having holding less than one acre, 33.80% are having holdings one acre or more but less than 3 acres, 3.63% are having holding 3 acre or more but less than 5 acres and above only 1.17% 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 64.08%, 30.28%, 4.23% and 1.41% 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 1272.43 acres to 1287.32 acre after the implementation of soil conservation programme. An additional area of 14.89 acre of

land has brought under cultivation which was not cultivated earlier. Hence it can be stated that 1.17% 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 86.37% to 87.38% 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, Kollam, Pathanamthitta, Palakkad, Kozhikode, 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	72.94	950300	146	125
2	Kollam	58.46	10198650	601	125
3	Pathanamthitta	17.75	674642	125	125
4	Alappuzha	44.01	2505392	125	125
5	Kottayam	236.61	2653480	125	125
6	Idukki	189.93	9500872	437	125
7	Eranakulam	22.48	4895400	125	125
8	Thrissur	25.77	523625	77	39
9	Palakkad	175.52	3502925	262	125
10	Malappuram	128.68	3031996	125	125
11	Kozhikkode	80.8	1597311	183	125
12	Kannur	262.35	1204516	125	125
13	Kasaragod	157.88	1000000	125	125
Total		1473.18	42239109	2581	1539

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		
1	Thiruvananthapuram	64.1	87.88	71.95	98.64	8.57	11.75	0	0.00
2	Kollam	47.7	81.59	50.25	85.96	5.59	9.56	2.95	5.05
3	Pathanamthitta	2.17	12.23	3.06	17.24	12.19	68.68	10.79	60.79
4	Alappuzha	40.42	91.84	5.22	11.86	1.08	2.45	33.82	76.85
5	Kottayam	225.29	95.22	225.29	95.22	0	0.00	0	0.00
6	Idukki	179.03	94.26	179.53	94.52	0.00	0.00	0	0.00
7	Eranakulam	20.29	90.26	14.11	62.77	0.28	1.25	5.68	25.27
8	Thrissur	25.7	99.73	25.7	99.73	0	0.00	0	0.00
9	Palakkad	157.38	89.66	165.17	94.10	10.22	5.82	1.95	1.11
10	Malappuram	105.02	81.61	105.63	82.09	4.59	3.57	3.82	2.97
11	Kozhikode	63.14	78.14	68	84.16	8.5	10.52	4.93	6.10
12	Kannur	205.57	78.36	236.2	90.03	35.02	13.35	7.82	2.98
13	Kasaragod	136.62	86.53	137.21	86.91	6.11	3.87	5.67	3.59
Total		1272.43	86.37	1287.32	87.38	92.15	6.26	77.43	5.26

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	0.27	0.37	0.99	1.36	0	0.00	0	0.00	72.94	100	72.94	100
2	Kollam	4.98	8.52	5.11	8.74	0.19	0.33	0.15	0.26	58.46	100	58.46	100
3	Pathanamthitta	3.32	18.70	3.87	21.80	0.07	0.39	0.03	0.17	17.75	100	17.75	100
4	Alappuzha	2.29	5.20	4.74	10.77	0.22	0.50	0.23	0.52	44.01	100	44.01	100
5	Kottayam	11.32	4.78	11.32	4.78	0	0.00	0	0.00	236.61	100	236.61	100
6	Idukki	10.30	5.42	9.80	5.16	0.60	0.32	0.6	0.32	189.93	100	189.93	100
7	Eranakulam	1.91	8.50	2.69	11.97	0	0.00	0	0.00	22.48	100	22.48	100
8	Thrissur	0.07	0.27	0.07	0.27	0	0.00	0	0.00	25.77	100	25.77	100
9	Palakkad	1.9	1.08	1.72	0.98	6.02	3.43	6.68	3.81	175.52	100	175.52	100
10	Malappuram	4.31	3.35	4.35	3.38	14.76	11.47	14.88	11.56	128.68	100	128.68	100
11	Kozhikkode	3.84	4.75	3.84	4.75	5.32	6.58	4.03	4.99	80.80	100	80.80	100
12	Kannur	10	3.81	6.63	2.53	11.76	4.48	11.7	4.46	262.35	100	262.35	100
13	Kasaragod	10.88	6.89	10.78	6.83	4.27	2.70	4.22	2.67	157.88	100	157.88	100
Total		65.39	4.44	65.91	4.47	43.21	2.93	42.52	2.89	1473.18	100	1473.18	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	10.64	93.17	0	0.00	0.78	6.83	0	0.00	11.42	100
2	Kollam	7.78	85.87	0.19	2.10	1.04	11.48	0.05	0.55	9.06	100
3	Pathanamthitta	1.93	63.91	0.02	0.66	0.69	22.85	0.38	12.58	3.02	100
4	Alappuzha	1.25	55.31	0.61	26.99	0.4	17.70	0	0.00	2.26	100
5	Kottayam	40.46	85.85	0	0.00	6.67	14.15	0	0.00	47.13	100
6	Idukki	37.29	91.08	1.75	4.27	1.9	4.64	0	0.00	40.94	100
7	Eranakulam	1.18	56.73	0.67	32.21	0.23	11.06	0	0.00	2.08	100
8	Thrissur	4.87	90.19	0	0.00	0.51	9.44	0.02	0.37	5.4	100
9	Palakkad	37.15	96.04	0.5	1.29	0.38	0.98	0.65	1.68	38.68	100
10	Malappuram	20.95	84.34	0.3	1.21	0.7	2.82	2.89	11.63	24.84	100
11	Kozhikkode	10.53	86.24	0.48	3.93	0.85	6.96	0.35	2.87	12.21	100
12	Kannur	41.19	84.42	5.44	11.15	1.48	3.03	0.68	1.39	48.79	100
13	Kasaragod	8.85	97.25	0	0.00	0.25	2.75	0	0.00	9.1	100
Total		224.07	87.89	9.96	3.91	15.88	6.23	5.02	1.97	254.93	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 1110.54 acre to 1219.25 acre. It showed an increase of 9.79%. At the same time the percentage change occurred in the cultivation of seasonal crops

recorded as -21.95 %. From this we can arrive at the conclusion that the farmers have shown a tendency to cultivate perannial 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 59.09 % and 36.71 %. The plantain cultivation percentage increase recorded as 20.35 %. At the same time in paddy cultivation percentage variation is in a negative trend. It is recorded as -46.90 %. 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 14.90 %. Coconut comes next with an increase of 4.88%. The area under pepper has decreased to 2.80 % 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	8.31	12.59	8.92	11.68	57.7	87.41	67.48	88.32
2	Kollam	51.76	95.27	62.49	96.63	2.57	4.73	2.18	3.37
3	Pathanamthitta	2.1	93.75	2.83	90.42	0.14	6.25	0.3	9.58
4	Alappuzha	4.26	10.68	5.34	78.65	35.62	89.32	1.45	21.35
5	Kottayam	227.14	99.75	227.39	99.72	0.56	0.25	0.63	0.28
6	Idukki	184.82	99.81	187.28	99.81	0.35	0.19	0.36	0.19
7	Eranakulam	3.8	17.55	6.04	37.17	17.85	82.45	10.21	62.83
8	Thrissur	9.62	34.77	9.66	33.94	18.05	65.23	18.8	66.06
9	Palakkad	155.51	99.25	162.82	99.16	1.18	0.75	1.38	0.84
10	Malappuram	84.92	79.11	92.67	83.8	22.43	20.89	17.92	16.2
11	Kozhikkode	60.58	90.65	76.21	91.76	6.25	9.35	6.84	8.24
12	Kannur	189.1	93.19	242.07	96.19	13.81	6.81	9.59	3.81
13	Kasaragod	128.62	99.61	135.53	99.26	0.5	0.39	1.01	0.74
Total		1110.54	86.25	1219.25	89.82	177.01	13.75	138.15	10.18

Table – 4 Contd..

Sl. No	Districts	Total Gross area cropped			
		Before SC work	%	After SC work	%
1	2	11	12	13	14
1	Thiruvananthapuram	66.01	100	76.40	100
2	Kollam	54.33	100	64.67	100
3	Pathanamthitta	2.24	100	3.13	100
4	Alappuzha	39.88	100	6.79	100
5	Kottayam	227.70	100	228.02	100
6	Idukki	185.17	100	187.64	100
7	Eranakulam	21.65	100	16.25	100
8	Thrissur	27.67	100	28.46	100
9	Palakkad	156.69	100	164.20	100
10	Malappuram	107.35	100	110.59	100
11	Kozhikode	66.83	100	83.05	100
12	Kannur	202.91	100	251.66	100
13	Kasaragod	129.12	100	136.54	100
	Total	1287.55	100	1357.40	100

Table 5 – Area under selected perennial crops

(Area in acres)

Sl. No	Districts	Arecanut			Coconut			Cashew		
		Before SC work	After SC work	% increase	Before SC work	After SC work	% increase	Before SC work	After SC work	% increase
1	2	3	4	5	6	7	8	9	10	11
1	Thiruvananthapuram	0	0.03	-	7.04	7.48	6.25	0	0	-
2	Kollam	0.58	0.7	20.69	7.45	8.73	17.18	0.7	0.71	1.43
3	Pathanamthitta	0.01	0.02	100	0.42	0.92	119.05	0	0	-
4	Alappuzha	0.06	0.1	66.67	3.22	3.87	20.19	0.06	0.07	16.67
5	Kottayam	0.02	0.02	0	23.05	23.07	0.09	0	0	-
6	Idukki	0	0	-	7.43	7.59	2.15	2.07	2.07	0
7	Eranakulam	0.09	0.1	11.11	2.99	4.77	59.53	0.05	0.05	0
8	Thrissur	1.18	1.2	1.69	8.42	8.44	0.24	0	0	-
9	Palakkad	4.22	4.5	6.64	24.05	26.28	9.27	0.16	0.16	0
10	Malappuram	6.2	6.28	1.29	58.97	59.12	0.25	6.26	5.5	-12.14
11	Kozhikode	6.39	6.67	4.38	29.01	30.96	6.72	1.35	2.64	95.56
12	Kannur	15.18	14.77	-2.70	34.79	35.02	0.66	32.12	34.84	8.47
13	Kasaragod	4.61	4.97	7.81	40.72	43.39	6.56	4.25	4.36	2.59
Total		38.54	39.36	2.13	247.56	259.64	4.88	47.02	50.4	7.19

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	16	17	18	19	20	21
1	Thiruvananthapuram	1.21	1.21	0	0	0.14	-	0.06	0.06	0	0	0	-
2	Kollam	36.96	45.84	24.03	4.58	4.73	3.28	1.41	1.7	20.57	0.07	0.07	0
3	Pathanamthitta	1.58	1.73	9.49	0	0.03	-	0.09	0.11	22.22	0	0.02	-
4	Alappuzha	0	0.02	-	.02	0.04	100.00	0.19	0.24	26.32	0.6	0.72	20
5	Kottayam	199.86	199.86	0	3.88	3.89	0.26	0.33	0.55	66.67	0	0	-
6	Idukki	46.45	47	1.18	59.73	59.69	-0.07	5.72	5.72	0	0	0	-
7	Eranakulam	0	0	-	0.04	0.04	0	0.37	0.37	0	0.22	0.21	-4.55
8	Thrissur	0	0	-	0	0	-	0	0	-	0.02	0.02	0
9	Palakkad	117.93	123.54	4.76	6.82	5.7	-16.42	1.31	1.29	-1.53	0.83	1.17	40.96
10	Malappuram	5.58	13.68	145.16	1.61	1.59	-1.24	2.69	2.8	4.09	3.5	3.59	2.57
11	Kozhikkode	4.6	10.79	134.57	8.64	9.37	8.45	2.26	3.28	45.13	0.59	0.72	22.03
12	Kannur	79.28	131.35	65.68	20.04	16.54	-17.47	5.38	6.35	18.03	1.25	1.33	6.4
13	Kasaragod	74.73	77.82	4.13	3.72	4.27	14.78	0.59	0.7	18.64	0	0	-
Total		568.18	652.84	14.9	109.08	106.03	-2.8	20.4	23.17	13.58	7.08	7.85	10.88

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	-	8.31	8.92	7.34
2	Kollam	0	0	-	0	0	-	0.01	0.01	0	51.76	62.49	20.73
3	Pathanamthitta	0	0	-	0	0	-	0	0	-	2.10	2.83	34.76
4	Alappuzha	0	0	-	0	0	-	0.11	0.28	154.55	4.26	5.34	25.35
5	Kottayam	0	0	-	0	0	-	0	0	-	227.14	227.39	0.11
6	Idukki	0.31	0.31	0	16.62	16.62	0	46.49	48.28	3.85	184.82	187.28	1.33
7	Eranakulam	0	0	-	0	0	-	0.04	0.5	1150	3.80	6.04	58.95
8	Thrissur	0	0	-	0	0	-	0	0	-	9.62	9.66	0.42
9	Palakkad	0	0	-	0	0	-	0.19	0.18	-5.26	155.51	162.82	4.70
10	Malappuram	0	0	-	0	0	-	0.11	0.11	0	84.92	92.67	9.13
11	Kozhikkode	7.04	10.67	51.56	0.7	1.11	58.57	0	0	-	60.58	76.21	25.80
12	Kannur	0.34	0.45	32.35	0.4	0.35	-12.5	0.32	1.07	234.38	189.10	242.07	28.01
13	Kasaragod	0	0	-	0	0	-	0	0.02	-	128.62	135.53	5.37
Total		7.69	11.43	48.63	17.72	18.08	2.03	47.27	50.45	6.73	1110.54	1219.25	9.79

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	34.98	36.82	5.26	0.89	1.46	64.04	2.89	3.74	29.41
2	Kollam				1.76	1.21	-31.25	0.48	0.62	29.17
3	Pathanamthitta				0.13	0.16	23.08	0.01	0.11	1000.00
4	Alappuzha	35.29	0.82	-97.68	0.06	0.12	100.00	0.22	0.30	36.36
5	Kottayam				0.15	0.19	26.67	0.39	0.42	7.69
6	Idukki				0.26	0.26	0.00	0.06	0.07	16.67
7	Eranakulam	17.64	1.35	-92.35	0.00	5.21		0.06	0.42	600.00
8	Thrissur	15.39	15.39	0.00	0.41	0.66	60.98	1.85	2.28	23.24
9	Palakkad	1.00	1.00	0.00	0.00	0.05		0.18	0.32	77.78
10	Malappuram				0.53	0.53	0.00	2.34	1.91	-18.38
11	Kozhikkode				4.60	4.63	0.65	1.45	2.01	38.62
12	Kannur				3.17	1.67	-47.32	2.74	2.84	3.65
13	Kasaragod				0.00	0.20		0.50	0.81	62.00
Total		104.30	55.38	-46.90	11.96	16.35	36.71	13.17	15.85	20.35

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	0.12		-100.00	15.42	22.84	48.12	1.33	1.03	-22.56			
2	Kollam				0.27	0.29	7.41	0.02	0.02	0.00	0.04	0.04	0.00
3	Pathanamthitta				0.00	0.03							
4	Alappuzha				0.02	0.03	50.00	0.01	0.09	800.00			
5	Kottayam				0.02	0.02	0.00						
6	Idukki				0.03	0.03	0.00						
7	Eranakulam				0.05	3.13	6160.00						
8	Thrissur				0.26	0.32	23.08	0.14	0.15	7.14			
9	Palakkad												
10	Malappuram												
11	Kozhikode							0.20	0.20	0.00			
12	Kannur	0.31	0.01	-96.77	1.21	0.80	-33.88	0.22	0.26	18.18	2.80	0.88	-68.57
13	Kasaragod												
Total		0.43	0.01	-97.67	17.28	27.49	59.09	1.92	1.75	-8.85	2.84	0.92	-67.61

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							2.07	1.59	-23.19	57.7	67.48	16.95
2	Kollam							0	0		2.57	2.18	-15.18
3	Pathanamthitta							0	0		0.14	0.3	114.29
4	Alappuzha	0	0.04					0.02	0.05	150.0 0	35.62	1.45	-95.93
5	Kottayam							0	0		0.56	0.63	12.5
6	Idukki							0	0		0.35	0.36	2.86
7	Eranakulam							0.1	0.1	0	17.85	10.21	-42.8
8	Thrissur							0	0		18.05	18.8	4.16
9	Palakkad							0	0.01		1.18	1.38	16.95
10	Malappuram				0.01	0.01	0	19.55	15.47	- 20.87	22.43	17.92	-20.11
11	Kozhikode							0	0		6.25	6.84	9.44
12	Kannur	0.06	0.42	600	0.01	0	-100	3.29	2.71	- 17.63	13.81	9.59	-30.56
13	Kasaragod							0	0		0.5	1.01	102
	Total	0.06	0.46	666.6 7	0.02	0.01	-50	25.03	19.93	- 20.38	177.0 1	138.1 5	-21.95

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 156.69 acres. It increases to 164.20 acres after the implementation of soil conservation measures. The increase in area is accounted as 7.51 acres. The percentage increase recorded as 4.80 %. 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, Kozhikode and Kasargod districts before soil conservation work the area were 202.91 acres, 66.83 acres, 129.12 acres, . It increased to 251.66, 83.05 and 136.54 acres respectively after the implementation of soil conservation work.

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	38310.0 0	171628	48790.0 0	236634	185805
	Arecanut	Nos.	0	0	1670.00	952	0
	Pepper	Qtl.	0	0	0.30	3774	0
	Rubber	Qtl.	4.00	15512	4.50	42633	37896
	Jack	Qtl	0	0	2.00	500	0
	Total				187140		284493
Kollam	Coconut	Nos	13635.0 0	71046	14710.0 0	83853	77725
	Arecanut	Nos.	8530.00	2729	12085.0 0	6651	4694
	Cashew	Qtl.	4.99	14668	3.13	8138	12974
	Pepper	Qtl.	2.43	18565	2.83	38538	33091
	Rubber	Qtl.	142.87	537482	177.70	1721027	1383698
	Jack	Qtl	130.03	13003	62.23	19476	40695
	Mango	Qyl	1.20	671	1.48	987	800
	Tamarind	Qtl	0.10	208	0.12	360	300
Total				658372		1879030	1553977
Pathanamthitta	Coconut	Nos	239.00	1306	1750.00	10500	1434
	Arecanut	Nos.	85.00	31	935.00	524	48
	Pepper	Qtl.			0.17	2216	0
	Rubber	Qtl.	43.75	169534	68.03	673497	433125
	Jack	Qtl	2.40	269	8.90	1602	432
	Mango	Qyl	0	0	1.13	1065	0
Total				171140		689404	435039
Alappuzha	Coconut	Nos	11677.0 0	56751	17655.0 0	94454	62472
	Arecanut	Nos.	2347.00	845	3143.00	1574	1175
	Cashew	Qtl.	0.15	433	0.35	1050	450
	Pappaya	Qtl	0	0	0.55	451	0
	Jack	Qtl	20.35	1832	16.07	3490	4420
	Mango	Qyl	13.69	5964	15.51	26921	23762
	Tamarind	Qtl	0.34	936	0.57	1653	986
Total				66761		129593	93265
Kottayam	Coconut	Nos	53338.0 0	294959	54957.0 0	316553	307228
	Arecanut	Nos.	1835.00	661	1905.00	991	955
	Pepper	Qtl.	4.02	31321	3.83	49819	52290
	Rubber	Qtl.	3251.00	12906470	3393.00	33387120	31989840
	Jack	Qtl	12.00	1080	101.75	19536	2304
	Total				1323449 1		3377401 9
Idukki	Coconut	Nos	13875.0 0	81866	17285.0 0	97486	78254
	Cashew	Qtl.	3.16	7761	4.06	13366	10403
	Pepper	Qtl.	165.64	1319993	215.04	2831227	2180824
	Rubber	Qtl.	428.82	1710135	558.73	5528071	4242742
	Jack	Qtl	29.50	2950	37.50	7500	5900

	Coffee	Qtl	234.78	614899	247.45	1911305	1813442
	Coco	Qtl	2.66	7036	3.79	1364	957
	Cardamum	Qtl	154.67	4887572	193.10	9152940	7331358
	Total			8632212		19543259	15663880

(Table 7 Contd..)

1	2	3	4	5	6	7	8
Ernakulam	Coconut	Nos	7199.00	34206	8636.00	47670	39738
	Arecanut	Nos.	8727.00	2620	10800.00	5615	4537
	Cashew	Qtl.	0.08	235	0.10	289	231
	Pepper	Qtl.	0.08	587	0.14	1820	1040
	Jack	Qtl	5.71	631	9.30	1972	1211
	Mango	Qyl	4.49	1851	6.13	5831	4271
	Total			40130		63197	51028
Thrissur	Coconut	Nos	35531.00	156337	46114.00	207054	159536
	Arecanut	Nos.	60486.00	22380	82829.00	47214	34478
	Mango	Qyl	3.00	2523	4.00	4756	3567
	Total			181240		259024	197581
Palakkad	Coconut	Nos	57900.00	254760	65920.00	257091	225813
	Arecanut	Nos.	317800.00	95340	398500.00	171357	136656
	Cashew	Qtl.	0.11	317	0.14	462	363
	Pepper	Qtl.	5.52	43599	8.64	111871	71473
	Rubber	Qtl.	1217.00	4749957	1453.30	14249618	11932695
	Jack	Qtl	48.50	8730	50.85	14747	14065
	Mango	Qyl	13.95	7492	14.60	12895	12321
	Total			516019		1481804	1239338
Malappuram	Coconut	Nos	277285.00	1111918	283838.00	1109818	1084196
	Arecanut	Nos.	704065.00	161940	732305.00	314891	302748
	Cashew	Qtl.	23.89	66464	21.38	69679	77859
	Pepper	Qtl.	3.21	25263	3.40	43407	40981
	Rubber	Qtl.	41.66	162599	55.25	540952	407892
	Jack	Qtl	521.17	41694	411.82	111192	140717
	Mango	Qyl	93.04	42707	89.46	73092	76017
	Tamarind	Qtl	0.35	472	0.41	697	595
	Total			161305		2263728	2131005
Kozhikode	Coconut	Nos	87603.00	371439	71198.00	271273	333778
	Arecanut	Nos.	455390.00	100186	335945.00	144460	195823
	Cashew	Qtl.	2.13	6135	7.04	23558	7128
	Pepper	Qtl.	7.97	62374	4.54	57528	100991
	Rubber	Qtl.	7.20	26906	13.80	135847	70877
	Jack	Qtl	8.75	1315	12.15	2916	2100
	Mango	Qyl	3.15	2432	3.25	2945	2854
	Coffee	Qtl	0.35	840	0.93	4287	1613
	Coco	Qtl	0.45	1058	0.85	2017	1068
	Total			572685		644831	716232

(Table 7 Contd..)

1	2	3	4	5	6	7	8
Kannur	Coconut	Nos	128193.00	543539	116743.80	440133	483297
	Arecanut	Nos.	1439950.0	446396	656375.00	321635	705600
	Cashew	Qtl.	129.20	380362	116.53	421838	467703
	Pepper	Qtl.	30.40	242047	17.37	223100	390457
	Rubber	Qtl.	328.71	1314183	614.84	5954108	3183226
	Pappaya	Qtl			0.09	74	0
	Jack	Qtl	24.21	3151	37.91	9480	6054
	Mango	Qyl	29.65	21378	41.85	44361	31429
	Coffee	Qtl	6.80	11220	6.30	46967	50695
	Coco	Qtl	0.40	899	1.40	2774	793
	Total			2963175		7464470	5319254
Kasaragod	Coconut	Nos	101045.00	487040	175270.00	725616	418325
	Arecanut	Nos.	202100.00	76798	467150.00	284962	123281
	Cashew	Qtl.	1.35	4032	6.25	22850	4936
	Pepper	Qtl.	1.77	13907	4.67	58178	22050
	Rubber	Qtl.	40.70	160726	154.80	1710542	449736
	Jack	Qtl	0.25	45	1.25	275	55
	Total			742548		2802423	1018383
STATE	Coconut	Nos	825830.00	3636795	922866.80	3898135	3457601
	Arecanut	Nos.	3201315.0	909926	2703642.0	1300826	1509995
	Cashew	Qtl.	165.06	480407	158.98	561230	582047
	Pepper	Qtl.	221.04	1757656	260.93	3421478	2893197
	Rubber	Qtl.	5505.71	21753504	6493.95	63943415	54131727
	Pappaya	Qtl	0.00	0	0.64	525	0
	Jack	Qtl	802.87	74700	751.73	192686	217953
	Mango	Qyl	162.17	85018	177.41	172853	155021
	Coffee	Qtl	241.93	626959	254.68	1962559	1865750
	Coco	Qtl	3.51	8993	6.04	6155	2818
	Tamarind	Qtl	0.79	1616	1.10	2710	1881
	Cardamum	Qtl	154.67	4887572	193.10	9152940	7331358
	Total			34223146		84615512	72149348

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	437.12	282382	429.73	451221	458981
	Tapioca	Qtl	70.00	28211	105.00	52920	35280
	Banana	Qtl	1158.55	1335810	1867.98	2887898	1791119
	Other Plantain	Qtl	209.70	152662	298.01	240198	169020
	Ginger	Qtl	0.50	1833			1142
	Vegitables	Qtl	42.50	41225	39.90	49476	52700
	Others	Qtl	40.30	48763	32.70	45453	56017
	Total				1890886		3727166
Kollam	Tapioca	Qtl	22.55	7871	19.95	9098	10284
	Banana	Qtl	8.20	8101	10.07	16616	13530
	Other Plantain	Qtl	19.87	12634	25.35	21425	16793
	Vegitables	Qtl	0.33	396	0.60	840	462
	Pineapple	Qtl	0.15	83	0.20	148	111
	Total				29085		48127
Pathanamthitta	Tapioca	Qtl	13.90	5852	13.73	8156	8257
	Banana	Qtl			1.06	1729	0
	Other Plantain	Qtl	1.11	738	6.52	4588	781
	Total			6590		14473	9038
Alappuzha	Paddy	Qtl	749.80	499365	16.60	14874	671839
	Tapioca	Qtl	6.90	2581	13.25	7023	3657
	Other Plantain	Qtl	9.58	5488	17.94	12665	6763
	Chenai	Qtl	0.15	103	0.39	572	220
	Total			507537		35134	682479
Kottayam	Tapioca	Qtl	1.60	737	2.75	1419	826
	Banana	Qtl	1.50	1608	1.60	2587	2425
	Other Plantain	Qtl	40.25	23827	46.64	31953	27575
	Total			26172		35959	30826

Table – 8 Contd..

1	2	3	4	5	6	7	8
Idukki	Tapioca	Qtl	26.50	11422	29.00	16791	15344
	Banana	Qtl	2.04	1812	3.20	4646	2962
	Other Plantain	Qtl	7.15	3783	8.75	5810	4748
	Total			17017		27247	23054
Ernakulam	Paddy	Qtl	455.10	293550	21.50	16555	350427
	Tapioca	Qtl			346.75	176497	
	Banana	Qtl	1.68	1576	169.39	251208	2491
	Other Plantain	Qtl	1.61	831	18.84	13320	1138
	Total			295957		457580	354056
Thrissur	Paddy	Qtl	135.65	86274	186.55	138982	101061
	Tapioca	Qtl	32.60	13007	59.10	29373	16202
	Banana	Qtl	16.40	16794	25.00	34925	22911
	Other Plantain	Qtl	65.70	30814	92.40	57753	41065
	Vegitables	Qtl	2.50	2750	3.10	4340	3500
	Total			149639		265373	184739
Palakkad	Paddy	Qtl	13.50	9221	23.00	18975	11138
	Tapioca	Qtl			2.00	860	
	Other Plantain	Qtl	9.70	5103	18.50	11379	5966
	Total			14324		31214	17104
Malappuram	Tapioca	Qtl	83.00	28552	83.40	39032	38845
	Other Plantain	Qtl	153.62	91099	133.60	94056	108150
	Others	Qtl	115.31	36993	99.30	49650	57655
	Total			156644		182738	204650

Table – 8 Contd..

1	2	3	4	5	6	7	8
Kozhikode	Tapioca	Qtl	50.00	20550	50.00	26650	26650
	Other Plantain	Qtl	47.97	31749	66.13	52640	38184
	Total			52299		79290	64834
Kannur	Tapioca	Qtl	224.75	96643	154.05	87350	127439
	Banana	Qtl	70.75	66859	48.90	70221	101598
	Other Plantain	Qtl	170.10	109205	165.75	141883	145607
	Ginger	Qtl	8.10	27524	0.20	459	18590
	Total			300231		299913	393234
Kasaragod	Tapioca	Qtl			3.00	2145	
	Other Plantain	Qtl	3.00	2013	11.20	9263	2481
	Total			2013		11408	2481
STATE	Paddy	Qtl	1791.17	1170792.00	677.38	640607.00	1593446.00
	Tapioca	Qtl	531.80	215426.00	881.98	457314.00	282784.00
	Banana	Qtl	1259.12	1432560.00	2127.20	3269830.00	1937036.00
	Other Plantain	Qtl	739.36	469946.00	909.63	696933.00	568271.00
	Ginger	Qtl	8.60	29357.00	0.20	459.00	19732.00
	Vegitables	Qtl	45.33	44371.00	43.60	54656.00	56662.00
	Pineapple	Qtl	0.15	83.00	0.20	148.00	111.00
	Chenai	Qtl	0.15	103.00	0.39	572.00	220.00
	Others	Qtl	155.61	85756.00	132.00	95103.00	113672.00
	Total			3448394		5215622	4571934

Table 9
Quantity and Value of Selected perennial and seasonal crops for the years 2008-09

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	825830.00	3636795	922866.80	3898135	3457601
	Arecanut	Nos.	3201315.00	909926	2703642.00	1300826	1509995
	Cashew	Qtl.	165.06	480407	158.98	561230	582047
	Pepper	Qtl.	221.04	1757656	260.93	3421478	2893197
	Rubber	Qtl.	5505.71	21753504	6493.95	63943415	54131727
	Pappaya	Qtl	0.00	0	0.64	525	0
	Jack	Qtl	802.87	74700	751.73	192686	217953
	Mango	Qyl	162.17	85018	177.41	172853	155021
	Coffee	Qtl	241.93	626959	254.68	1962559	1865750
	Coco	Qtl	3.51	8993	6.04	6155	2818
	Tamarind	Qtl	0.79	1616	1.10	2710	1881
	Cardamum	Qtl	154.67	4887572	193.10	9152940	7331358
	Total (A)			3422314		8461551	7214934
				6		2	8
B. Seasonal Crops	Paddy	Qtl	1791.17	1170792.00	677.38	640607.00	1593446.00
	Tapioca	Qtl	531.80	215426.00	881.98	457314.00	282784.00
	Banana	Qtl	1259.12	1432560.00	2127.20	3269830.00	1937036.00
	Other Plantain	Qtl	739.36	469946.00	909.63	696933.00	568271.00
	Ginger	Qtl	8.60	29357.00	0.20	459.00	19732.00
	Turmeric	Qtl	0.00	0.00	0.00	0.00	0.00
	Vegitables	Qtl	45.33	44371.00	43.60	54656.00	56662.00
	Pineapple	Qtl	0.15	83.00	0.20	148.00	111.00
	Chennai	Qtl	0.15	103.00	0.39	572.00	220.00
	Others	Qtl	155.61	85756.00	132.00	95103.00	113672.00
		Total (B)			3448394		5215622
	All Crops (A+B)			37671540		89831134	76721282

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 its 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.4,22,39,109/-

The total area under cultivation after soil conservation work was 1287.32 acres. The value of crops before the soil conservation programme comes to Rs.3,76,71,540/- The value of crops after the implementation of soil conservation programme has also been calculated as Rs. 8,98,31,134/- Thus the additional benefits due to the implementation of soil conservation programme is worked out to be Rs.5,21,59,594/-. It is estimated that the value at constant price as Rs. 7,67,21,282/- This shows that 123% 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 14.89 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 12%, cardamom 25%, Rubber 18%, Banana 69%, Pepper 17% etc. As a seasonal crop productivity of tapioca increased to 65%.

(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 (4%). Growing of perennial crops will accelerate conservation of soil more affectively.

Occupational Profile

The occupational profile of the selected beneficiaries reveals that 40% included agriculture job, 24% are accounted as non-agriculture; 23% agricultural labourers and 13% 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						
1	Thiruvananthapuram	2070244	3997204	1217548	2575568	852696	1421636
2	Kollam	690717	1936857	345600	548830	345117	1388027
3	Pathanamthitta	177251	702847	29379	79199	147872	623648
4	Alappuzha	574009	164827	246072	77495	327937	87332
5	Kottayam	13270944	33802873	2513885	3865274	10757059	29937599
6	Idukki	8483329	19265250	4143990	8474344	4339339	10790906
7	Eranakulam	332143	519278	155985	228295	176158	290983
8	Thrissur	330879	524397	196651	363805	134228	160592
9	Palakkad	5210492	14849255	1892380	2898285	3318112	11950970
10	Malappuram	1748024	2420430	718940	893031	1029084	1527399
11	Kozhikkode	624710	720395	326514	367911	298196	352484
12	Kannur	3265090	7764023	1115899	2748830	2149191	5015193
13	Kasaragod	744561	2813831	388625	2382810	355936	431021
	State	37522393	89481467	13291468	25503677	24230925	63977790

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	173916	135810	38106
2	Kollam	205573	77050	128523
3	Pathanamthitta	101680	22040	79640
4	Alappuzha	23680	13100	10580
5	Kottayam	5851888	2576495	3275393
6	Idukki	2326543	1234986	1091557
7	Eranakulam	46228	18830	27398
8	Thrissur	170399	126165	44234
9	Palakkad	2922646	609530	2313116
10	Malappuram	274657	106120	168537
11	Kozhikkode	113342	67485	45857
12	Kannur	1537243	567120	970123
13	Kasaragod	138054	120500	17554
State		13885849	5675231	8210618

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	64.10	852696	13303	71.95	1421636	19759
2	Kollam	47.70	345117	7235	50.25	1388027	27622
3	Pathanamthitta	2.17	147872	68144	3.06	623648	203807
4	Alappuzha	40.42	327937	8113	5.22	87332	16730
5	Kottayam	225.29	10757059	47748	225.29	29937599	132885
6	Idukki	179.03	4339339	24238	179.53	10790906	60106
7	Eranakulam	20.29	176158	8682	14.11	290983	20622
8	Thrissur	25.70	134228	5223	25.7	160592	6249
9	Palakkad	157.38	3318112	21083	165.17	11950970	72356
10	Malappuram	105.02	1029084	9799	105.63	1527399	14460
11	Kozhikkode	63.14	298196	4723	68	352484	5184
12	Kannur	205.57	2149191	10455	236.2	5015193	21233
13	Kasaragod	136.62	355936	2605	137.21	431021	3141
State		1272.43	24230925	19043	1287.32	63977790	49698

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	10.64	38106	3581
2	Kollam	7.78	128523	16520
3	Pathanamthitta	1.93	79640	41264
4	Alappuzha	1.25	10580	8464
5	Kottayam	40.46	3275393	80954
6	Idukki	37.29	1091557	29272
7	Eranakulam	1.18	27398	23219
8	Thrissur	4.87	44234	9083
9	Palakkad	37.15	2313116	62264
10	Malappuram	20.95	168537	8045
11	Kozhikkode	10.53	45857	4355
12	Kannur	41.19	970123	23552
13	Kasaragod	8.85	17554	1984
State		224.07	8210618	36643

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 61% of the beneficiary holding belongs to less than one acre, 34% have holding area between one acre to 3 acre. And above 3 acre were 5 % respectively..

The opinion of selected beneficiaries are collected. Out of that 3% of the beneficiaries reported that contour bunds effectively control soil erosion while about 91 percent opinioned that it moderately controls soil erosion. The rest 6% are of opinion that it has no effect.

About the fertility of the soil 1% are of the view that the conservation measures have improved the fertility of the soil remarkably. While 98% reported that the fertility of the soil has improved moderately and 1% opinioned that it has no effect on the fertility of the soil.

Similarly regarding the moisture retention 1% reported that the scheme has substantially increased moisture retention while 99% 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	1	123	1	0	125	0	1	123	1	125
2	Kollam	0	49	76	0	124	1	0	123	2	125
3	Pathanamthitta	0	125	0	0	125	0	0	125	0	125
4	Alappuzha	9	116	0	8	117	0	8	116	1	125
5	Kottayam	0	124	1	0	125	0	0	125	0	125
6	Idukki	1	123	1	0	124	1	0	125	0	125
7	Eranakulam	0	125	0	1	124	0	1	123	1	125
8	Thrissur	0	38	1	0	39	0	0	39	0	39
9	Palakkad	0	125	0	0	125	0	0	125	0	125
10	Malappuram	1	124	0	0	125	0	0	125	0	125
11	Kozhikkode	1	123	1	1	124	0	2	123	0	125
12	Kannur	34	90	1	7	118	0	6	115	04	125
13	Kasaragod	1	121	3	0	123	2	0	123	2	125
State		48	1406	85	17	1518	4	18	1510	11	1539

Table 13
Conditions of Bund
(Scheme Area)

Sl	Name of District	Good	Partially	Seriously	Total
1	2	3	4	5	6
1	Thiruvananthapuram	95	30	0	125
2	Kollam	105	18	2	125
3	Pathanamthitta	120	5	0	125
4	Alappuzha	119	6	0	125
5	Kottayam	121	4	0	125
6	Idukki	98	27	0	125
7	Eranakulam	85	40	0	125
8	Thrissur	33	6	0	39
9	Palakkad	116	9	0	125
10	Malappuram	90	32	3	125
11	Kozhikkode	113	12	0	125
12	Kannur	109	14	2	125
13	Kasaragod	115	10	0	125
	State	1319	213	7	1539

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	115	0	8	2	125
2	Kollam	24	52	39	10	125
3	Pathanamthitta	6	48	43	28	125
4	Alappuzha	4	38	11	72	125
5	Kottayam	125	0	0	0	125
6	Idukki	42	9	72	2	125
7	Eranakulam	29	48	38	10	125
8	Thrissur	13	20	4	2	39
9	Palakkad	85	35	5	0	125
10	Malappuram	5	85	12	23	125
11	Kozhikkode	31	12	66	16	125
12	Kannur	55	20	17	33	125
13	Kasaragod	88	4	33	0	125
	State	622	371	348	198	1539

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	13	1	11	0	25
2	Kollam	3	18	3	1	25
3	Pathanamthitta	1	11	12	1	25
4	Alappuzha	0	1	0	19	20
5	Kottayam	30	0	0	0	30
6	Idukki	13	1	9	1	24
7	Eranakulam	5	6	4	0	15
8	Thrissur	2	10	1	2	15
9	Palakkad	21	4	0	0	25
10	Malappuram	1	21	2	1	25
11	Kozhikkode	6	5	11	3	25
12	Kannur	20	3	1	1	25
13	Kasaragod	4	0	1	0	5
Total		119	81	55	29	284

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 85.5% are in good condition 14% are partially damaged and 0.5% 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 2008-09. 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 fifty five schemes were selected. The total number of beneficiaries comes to 2581. Out of this 1539 number of beneficiaries were selected for the detailed study (60%). 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 14.89 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 164%. It is estimated that the percentage increase of net income per acre in beneficiary plots of the scheme area as 164%

Analysis of data collected from the beneficiary and control plots reveals that the net income per acre, received from the beneficiary plot is Rs.49698/- and from the control plot is Rs.36643/- 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 18% recorded in the case of pepper even though the area under pepper showed a decrease of 2.8% . Production of coconut also increased 12%. Whereas the percentage increase of area was 4.88%. Likewise in rubber production the percentage increase is recorded as 18%. Whereas the area increase was only 14.9%.

Cost benefit analysis of the collected data reveals that 123% 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	64.1	71.95	66.01	76.4	102.98	106.18
2	Kollam	47.7	50.25	54.38	64.7	114.00	128.76
3	Pathanamthitta	2.17	3.06	2.23	3.09	102.76	100.98
4	Alappuzha	40.42	5.22	39.85	6.77	98.59	129.69
5	Kottayam	225.29	225.29	227.68	228	101.06	101.20
6	Idukki	179.03	179.53	185.17	187.66	103.43	104.53
7	Eranakulam	20.29	14.11	21.66	16.24	106.75	115.10
8	Thrissur	25.7	25.7	27.68	28.47	107.70	110.78
9	Palakkad	157.38	165.17	156.69	164.18	99.56	99.40
10	Malappuram	105.02	105.63	107.36	110.58	102.23	104.69
11	Kozhikkode	63.14	68	66.83	83.06	105.84	122.15
12	Kannur	205.57	236.2	202.93	251.64	98.72	106.54
13	Kasaragod	136.62	137.21	129.12	136.54	94.51	99.51
State		1272.43	1287.32	1287.59	1357.33	101.19	105.44

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 101.19 % to 105.44%. Districtwise details are presented in Table No.15.