Government of Kerala

Evaluation Study on Soil Conservation in Kerala 2015-16

DEPARTMENT OF ECONOMICS & STATISTICS
THIRUVANANTHAPURAM
2018

PREFACE

One of the most valuable gifts of nature to mankind is soil. For the maintenance of soil, adequate protection and conservation is necessary. Due to the peculiarity of the rainfall and topography of the state, soil conservation assumes importance in our planning process. Heavy soil erosion results in the loss of fertility and moisture content of the earth's surface and diminishing rate of agricultural production. Hence Government is implementing various soil conservation measures through the soil conservation department, local bodies, etc., for maintaining the fertility and moisture content of the surface soil. The Evaluation study of soil conservation schemes has been done by the Directorate of Economics and Statistics for all districts except Wayanad and Idukki. This report relates to the survey results of 43 schemes completed by the Soil Conservation Department and various other agencies. The field survey was conducted during the agricultural year 2015-2016 by the Statistical Investigators under the supervision of the Research Officer and Deputy Director in the District Offices. The schemes implemented and completed before five years are taken up for study so that full benefit of the scheme could be evaluated and assessed. This evaluation study results may be much of use to Administrators, Statisticians, Research Scholars, Agricultural Geologists and others interested in the subject.

I acknowledge my sincere thanks to the staff of Soil Conservation Department and other local bodies for their valuable suggestion and whole hearted co-operation for the successful conduct of the survey in the state.

Thiruvananthapuram,
28-12-2018

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DIRECTOR GENERAL

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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.

1.2 Objectives and Methodology

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 selected were executed five years prior to the survey i.e. during 2010-11 in the State by the Soil Conservation Department, Local Self Government Department and other Government agencies. The study covered all the districts of the State except Wayanad and Idukki. The list of beneficiaries under each scheme is collected from the Soil Conservation Department, Local Self Government Department and other Government agencies. The beneficiaries are selected by stratified random sampling method on the basis of the area of the holding. The holdings are stratified into four stratum.

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 from the list of beneficiaries collected from Soil Conservation Department, local bodies and other Government agencies. 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. 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).

Statement Showing List of Selected schemes

Sl No.	DISTRICT NAME	SCHEME NUMBER	Name of Selected Schemes
1	THIRUVANANTHAPUAM	1	Kamukinthodu,kayanikkarathodu
		2	Perumkulam Bundpunarudharanam
		3	Njarakkala channel bund
		4	Kunnanaduvanchiyoorkonam bund road side wall
		5	KeezharoorAttukadavu bund road side wall
2	KOLLAM	1	Chadayamangalam watershed padhathi
3	PATHANAMTHITTA	1	Panikkampara watershed padhathy
		2	Vellappara watershed padhathy
		3	ChiravayalArukalikkal
		4	Payyanallor watershed padhathy

4	**ALAPPUZHA**	**1**	**Korthusserythodu coir bhuvastram**
		2	Eliyathanamthodu coir bhuvastram
		3	Puthenveeduthodu coir bhuvastram
		4	MunnuttilChirathodu coir bhuvastram
		5	Valiyathodu coir bhuvastram
5	KOTTAYAM	1	Chengalam watershed padhathy
6	ERNAKULAM	1	Kavalangadpadashekarathodu
		2	Charuparakaithodusamrakshanapadhathy
		3	Chelakkappillithodusamrakshanapadhathy
		4	Mundoorchirasamrakshanam
		5	VeggachuvadKadlithodusamrakshanam
7	TRISSUR	1	Attumpuram watershed
8	PALAKKAD	1	AkkiyampadamNeerthadapadhathy
		2	KundanthoduNeerthadapadhathy
9	KOZHIKODE	1	Vattachiraanthiyoduthodupadhathy
		2	Chamalthodu watershed padhathy
		3	Kattipoyyil watershed padhathy
		4	Aruvithodu watershed padhathy
		5	Kakkery watershed padhathy
10	MALAPPURAM	1	KizhiKallingal watershed
		2	Chekunnu watershed
		3	Palliyarthodu watershed
		4	Pullottaruthodu watershed
11	KANNUR	1	Palliyarathodu watershed
		2	Nellikutty watershed
		3	Santhi Nagar watershed
		4	Vembuzha watershed
		5	Arangu-Mannumkund watershed
12	KASARGOD	1	Kalliyadukum watershed scheme WGDP
		2	Chalinkal watershed scheme WGDP
		3	Pothavoor watershed scheme W
		4	Kottodi watershed scheme WGDP
		5	Aripod watershed scheme WGDP

Table – 1

Statement Showing Stratum Wise Distribution of Selected Beneficiaries

(Area in Acres)

Sl No	Districts	No of Schemes selected	Stratum -1		Stratum-11		Stratum-111		Stratum 1V		Total	
			No	Area in Acres	No	Area in Acres	No	Area in Acres	No	Area in Acres	NO	Area in Acres
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Thiruvananthapuram	5	117	23.57	8	11.29	0	0	0	0	125	34.9
2	Koll am	1	102	42.85	20	27.19	0	0.00	3	13.77	125	83.8
3	Pathanamthitta	4	125	36.32	0	0.00	0	0.00	0	0.00	125	36.3
4	Alappuzha	5	52	16.75	21	33.73	28	95.31	24	120.50	125	266.3
5	Kottayam	1	20	13.48	63	109.63	30	113.77	12	85.80	125	322.675
6	Ernakulam	5	87	32.78	38	48.78	0	0.00	0	0.00	125	81.6
7	Thrissur	1	53	31.76	57	101.41	10	34.20	5	32.64	125	200.0
8	Palakkad	2	57	28.99	56	92.05	9	30.27	3	18.29	125	169.6
9	Malappuram	4	33	18.07	62	113.12	19	70.92	11	78.43	125	280.5
10	Kozhikkode	5	71	31.33	45	75.58	9	31.72	0	0.00	125	138.6
11	Kannur	5	36	22.49	58	92.60	30	100.81	1	5.15	125	221.1
12	Kasaragod	5	60	56.75	43	68.54	17	62.99	5	25.80	125	214.1
	Total	43	**813**	**355.14**	**471**	**773.92**	**152**	**539.99**	**64**	**380.38**	**1500**	**2049.4**

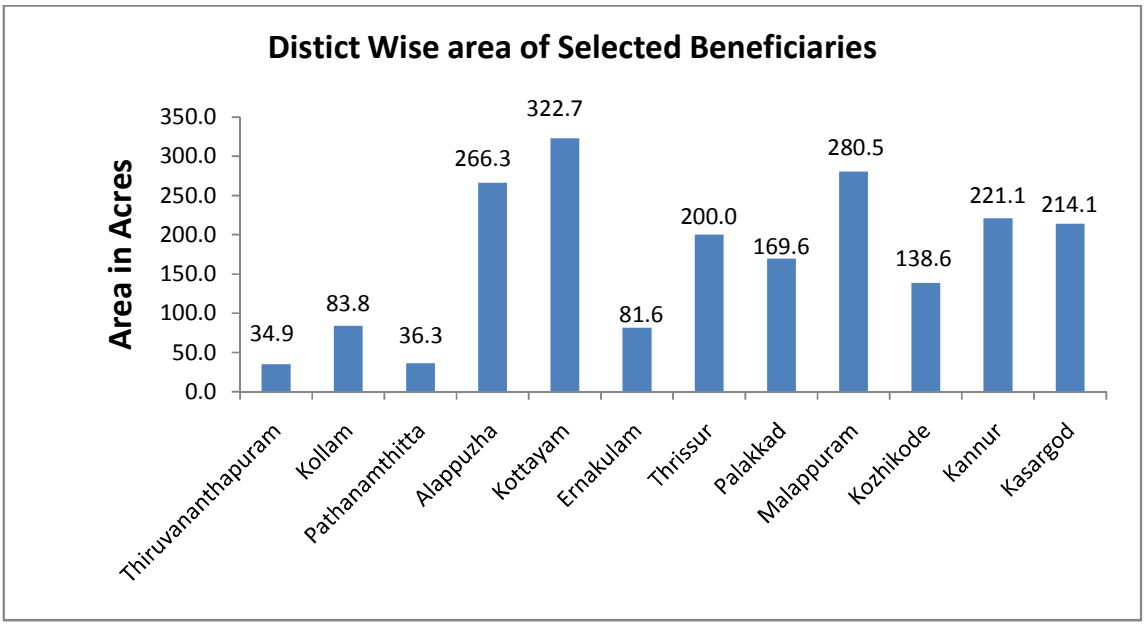
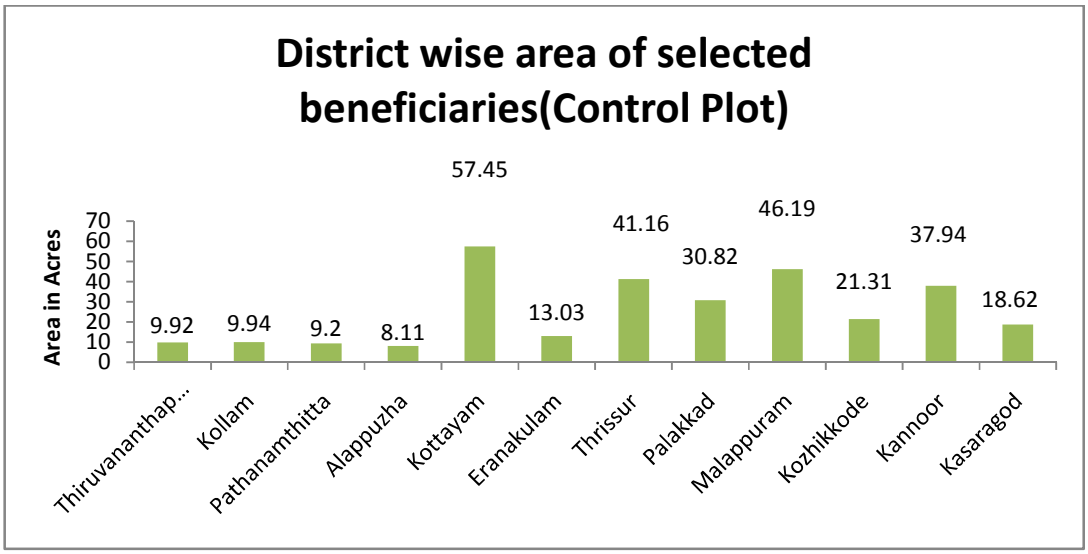


TABLE 1(a)

Statement Showing Stratum Wise Distribution of Control Plots
(Area in Acres)

Sl No	Districts	No of Schemes selected	Stratum -1		Stratum-11		Stratum-111		Stratum 1V		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	23	6.42	2	3.50	0	0.00	0	0.00	25	9.92
2	Kollam	1	25	9.94	0	0.00	0	0.00	0	0.00	25	9.94
3	Pathanamthitta	4	25	9.20	0	0.00	0	0.00	0	0.00	25	9.20
4	Alappuzha	5	25	8.11	0	0.00	0	0.00	0	0.00	25	8.11
5	Kottayam	1	4	2.06	12	18.06	6	20.51	3	16.82	25	57.45
6	Eranakulam	5	21	8.53	4	4.50	0	0.00	0	0.00	25	13.03
7	Thrissur	1	6	4.25	15	22.01	4	14.90	0	0.00	25	41.16
8	Palakkad	2	11	2.83	13	24.84	1	3.15	0	0.00	25	30.82
9	Malappuram	4	7	1.77	11	14.82	4	13.80	3	15.80	25	46.19
10	Kozhikkode	5	16	6.41	8	11.10	1	3.80	0	0.00	25	21.31
11	Kannur	5	9	6.25	14	23.75	2	7.94	0	0.00	25	37.94
12	Kasaragod	5	18	9.58	7	9.04	0	0.00	0	0.00	25	18.62
Total		**43**	**190**	**75.35**	**86**	**131.62**	**18**	**64.10**	**6**	**32.62**	**300**	**303.69**



The total number of beneficiaries comes to 1500. About 54.2% of the beneficiaries are having holding less than one acre, 31.4% are having holdings one acre or more but less than 3 acres,10.13% are having holding 3 acre or more but less than 5 acres and 4.27% 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 63.33%, 28.67%, 6% and 2% 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

1.1 Problems of Soil Erosion

Soil erosion means the disappearance of the top soil by the action of wind and water. Ultimately soil erosion leads the desertification of land. Degradation of natural resources has lead to many indirect damages, such as increasing extent of

wasteland, soil erosion, land sliding, etc. all these cumulatively or independently affected agricultural area or reduce 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 16.3t/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 5cm to 10 cm of the top soil (ranging from 0.05m to 0.1 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 gifts 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 Km 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 is more prone to erosion. The different forms of soil erosion cause huge damage to Kerala's economy every year and reported causalities every year due to landslides in monsoon season.

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 less costly such as contour ploughing / optimal fertilizing, organic farming, etc. Engineering measures include contour bunding, land levelling, 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 leaves dangerous quantities of the residues in the soil and the water sources.

Chapter – II

2.1 Impact of SoilConservationProgramme 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 the 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 subsides 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 bundling (mechanical and mechanical-cum-vegetative barriers), deep ploughing, levelling, smoothening, etc. Bunding was

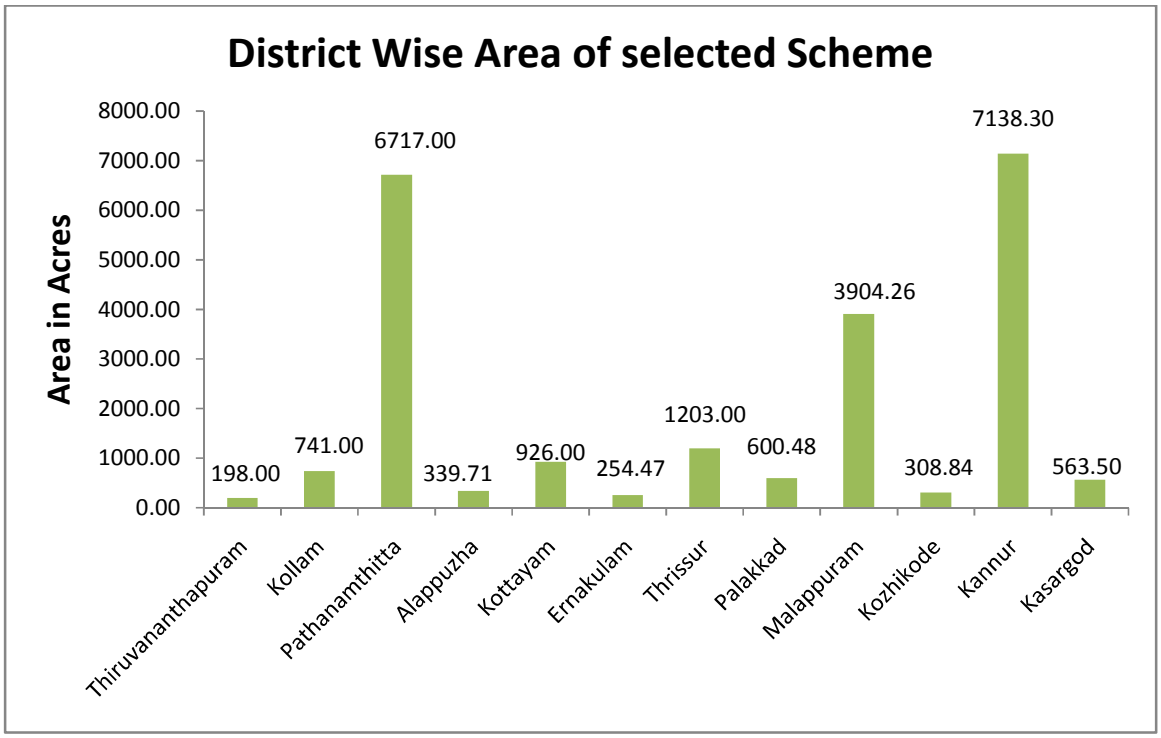
accepted by farmers to strengthen existing bunds without any obstruction in their plot Moisture conservation on measures increased yield magically.

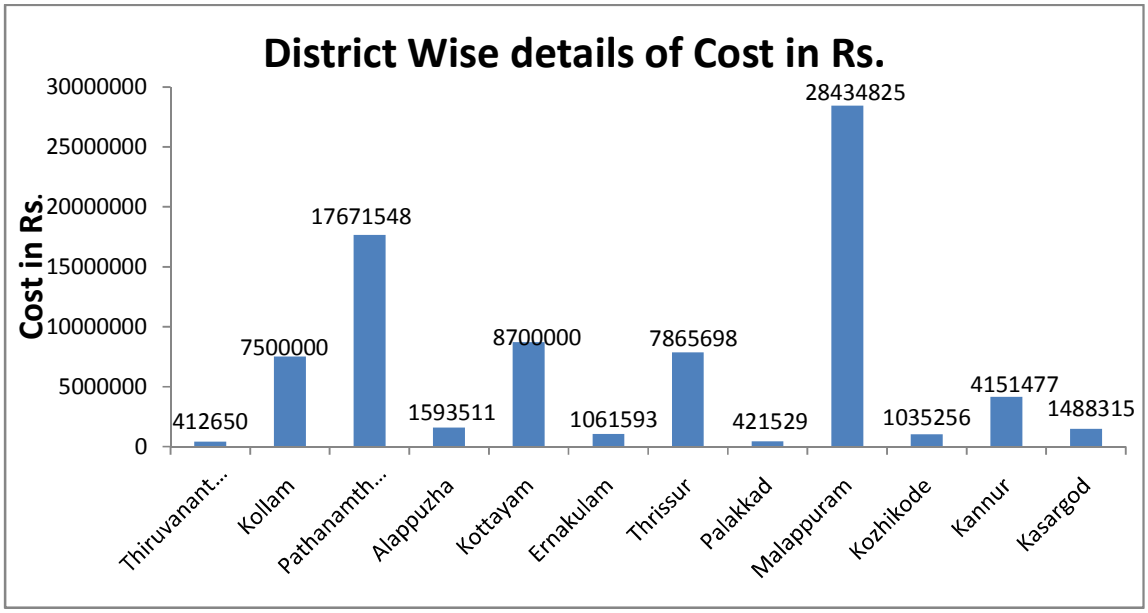
Farmers in different parts reported the fact that the sustainability of agriculture is only possible by soil and water conservation measures. They also reported that soil erosion can be minimized and irrigation potentials can be improved through soil and water conservation measures. In addition, vegetation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

Table 2 gives number of beneficiaries selected in each district and cost of the selected schemes. Also gives total area covered.

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	198.00	412650	125	125
2	Kollam	741.00	7500000	125	125
3	Pathanamthitta	6717.00	17671548	125	125
4	Alappuzha	339.71	1593511	346	125
5	Kottayam	926.00	8700000	125	125
6	Eranakulam	254.47	1061593	125	125
7	Thrissur	1203.00	7865698	125	125
8	Palakkad	600.48	421529	125	125
9	Malappuram	3904.26	28434825	125	125
10	Kozhikkode	308.84	1035256	127	125
11	Kannoor	7138.30	4151477	125	125
12	Kasaragod	563.50	1488315	125	125
Total		**22894.56**	**80336402**	**1723**	**1500**





Land Use particulars of Beneficiary plots

Table Ns. 3 and 3(a) reveals the land use particulars of beneficiary plots and control plots respectively. There is only slight increase in area after soil

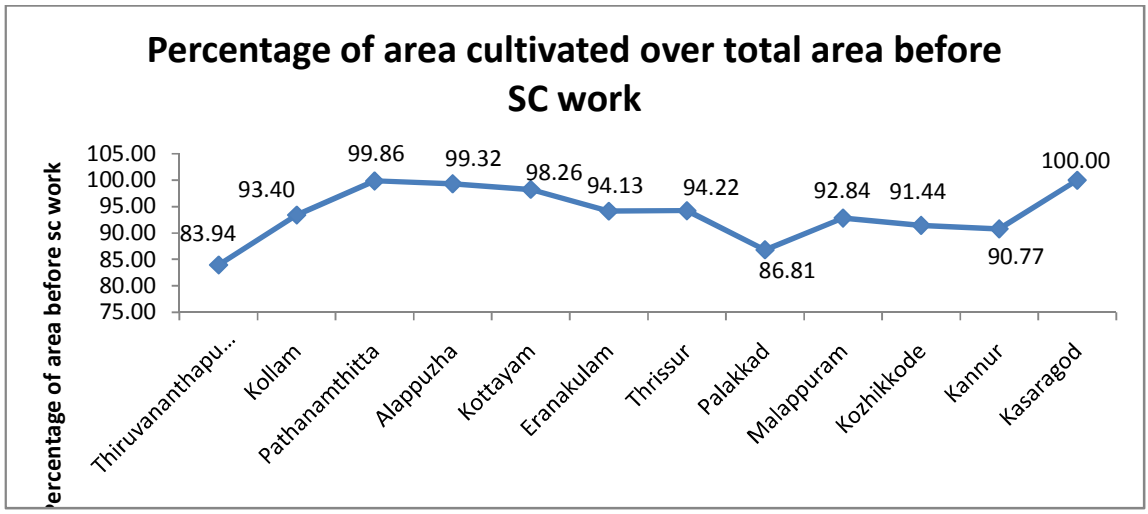
conservation programme. Area increased from 1939.71 acres to 1941.42 acres after the implementation of soil conservation programme. Only 1.71 acres of land has brought under cultivation which was not cultivated earlier. That is only 0.08% of additional area is cultivated after the implementation of soil conservation programme. In other words area under cultivation has increased from 94.65% to 94.73% by decreasing the current fallow from 1.07% to 0.96%**.**

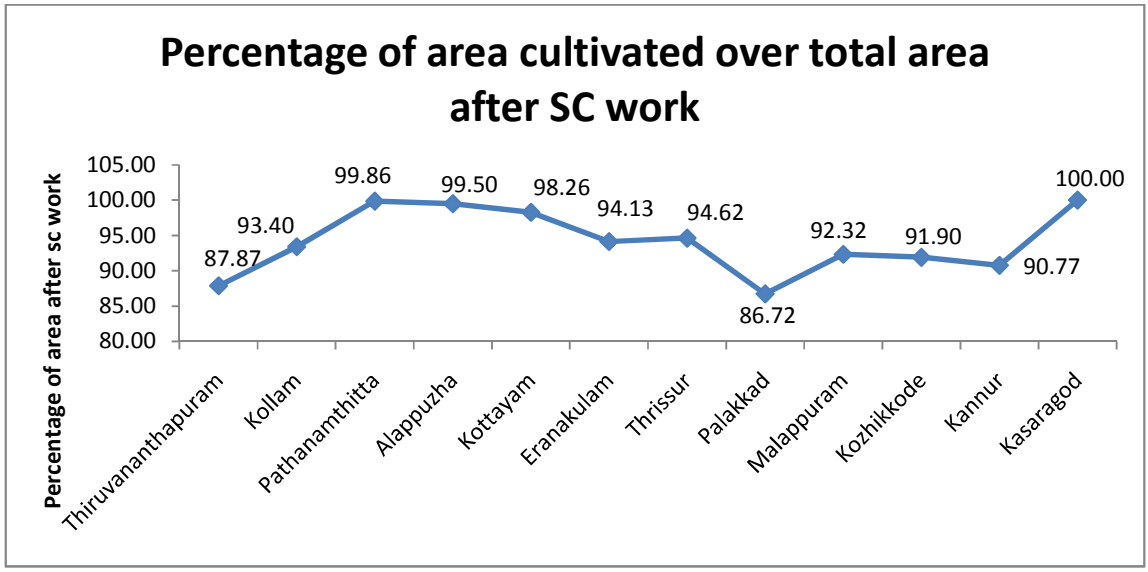
On examining the district wise data, an increase in area noted only in Thiruvananthapuram, Thrissur, Alappuzha and Kozhikkode. But this increase is only 1.37, 0.80, 0.50 and 0.64 respectively. While in Palakkad and Malappuram area decreased.

Table 3 - Land Use Particulars of Beneficiary Plots

(Area in Acres)

Sl No	District	Area Cultivated				Current Fallow				Other Use				Area not Cultivated				**Total**	
		Before Sc Work		After Sc Work		Before Sc Work		After Sc Work		Before Sc Work		After Sc Work		Before Sc Work		After Sc Work		**Before Sc Work**	**After Sc Work**
		Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%	**Area**	**Area**
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	**19**	**21**
1	Thiruvananthapuram	29.260	83.94	30.630	87.87	1.43	4.1	0.06	0.17	4.13	11.85	*13*	*14*	0.04	0.11	0.04	0.11	34.86	34.86
2	Kollam	78.280	93.40	78.280	93.40	0.02	0.02	0.02	0.02	5.44	6.49	4.13	11.85	0.07	0.08	0.07	0.08	83.81	83.81
3	Pathanamthitta	36.270	99.86	36.270	99.86	0	0	0	0	0.05	0.14	5.44	6.49	0	0	0	0	36.32	36.32
4	Alappuzha	264.470	99.32	264.970	99.50	0.97	0.36	0.47	0.18	0.75	0.28	0.05	0.14	0.1	0.04	0.1	0.04	266.29	266.29
5	Kottayam	317.055	98.26	317.055	98.26	0.05	0.02	0.05	0.02	5.57	1.73	0.75	0.28	0	0	0	0	322.68	322.68
6	Eranakulam	76.770	94.13	76.770	94.13	1.73	2.12	1.73	2.12	3.06	3.75	5.57	1.73	0	0	0	0	81.56	81.56
7	Thrissur	188.450	94.22	189.250	94.62	0.8	0.4	0	0	10.76	5.38	3.06	3.75	0	0	0.12	0.06	200.01	200.01
8	Palakkad	147.230	86.81	147.080	86.72	4.34	2.56	4.49	2.65	5.61	3.31	5.61	3.31	12.42	7.32	12.42	7.32	169.6	169.6
9	Malappuram	260.440	92.84	258.990	92.32	8.05	2.87	9.45	3.37	7.71	2.75	7.76	2.77	4.34	1.55	4.34	1.55	280.54	280.54
10	Kozhikkode	126.760	91.44	127.400	91.90	1.04	0.75	0	0	10.83	7.81	11.23	8.1	0	0	0	0	138.63	138.63
11	Kannoor	200.640	90.77	200.640	90.77	3.45	1.56	3.45	1.56	10.84	4.9	10.84	4.9	6.12	2.77	6.12	2.77	221.05	221.05
12	Kasaragod	214.080	100.00	214.080	100.00	0	0	0	0	0	0	0	0	0	0	0	0	214.08	214.08
	Total	**1939.705**	**94.65**	**1941.415**	**94.73**	**21.88**	**1.07**	**19.72**	**0.96**	**64.75**	**3.16**	**65.08**	**3.18**	**23.09**	**1.13**	**23.21**	**1.13**	2049.43	2049.43


Percentage of area cultivated over total area before SC work
Percentage of area before sc work
105.00
100.00
95.00
90.00
85.00
80.00
75.00
83.94
93.40
99.86
99.32
98.26
94.13
94.22
86.81
92.84
91.44
90.77
100.00
Thiruvananthapu...
Kollam
Pathanamthitta
Alappuzha
Kottayam
Eranakulam
Thrissur
Palakkad
Malappuram
Kozhikkode
Kannur
Kasaragod


Percentage of area cultivated over total area after SC work
Percentage of area after sc work
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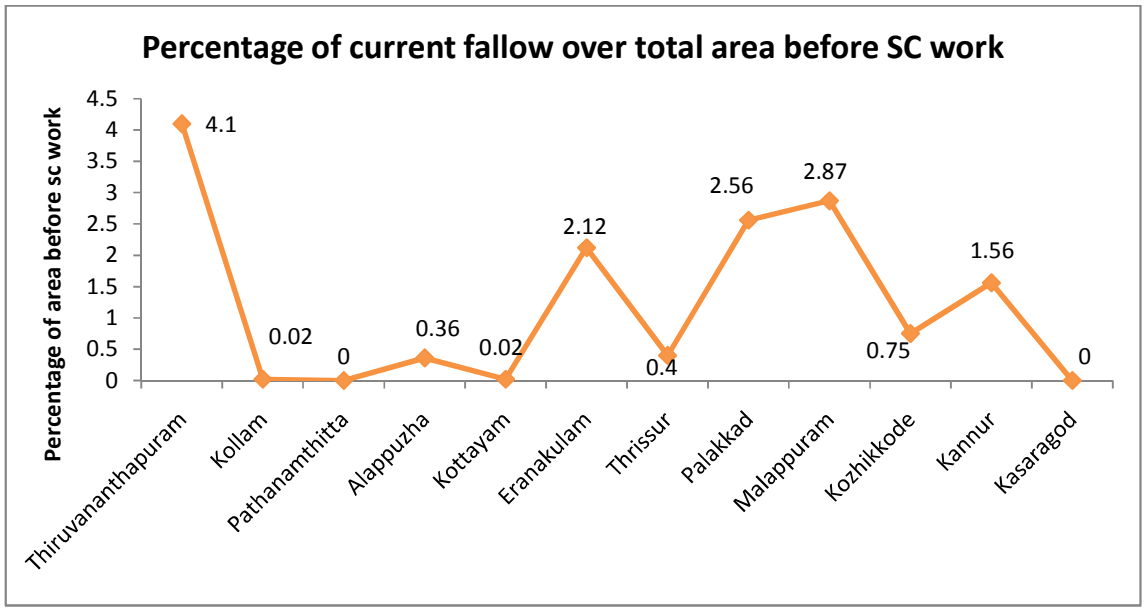
100.00
95.00
90.00
85.00
80.00
87.87
93.40
99.86
99.50
98.26
94.13
94.62
86.72
92.32
91.90
90.77
100.00
Thiruvananthapuram
Kollam
Pathanamthitta
Alappuzha
Kottayam
Eranakulam
Thrissur
Palakkad
Malappuram
Kozhikkode
Kannur
Kasaragod


Percentage of current fallow over total area before SC work
Percentage of area before sc work
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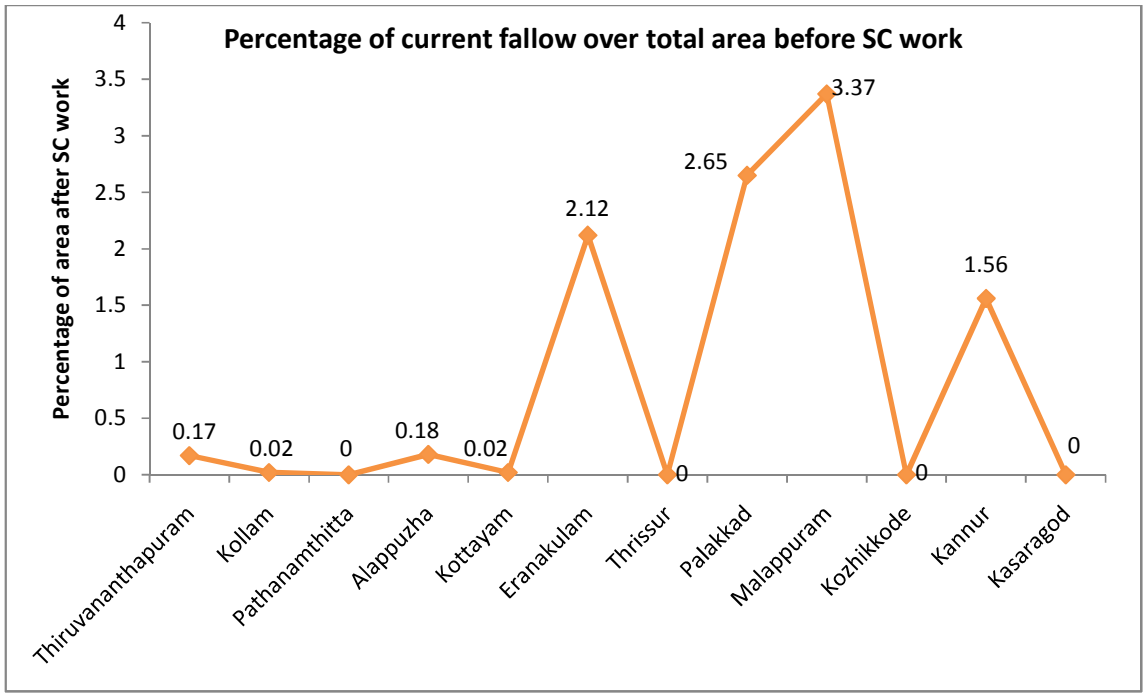
4
3.5
3
2.5
2
1.5
1
0.5
0
4.1
0.02
0
0.36
0.02
2.12
0.4
2.56
2.87
0.75
1.56
0
Thiruvananthapuram
Kollam
Pathanamthitta
Alappuzha
Kottayam
Eranakulam
Thrissur
Palakkad
Malappuram
Kozhikkode
Kannur
Kasaragod


Percentage of current fallow over total area before SC work
Percentage of area after SC work
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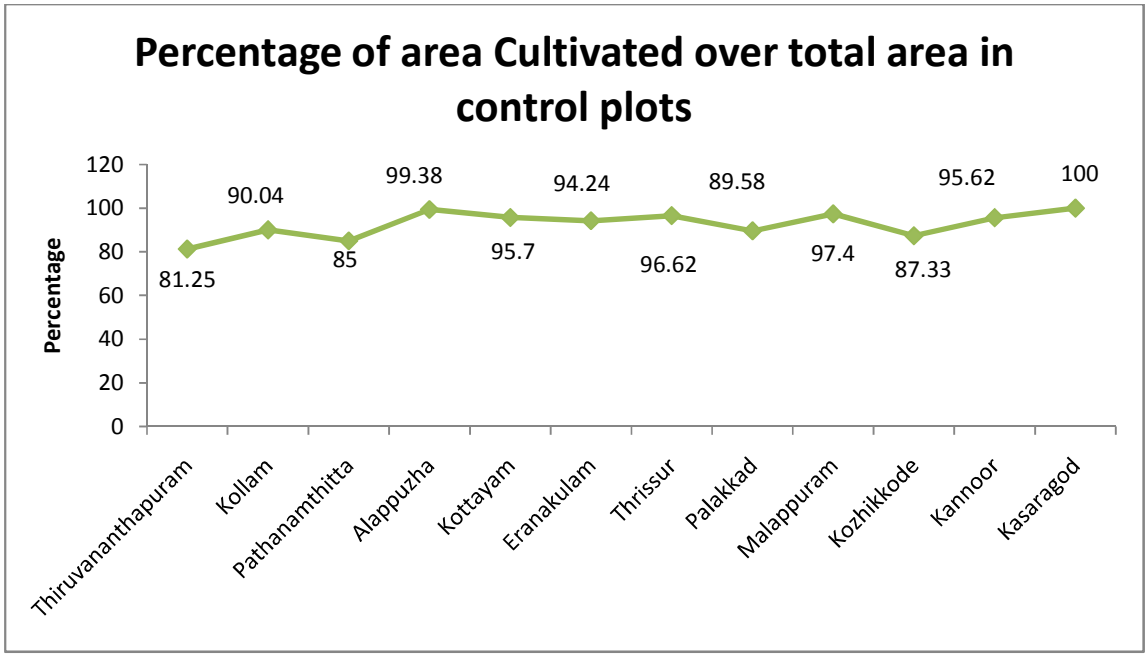
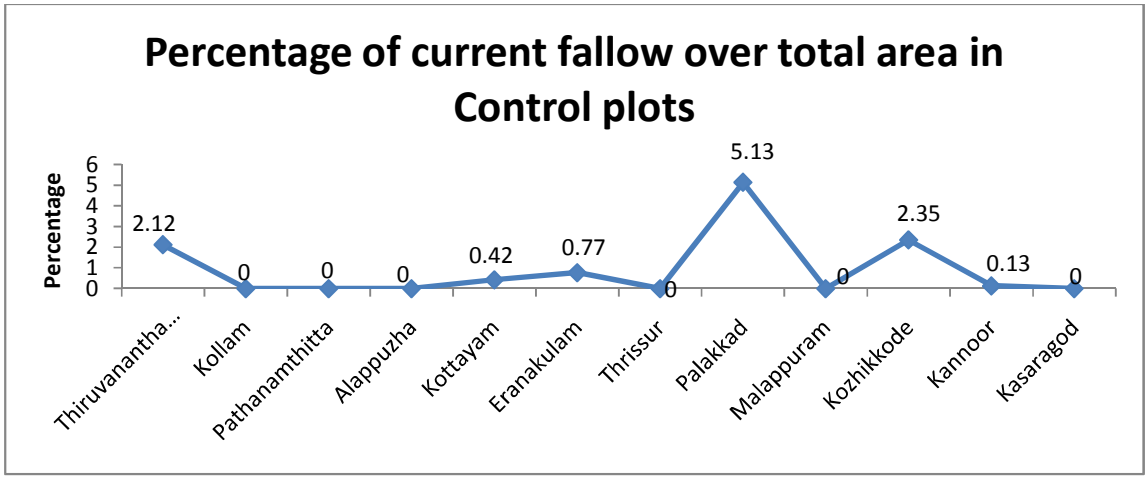
3.5
3
2.5
2
1.5
1
0.5
0
0.17
0.02
0
0.18
0.02
2.12
0
2.65
3.37
0
1.56
0
Thiruvananthapuram
Kollam
Pathanamthitta
Alappuzha
Kottayam
Eranakulam
Thrissur
Palakkad
Malappuram
Kozhikkode
Kannur
Kasaragod

Table 3(A)-Land Use Particulars (Control Plots)

Sl. No.	District Name	Area Cultivated		Current Fallow		Other Use		Area Not Cultivated		Total
		Area	%	Area	%	Area	%	Area	%	Area
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	Thiruvananthapuram	8.060	81.25	0.210	2.12	0.930	9.37	0.720	7.26	9.920
2	Kollam	8.950	90.04	0.000	0.00	0.990	9.96	0.000	0.00	9.940
3	Pathanamthitta	7.820	85.00	0.000	0.00	1.380	15.00	0.000	0.00	9.200
4	Alappuzha	8.060	99.38	0.000	0.00	0.050	0.62	0.000	0.00	8.110
5	Kottayam	54.980	95.70	0.240	0.42	2.230	3.88	0.000	0.00	57.45
6	Eranakulam	12.280	94.24	0.100	0.77	0.650	4.99	0.000	0.00	13.03
7	Thrissur	39.770	96.62	0.000	0.00	0.990	2.41	0.400	0.97	41.16
8	Palakkad	27.610	89.58	1.580	5.13	1.630	5.29	0.000	0.00	30.82
9	Malappuram	44.990	97.40	0.000	0.00	0.200	0.43	1.000	2.16	46.19
10	Kozhikkode	18.610	87.33	0.500	2.35	2.200	10.32	0.000	0.00	21.31
11	Kannur	36.280	95.62	0.050	0.13	1.460	3.85	0.150	0.40	37.94
12	Kasaragod	18.620	100.0	0.000	0.00	0.000	0.00	0.000	0.00	18.62
Total		**286.03**	**94.18**	**2.680**	**0.88**	**12.71**	**4.19**	**2.27**	**0.75**	**303.69**





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 favoring 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; multi-storage 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. In Table- 4 the area under perennial crops has increased from 1606.57 acres to 1617.96 acres. It showed an increase of 0.71%. At the same time the percentage change occurred in the cultivation of seasonal crops recorded as 5.01 %. 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.

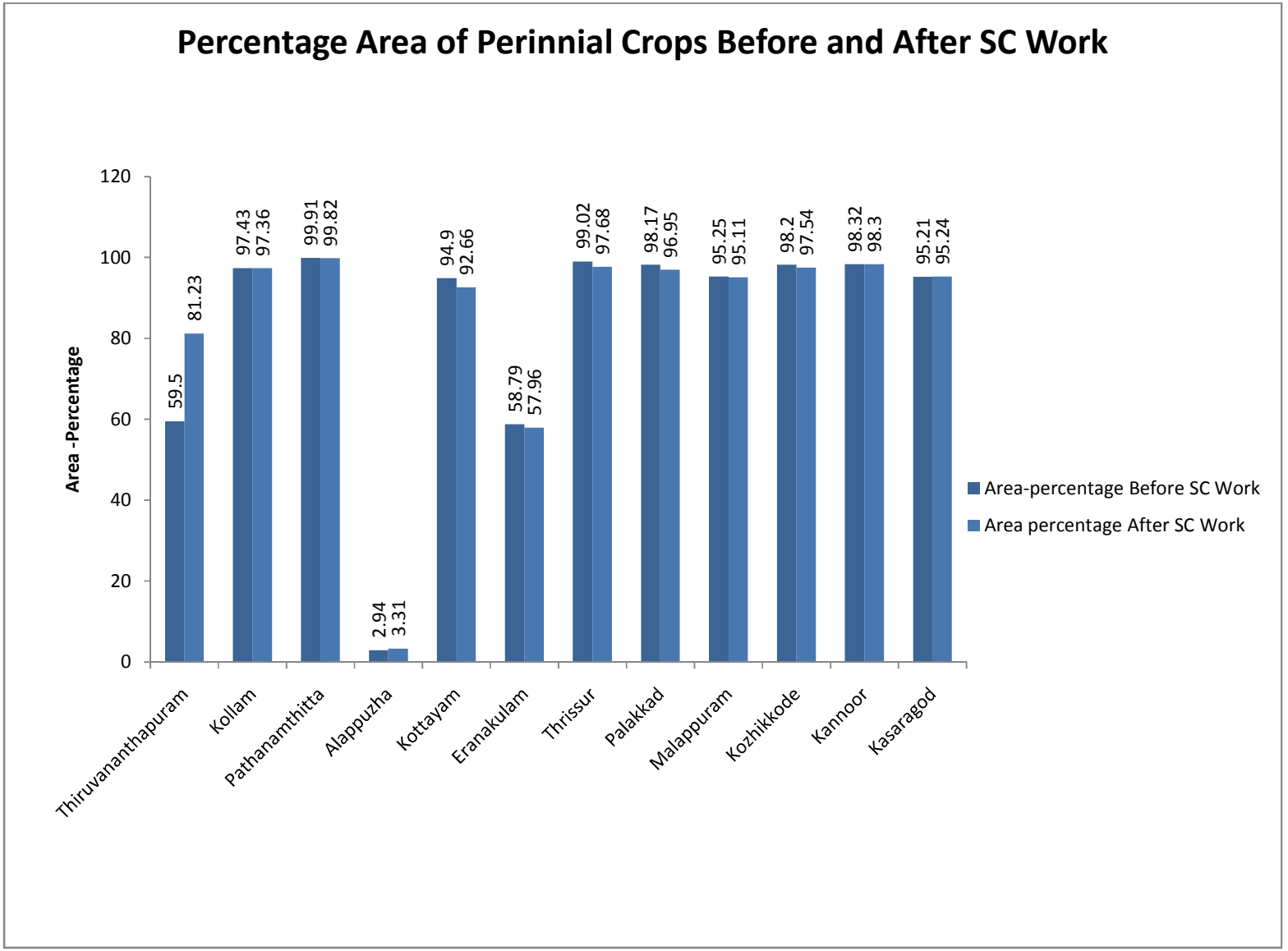
Table No. 5 reveals that after the introduction of soil conservation programmes, the area of perennial crops like Coconut, Jack, Mango and Coffee shows a positive increase. These are 2.81%, 19.43%, 24.16% and 4.17% respectively. While the variation of area under Arecanut, Nutmeg, Cashew, Pepper and Rubber have decreased to 3.28%,12.09%,14.73%,0.19% and 0.03% respectively after the soil conservation programme..

In seasonal crops, the cultivation of Plantain, Banana, Tapioca, Cheera, Yam, Elephant foot yam and Colocasia exhibited comparative increase. The respective percentage changes recorded as 43.32%, 9.02%, and 29.88%, 144.44%, 71.43%, 19.05% and 70.59% respectively.

Ongoing 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)

		Perennial crops				Seasonal Crops				Total Gross area cropped			
Sl.No	District Name	Before Sc work	%	After Sc work	%	Before Sc work	%	After Sc work	%	Before Sc work	%	After Sc work	%
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
1	Thiruvananthapuram	19.798	59.50	62.848	81.23	13.475	40.50	14.526	18.77	33.273	100.00	77.374	100.00
2	Kollam	88.128	97.43	94.466	97.36	2.325	2.57	2.562	2.64	90.453	100.00	97.028	100.00
3	Pathanamthitta	61.702	99.91	41.749	99.82	0.055	0.09	0.077	0.18	61.757	100.00	41.826	100.00
4	Alappuzha	7.426	2.94	8.449	3.31	245.544	97.06	246.872	96.69	252.970	100.00	255.321	100.00
5	Kottayam	307.572	94.90	313.257	92.66	16.541	5.10	24.809	7.34	324.113	100.00	338.066	100.00
6	Eranakulam	46.738	58.79	45.798	57.96	32.763	41.21	33.215	42.04	79.501	100.00	79.013	100.00
7	Thrissur	209.057	99.02	179.588	97.68	2.073	0.98	4.266	2.32	211.130	100.00	183.854	100.00
8	Palakkad	160.147	98.17	153.001	96.95	2.982	1.83	4.810	3.05	163.129	100.00	157.811	100.00
9	Malappuram	204.831	95.25	211.916	95.11	10.212	4.75	10.901	4.89	215.043	100.00	222.817	100.00
10	Kozhikkode	107.986	98.20	109.175	97.54	1.979	1.80	2.755	2.46	109.965	100.00	111.930	100.00
11	Kannoor	186.110	98.32	184.052	98.30	3.184	1.68	3.184	1.70	189.294	100.00	187.236	100.00
12	Kasaragod	207.076	95.21	213.662	95.24	10.416	4.79	10.681	4.76	217.492	100.00	224.343	100.00
Total		**1606.571**	**82.47**	**1617.96**	**81.85**	**341.549**	**17.53**	**358.658**	**18.15**	**1948.12**	**100.00**	**1976.619**	**100**


Percentage Area of Perinnial Crops Before and After SC Work
Area -Percentage
120
100
80
60
40
20
0
59.5
81.23
97.43
97.36
99.91
99.82
2.94
3.31
94.9
92.66
58.79
57.96
99.02
97.68
98.17
96.95
95.25
95.11
98.2
97.54
98.32
98.3
95.21
95.24
Thiruvananthapuram
Kollam
Pathanamthitta
Alappuzha
Kottayam
Eranakulam
Thrissur
Palakkad
Malappuram
Kozhikkode
Kannoor
Kasaragod
Area-percentage Before SC Work
Area percentage After SC Work

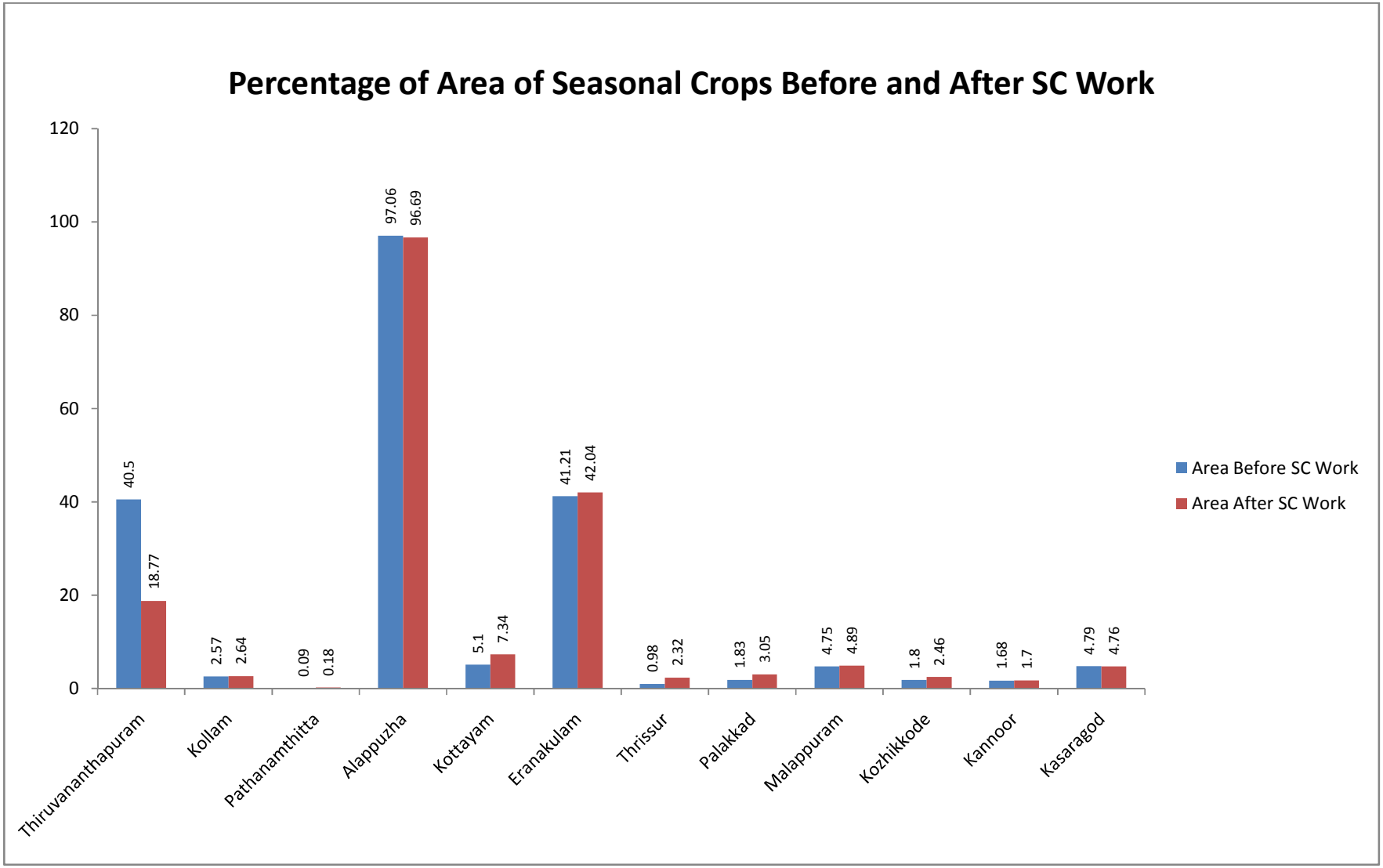

Percentage of Area of Seasonal Crops Before and After SC Work
120
100
80
60
40
20
0
40.5
18.77
2.57
2.64
0.09
0.18
97.06
96.69
5.1
7.34
41.21
42.04
0.98
2.32
1.83
3.05
4.75
4.89
1.8
2.46
1.68
1.7
4.79
4.76
Thiruvananthapuram
Kollam
Pathanamthitta
Alappuzha
Kottayam
Eranakulam
Thrissur
Palakkad
Malappuram
Kozhikkode
Kannoor
Kasaragod
Area Before SC Work
Area After SC Work

Table 5 – Area Under Selected Perennial Crops										
Sl No	District	Arecanut			Coconut			Nutmeg		
		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	0.072	0.072	0.00	10.191	52.895	419.04	0.0	0 .0	0.0
2	Kollam	0.034	1.034	2941.18	10.411	12.388	18.99	0.0	0.0	0.0
3	Pathanamthitta	0.12	0.114	-3.39	5.072	2.138	-57.85	0.02	0.016	0.00
4	Alappuzha	0.01	0.014	0.00	7.097	7.190	1.31	0.0	0.0	0.0
5	Kottayam	0.020	0.020	0.00	40.327	45.513	12.86	1.920	2.546	32.60
6	Eranakulam	0.638	0.619	-2.98	9.887	9.815	-0.73	1.475	1.475	0.00
7	Thrissur	3.153	3.523	11.73	96.621	65.993	-31.70	0.568	0.741	30.46
8	Palakkad	3.904	3.573	-8.48	52.317	51.621	-1.33	3.000	0.058	-98.07
9	Malappuram	12.660	12.868	1.64	98.327	97.533	-0.81	1.423	1.588	11.60
10	Kozhikkode	7.599	4.293	-43.51	80.516	80.471	-0.06	1.275	1.968	54.35
11	Kannoor	3.273	2.826	-13.66	21.019	21.018	0.00	0.948	0.948	0.00
12	Kasaragod	18.032	18.935	5.01	94.419	94.393	-0.03	0.0	0.0	0.0
Total		**49.517**	**47.891**	**-3.28**	**526.204**	**540.968**	**2.81**	**10.625**	**9.340**	**-12.09**

Table 5 –Contd.....

Sl No	District	Cashew			Pepper(Garbled)			Rubber		
		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	0.0	0.0	0.379	0.379	0.00	9.026	9.372	3.83
2	Kollam	0.099	0.099	0.00	0.137	0.137	0.00	74.055	74.238	0.25
3	Pathanamthitta	0.043	0.043	0.00	0.530	0.527	-0.57	54.885	37.983	-30.80
4	Alappuzha	0.0	0.0	0.0	0.0	0.0	0.0	0.005	0.005	0.00
5	Kottayam	0.022	0.238	981.82	5.685	6.073	6.82	253.264	251.293	-0.78
6	Eranakulam	0.0	0.0	0.0	0.0	0.0	0.0	34.216	33.367	-2.48
7	Trissur	0.011	0.011	0.00	0.854	1.037	21.43	107.850	108.283	0.40
8	Palakkad	1.088	0.140	-87.13	2.289	0.596	-73.96	96.559	96.003	-0.58
9	Malappuram	0.798	0.539	-32.46	5.086	5.718	12.43	78.907	83.980	6.43
10	Kozhikkode	0.033	0.066	100.00	1.143	1.448	26.68	9.771	10.706	9.57
11	Kannoor	56.392	47.594	-15.60	3.131	3.165	1.09	94.022	101.657	8.12
12	Kasaragod	6.662	6.824	2.43	2.967	3.078	3.74	83.096	88.532	6.54
Total		**65.148**	**55.554**	**-14.73**	**22.201**	**22.158**	**-0.19**	**895.656**	**895.42**	**-0.03**

Table 5 Contd.....

Sl No.	District	Jack			Mango			Coffee			Others		
		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*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*9*	*10*	*11*
1	Thiruvananthapuram	0.130	0.130	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.000	0.00
2	Kollam	2.446	5.620	129.76	0.946	0.950	0.42	0.0	0.0	0.0	0.000	0.000	0.00
3	Pathanamthitta	0.980	0.880	-10.20	0.010	0.010	0.00	0.023	0.023	0.00	0.025	0.015	-40.00
4	Alapuzha	0.210	0.220	4.76	0.100	1.020	920.00	0.0	0.0	0.0	0.000	0.000	0.00
5	Kottayam	6.020	7.260	20.60	0.030	0.030	0.00	0.042	0.042	0.00	0.242	0.242	0.00
6	Eranakulam	0.120	0.120	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.402	0.402	0.00
7	Thrissur	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.000	0.00
8	Palakkad	0.450	0.470	4.44	0.540	0.540	0.00	0.0	0.0	0.0	0.000	0.000	0.00
9	Malappuram	4.960	6.160	24.19	2.670	3.530	32.21	0.0	0.0	0.0	0.000	0.000	0.00
10	Kozhikode	2.770	2.540	-8.30	0.0	0.0	0.0	0.007	0.010	42.86	4.872	7.673	57.49
11	Kannoor	3.760	3.060	-18.62	2.972	2.944	-0.94	0.0	0.0	0.0	0.593	0.840	41.65
12	Kasaragod	1.900	1.900	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.000	0.00
	Total	**23.746**	**28.360**	**19.43**	**7.268**	**9.024**	**24.16**	**0.072**	**0.075**	**4.17**	**6.134**	**9.172**	49.53

Table 5 contd.....

Sl No.	District	Total		
		Before SC Work	After SC Work	%Increase
1	*2*	3	4	
1	Thiruvananthapuram	19.798	62.848	217.45
2	Kollam	88.128	94.466	7.19
3	Pathanamthitta	61.702	41.749	-32.34
4	Alappuzha	7.426	8.449	13.78
5	Kottayam	307.572	313.257	1.85
6	Eranakulam	46.738	45.798	--2.01
7	Thrissur	209.057	179.588	14.10
8	Palakkad	160.147	153.001	4.46
9	Malappuram	204.831	211.916	3.46
10	Kozhikkode	107.986	109.175	1.10
11	Kannoor	186.110	184.052	-1.11
12	Kasaragod	207.076	213.662	3.18
Total		**1606.571**	**1617.96**	**0.71**

Table 6 - Area Under Selected Seasonal Crops										
Sl.No	District	Plantain			Banana			Pineapple		
		Before SC Work	After SC Work	% of Increase	Before SC Work	After SC Work	% of Increase	Before SC Work	After SC Work	% of Increase
1	Thiruvananthapuram	4.031	4.645	15.23	3.874	3.991	3.02	0.020	0.020	0.00
2	Kollam	0.668	0.802	20.06	0.629	0.662	5.25	0.0	0.0	0.0
3	Pathanamthitta	0.035	0.057	62.86	0.0	0.0	0.0	0.0	0.0	0.0
4	Alappuzha	0.131	0.213	62.60	3.173	0.299	-90.58	0.0	0.0	0.0
5	Kottayam	0.80	4.20	424.59	14.34	17.13	19.46	0.0	0.0	0.0
6	Eranakulam	0.575	0.600	4.35	4.888	5.315	8.74	0.0	0.0	0.0
7	Trissur	2.073	3.466	67.20	0.0	0.0	0.0	0.0	0.0	0.0
8	Palakkad	0.0	0.0	0.0	2.722	4.500	65.32	0.0	0.0	0.0
9	Malappuram	1.658	2.218	33.78	1.453	1.562	7.50	0.0	0.0	0.0
10	Kozhikkode	0.0	0.0	0.0	1.068	1.573	47.28	0.010	0.010	0.00
11	Kannur	2.035	2.035	0.00	0.581	0.581	0.00	0.0	0.0	0.0
12	Kasaragod	2.488	2.536	1.93	1.641	1.856	13.10	0.259	0.261	0.77
Total		**14.50**	**20.77**	**43.32**	**34.37**	**37.47**	**9.02**	**0.289**	**0.291**	**0.69**

Table 6contd

SL.NO	District	Tapioca			Cheera			Paddy		
		Before SC Work	After SC Work	% of Increase	Before SC Work	After SC Work	% of Increase	Before SC Work	After SC Work	% of Increase
1	Thiruvananthapuram	5.530	5.820	5.24	0.0	0.0	0.0	0.0	0.0	0.0
2	Kollam	0.768	0.838	9.11	0.0	0.0	0.0	0.0	0.0	0.0
3	Pathanamthitta	0.020	0.020	0.00	0.0	0.0	0.0	0.0	0.0	0.0
4	Alappuzha	1.310	2.540	93.89	0.080	0.200	150.00	240.550	242.960	1.00
5	Kottayam	1.398	3.474	148.5	0.0	0.0	0.0	0.0	0.0	0.0
6	Eranakulam	2.250	2.250	0.00	0.0	0.0	0.0	24.800	24.800	0.00
7	Thrissur	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.800	0
8	Palakkad	0.000	0.050	0	0.0	0.0	0.0	0.0	0.0	0.0
9	Malappuram	0.0	0.0	0.0	0.010	0.020	100.00	2.000	2.000	0.00
10	Kozhikkode	0.900	1.170	30.00	0.0	0.0	0.0	0.0	0.0	0.0
11	Kannoor	0.568	0.568	0.00	0.0	0.0	0.0	0.0	0.0	0.0
12	Kasaragod	0.598	0.598	0.00	0.0	0.0	0.0	5.430	5.430	0.00
Total		**13.342**	**17.33**	**29.88**	**0.090**	**0.220**	**144.44**	**272.78**	**275.99**	**1.18**

Table 6contd

		Ginger			Yarm			Elephant foot Yarm		
		Before SC Work	After SC Work	% of Increase	Before SC Work	After SC Work	% of Increase	Before SC Work	After SC Work	% of Increase
1	Thiruvananthapuram	0.000	0.030	0	0.0	0.0	0.0	0.0	0.0	0.0
2	Kollam	0.090	0.090	0.00	0.0	0.0	0.0	0.045	0.045	0.00
3	Pathanamthitta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Alappuzha	0.000	0.020	0	0.070	0.120	71.43	0.020	0.080	300.00
5	Kottayam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Eranakulam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Trissur	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Palakkad	0.010	0.010	0.00	0.0	0.0	0.0	0.250	0.250	0.00
9	Malappuram	3.020	3.030	0.33	0.0	0.0	0.0	0.0	0.0	0.0
10	Kozhikkode	0.001	0.002	100.00	0.0	0.0	0.0	0.0	0.0	0.0
11	kannur	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	Kasaragod	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		**3.121**	**3.182**	**1.95**	**0.070**	**0.120**	**71.43**	**0.315**	**0.375**	**19.05**

Table 6 – Contd.....

SL NO	District	Colacasia			Turmeric			Poovan		
		Before SC Work	After SC Work	% of Increase	Before SC Work	After SC Work	% of Increase	Before SC Work	After SC Work	% of Increase
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1	Thiruvananthapuram	0.020	0.020	0.00	0.0	0.0	0.0	0.0	0.0	0.0
2	Kollam	0.075	0.075	0.00	0.0	0.0	0.0	0.050	0.050	0.00
3	Pathanamthitta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Alappuzha	0.160	0.340	112.50	0.0	0.0	0.0	0.0	0.0	0.0
5	Kottayam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Eranakulam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Trissur	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Palakkad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	Malappuram	0.0	0.0	0.0	0.021	0.021	0.00	0.0	0.0	0.0
10	Kozhikkode	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	kannur	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	Kasaragod	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL		**0.255**	**0.435**	**70.59**	**0.021**	**0.021**	**0.00**	**0.050**	**0.050**	**0.00**

Table 6 – Contd.....

SI. NO	District	Others			Total		
		Before SC Work	After SC Work	% of Increase	Before SC Work	After SC Work	% of Increase
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	Thiruvananthapuram	0.000	0.000	0.00	13.475	14.526	7.8,
2	Kollam	0.000	0.000	0.00	2.325	2.562	10.19
3	Pathanamthitta	0.000	0.000	0.00	0.055	0.077	40
4	Alappuzha	0.010	0.010	0.00	245.544	246.872	0.54
5	Kottayam	0.000	0.000	0.00	16.541	24.81	49.98
6	Eranakulam	0.000	0.000	0.00	32.763	33.215	1.38
7	Trissur	0.000	0.000	0.00	2.073	4.266	105.79
8	Palakkad	0.000	0.000	0.00	2.982	4.810	61.30
9	Malappuram	0.000	0.000	0.00	10.212	10.901	6.75
10	Kozhikkode	0.000	0.000	0.00	1.979	2.755	39.21
11	Kannur	0.000	0.000	0.00	3.184	3.184	0
12	Kasaragod	0.000	0.000	0.00	10.416	10.681	2.54
TOTAL		**0.010**	**0.010**	**0.00**	**339.209**	**356.27**	**5.03**

Impact of Soil Conservation Treatment on the Yield of Crops

For studying the impact of soil conservation treatment on the yield of crops, a detailed survey was conducted following the “Before” and “After” method. Details regarding the yield and value of crops are collected from the beneficiaries in the scheme area. District wise details are presented in table No. 7 and 8 Survey results reveals that in most cases, the crop yields after the implementation of the programme were higher than that of before. Therefore, the total output from crops represented a big increase. As much as major portion of this output came from perennial crops indicating improved stability in output. Almost all perennial crops have also shown a marked improvement. In Thiruvananthapuram total gross cropped area is more increased. In this district total cropped area before soil conservation work was 33.27acres.It is increased to 77.37 acres after the implementation of soil conservation measures. The increase in area is accounted as 44.10 acres.

The percentage of increase recorded as 132.54. When we analyse the yield of perennial crops in Thiruvananthapuram district, it can be seen that production of Coconut, Arecanut and Rubber are increased. In the case of Seasonal crops, in this district it can be seen that the yield of tapioca, plantain, banana etc. are increased.

In Kottayam, Malappuram, Kasargode and Koll am districts before soil conservation work the area were 324.11acre, 215.04, 217.49, and 90.45 respectively. It is increased 338.07, 222.82, 224.34 and 97.03 respectively after the implementation of soil conservation work. Increase in area accounted as 13.95, 7.77, 6.85 and 6.57 respectively.

While in Pathanamthitta, Thrissur and Kannur total gross cropped area is decreased after soil conservation works. The percentage of decrease recorded as 19.93%, 27.28% and 2.06% respectively. Productions of all seasonal crops and perennial crops are increased, except Ginger (green) after soil conservation works.

Table 7

Crop wise Yield and Value of Perennial Crops in Scheme Area								
District	Name of Crop	Unit	Before SC Work		After SC Work		Value at constant price	% Change Over Quantity
			Quantity	Value	Quantity	Value		
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	
Thiruvananthapuram	Pepper(dry)	Quintal	0.210	2731.42	0.240	13838.50	3121.62	14.286
	Pepper(green)	Quintal	2.545	8911.04	3.095	56096.88	10836.80	21.611
	Rubber (Garbled)	Quintal	174.350	2249115.00	183.000	1948346.13	2360700.00	4.961
	Coconut(with husk)	Nos.	11960.000	54418.00	12250.000	175542.50	55737.50	2.425
	Coconut(without husk)	Nos.	15970.000	68671.00	16815.000	233392.20	72304.50	5.291
	Arecnut	Nos.	3920.000	2116.80	4000.000	7480.00	2160.00	2.041
	Jack	Quintal	15.700	4710.00	16.100	2108.75	4830.00	2.548
	Total			**2390673.26**		**2436804.96**	**2509690.43**	
Kollam	Pepper(Garbled)	Quintal	0.375	5056.76	0.475	27188.08	6405.24	26.667
	Rubber (Garbled)	Quintal	589.450	7570135.40	822.650	9391117.52	10565055.38	39.562
	Coconut(with husk)	Quintal	17812.000	103665.84	21876.000	451958.16	127318.32	22.816
	Coconut(without husk)	Quintal	225.000	1264.50	282.000	5899.44	1584.84	25.333
	Arecanut	Nos.	1430.000	686.40	1745.000	2896.70	837.60	22.028
	Jack	Quintal	138.850	31299.55	157.350	130514.03	35469.84	13.324
	Mango	Quintal	14.250	19445.23	19.850	43087.03	27086.91	39.298
	Cashew	Quintal	0.610	2595.13	0.940	7399.88	3999.07	54.098
	Total			**7734148.81**		**10060060.84**	**10767757.2**	
Pathanamthitta	Pepper(dry)	Quintal	2.900	38784.03	10.360	657570.40	138552.67	257.241
	Rubber(Garbled)	Quintal	132.240	1736090.29	217.770	2574585.92	2858956.42	64.678
	Coconut(with husk)	Nos.	216.870	1264.35	595.000	10251.85	3468.85	174.358
	Coconut(without husk)	Nos.	275.000	1669.25	784.000	14206.08	4758.88	185.091
	Arecanut	Nos.	360.000	180.00	957.000	1693.89	478.50	165.833
	Total			**1777987.92**		**3258308.14**	**3006215.33**	

Table 7 contd

Alappuzha	Coconut(with husk)	Nos.	3926.000	24458.98	4693.000	72178.34	29237.39	19.536
	Coconut(without husk)	Nos.	14785.000	100094.45	15814.000	245749.56	107060.78	6.960
	Total			**124553.43**		**317927.90**	**136298.17**	
Kottayam	Pepper(dry)	Quintal	19.010	259858.71	29.680	1853588.12	405713.13	56.128
	Rubber(Garbled)	Quintal	2053.82	26008200.45	2319.230	28046262.85	29369174.84	-69.475
	Coconut(with husk)	Nos.	10961.000	58641.35	17607.000	281712.00	94197.45	60.633
	Coconut(without husk)	Nos.	50927.000	304543.46	94306.500	1557943.38	563952.87	85.180
	Arecanut	Nos.	1460.000	788.40	1720.000	2889.60	928.80	17.808
	Nutmeg	Quintal	0.900	16072.20	4.800	124560.00	85718.40	433.333
	Coco(without husk)	Quintal	0.000	0.00	2.450	11280.22	9279.38	Infinity
	Total			**26648104.57**		**31878236.17**	**30528964.8**	
Eranakulam	Rubber(Rubber garbled)	Quintal	339.460	4376630.62	357.650	4340680.03	4611152.84	5.359
	coconut(With husk)	Number	95.000	502.55	110.000	1763.3	581.90	15.789
	coconut(With out husk)	Number	38370.000	201058.80	40890.000	694721.10	214263.60	6.568
	Arecanut	Number	112430.000	57339.30	122500.000	120050.00	62475.00	8.957
	Jack	Quintal	5.500	1881.00	7.100	3968.90	2428.20	29.091
	Nutmeg	Quintal	3.060	53822.34	3.280	87103.68	57691.92	7.190
	coco(without husk)	Quintal	9.980	36399.25	10.560	48121.27	38514.64	5.812
	Total			**4727633.86**		**5296408.28**	**4987108.10**	
Thrissur	pepper(Pepper dry)	Quintal	1.340	17710.33	3.970	238489.81	52470.18	196.269
	Rubber(Rubber garbled)	Quintal	315.910	4119466.40	1086.080	12871557.65	14162483.20	243.794
	coconut(With husk)	Number	44724.000	181132.20	85032.000	1175142.24	344379.60	90.126
	coconut(With out husk)	Number	91258.000	368682.32	152055.000	2128770.00	614302.20	66.621
	Arecanut	Number	60210.000	33115.50	139730.000	278062.70	76851.50	132.071
	Cashew	Quintal	0.040	166.60	0.040	287.64	166.60	0.000
	Nutmeg	Quintal	0.000	0.00	1.270	35071.05	22639.02	Infinity
	Total			**4720273.35**		**16727381.09**	**15273292.30**	

Table 7 contd

Palakkad	pepper(Pepper dry)	Quintal	8.620	115754.03	1.650	100586.41	22157.09	-80.858
	Rubber(Rubber garbled)	Quintal	947.840	12376420.80	961.950	11378666.15	12560662.13	1.489
	coconut(With husk)	Number	296057.000	1207912.56	300198.000	3944601.72	1224807.84	1.399
	coconut(With out husk)	Number	3980.000	16238.40	4150.000	54531.00	16932.00	4.271
	Arecanut	Number	406010.000	158343.90	414372.000	530396.16	161605.08	2.060
	Mango	Quintal	0.500	620.00	1.000	1690.63	1240.00	100.000
	Total			**13875289.69**		**16010472.07**	**13987404.14**	
Malappuram	pepper(Pepper dry)	Quintal	8.180	109671.65	9.331	563223.07	125103.42	14.071
	Rubber(Rubber garbled)	Quintal	327.640	4076614.83	347.310	4209480.52	4321356.05	6.004
	coconut(With husk)	Number	9090.000	33542.10	10880.000	123270.40	40147.20	19.692
	coconut(With out husk)	Number	456736.000	1575739.20	504669.000	5722946.46	1741108.05	10.495
	Arecanut	Number	979070.000	313302.40	1105290.000	1503194.40	353692.80	12.892
	Cashew	Quintal	4.960	19385.31	4.030	29167.13	15750.57	-18.750
	Total			**6128255.49**		**12151281.98**	**6597158.09**	
Kozhikkode	pepper(Pepper dry)	Quintal	1.570	20879.94	1.820	106760.71	24204.74	15.924
	Rubber(Rubber garbled)	Quintal	60.400	776307.91	65.000	780767.65	835430.70	7.616
	coconut(With husk)	Number	44820.000	174798.00	40850.000	447716.00	159315.00	-8.858
	coconut(With out husk)	Number	225530.000	834461.00	201060.000	2430815.40	743922.00	-10.850
	Arecanut	Number	393100.000	125792.00	227900.000	237016.00	72928.00	-42.025
	Nutmeg	Quintal	0.680	12504.52	1.450	37508.60	26664.05	113.235
	coco(with husk)	Quintal	1.430	4882.36	2.500	10725.70	8535.60	74.825
	Total			**1949625.73**		**4051310.06**	**1871000.09**	

Table-7 Contd.....

Kannoor	pepper(Pepper dry)	Quintal	14.790	199172.07	20.920	1260471.84	281722.74	41.447
	Rubber(Rubber garbled)	Quintal	421.950	5381913.18	609.300	7035721.14	7771536.20	44.401
	coconut(With husk)	Number	56550.000	171912.00	67950.000	784143.00	206568.00	20.159
	coconut(With out husk)	Number	28750.000	90275.00	36350.000	420933.00	114139.00	26.435
	Arecanut	Number	414008.000	178023.44	447009.000	755445.21	192213.87	7.971
	Cashew	Quintal	156.530	622676.34	170.850	1316228.40	679641.30	9.148
	Total			**6643972.03**		**11572942.59**	**9245821.10**	
Kasaragod	pepper(Pepper dry)	Quintal	69.150	924449.16	97.310	5883200.12	1300913.06	40.723
	Rubber(Rubber garbled)	Quintal	946.070	11585412.43	1285.790	15140177.25	15745565.76	35.909
	coconut(With husk)	Number	35840.000	128665.60	45870.000	605484.00	164673.30	27.985
	coconut(With out husk)	Number	556078.000	1996320.02	689393.000	9603244.49	2474920.87	23.974
	Arecanut	Number	3439773.000	1582295.58	4305341.000	6156637.63	1980456.86	25.164
	Cashew	Quintal	99.640	455853.00	126.500	1023068.76	578737.50	26.957
	Total			**16672995.79**		**38411812.25**	**22245267.35**	

Table-7 Contd.....

STATE	Name of Crop	Unit	Before SC Work		After SC Work		Value at constant price	% Change Over Quantity
			Quantity	Value	Quantity	Value		
1	2	3	4	5	6	7	8	9
KERALA	pepper(garbled)	Quintal	0.375	5056.76	0.475	27188.08	6405.24	26.667
	pepper(Pepper dry)	Quintal	125.770	1689011.34	175.281	10677728.98	2353958.67	39.366
	pepper(Pepper green)	Quintal	2.545	8911.04	3.095	56096.88	10836.80	21.611
	Rubber(Rubber garbled)	Quintal	6309.130	80256307.31	8255.730	97717362.81	105162073.51	30.854
	coconut(With husk)	Number	532051.870	2140913.53	607911	8073763.51	2450432.35	14.258
	coconut(With out husk)	Number	1482884.000	5559017.40	1756568.500	23113152.11	6669249.59	18.456
	Arecanut	Number	5811771.000	2451983.72	6770564.000	9595762.29	2904628.01	16.497
	Jack	Quintal	160.050	37890.55	180.550	136591.68	42728.04	12.808
	Mango	Quintal	14.750	20065.23	20.850	44777.66	28326.91	41.356
	Cashew	Quintal	261.780	1100676.38	302.360	2376151.81	1278295.04	15.502
	Nutmeg	Quintal	4.640	82399.06	10.800	284243.33	192713.39	132.759
	coco(with husk)	Quintal	1.430	4882.36	2.500	10725.70	8535.60	74.825
	coco(without husk)	Quintal	9.980	36399.25	13.010	59401.49	47794.02	30.361
	Total			**93393513.93**		**1521712946.33**	**121155977.17**	

Table 8 - Crop wise Yield and Value of Seasonal Crops in Scheme Area								
District	**Name of Crop**	**Unit**	**Before SC Work**		**After SC Work**		**Value at constant price**	% of Change Over Quantity
			Quantity	**Value**	**Quantity**	**Value**		
1	2	3	4	5	6	7	8	9
Thiruvananthapuram	plantain	Quintal	380.360	406311.95	440.290	697353.28	470330.99	15.756
	banana	Quintal	200.800	416451.17	218.000	769472.41	452123.28	8.566
	tapiaco(Tapioca raw)	Quintal	826.940	424451.78	926.550	857540.56	475579.58	12.046
	Colocasia	Quintal	0.450	1125.00	0.500	1750	1250.00	11.111
	Total			**1248339.90**		**2326116.25**	**1399283.85**	
Kollam	plantain	Quintal	38.750	38822.88	47.200	89719.20	47288.74	21.806
	banana	Quintal	44.400	94544.47	52.200	216173.26	111153.64	17.568
	tapiaco(Tapioca raw)	Quintal	22.000	11692.13	28.850	32095.64	15332.62	31.136
	Elephant Foot yam	Quintal	1.350	1660.27	1.900	4480.78	2336.68	40.741
	Colocasia	Quintal	1.025	4376.06	1.300	2840.75	5550.12	26.829
	Poovan	Quintal	1.750	4824.05	2.100	10394.26	5788.86	20.000
	Total			**155919.86**		**355703.89**	**187450.65**	
Pathanamthitta	plantain	Quintal	0.320	485.76	1.020	1389.33	1548.36	218.750
	tapiaco(Tapioca raw)	Quintal	0.180	115.55	0.450	598.31	288.86	150.000
	Total			**601.31**		**1987.64**	**1837.22**	
Alappuzha	plantain	Quintal	59.380	61339.54	34.000	54071.90	35122.00	-42.742
	banana	Quintal	30.810	71053.41	39.620	145823.78	91370.85	28.595
	tapiaco(Tapioca raw)	Quintal	134.630	111017.23	242.180	305330.85	199704.05	79.886
	cheera	Quintal	0.860	1595.30	2.540	11348.37	4711.70	195.349
	Paddy(Paddy High yeild)	Quintal	4611.820	5755551.36	4780.760	8796598.40	5966388.48	3.663
	Paddy(Paddy Local)	Quintal	150.890	196157.00	151.640	285588.17	197132.00	0.497
	yam	Quintal	1.790	3445.75	2.140	6211.09	4119.50	19.553
	Elephant Foot yam	Quintal	0.360	637.20	1.470	3646.42	2601.90	308.333
	Colocasia	Quintal	1.690	5119.01	3.980	13389.86	12055.42	135.503
	Cowpea	Quintal	0.000	0.00	0.500	2279.50	1262.50	Infinity
	Ladies finger	Quintal	0.050	65.00	0.060	144.00	78.00	20.000
	Total			**6205980.80**		**9624432.34**	**6514546.40**	

Table 8contd

Kottayam	**plantain**	**Quintal**	**97.950**	**92847.78**	**41.25**	**60500.14**	**39101.29**	**-57.89**
	banana	Quintal	940.23	2005510.59	1203.75	4117824.12	2567598.75	28.03
	tapiaco(Tapioca raw)	Quintal	421.400	278912.01	595.700	557038.78	394275.96	41.362
	Total			**2377270.38**		**4735363.04**	**3000976.00**	
Eranakulam	plantain	Quintal	48.300	41827.80	54.300	75952.13	47023.80	12.422
	banana	Quintal	386.560	729604.96	425.200	1366873.44	802535.24	9.996
	tapiaco(Tapioca raw)	Quintal	192.080	97132.94	216.900	222472.18	109684.16	12.922
	Paddy(Paddy High yeild)	Quintal	715.600	724902.80	748.100	1168532.20	757825.30	4.542
	Paddy(Paddy Local)	Quintal	41.550	42838.05	43.150	77670.00	44487.65	3.851
	Cowpea	Quintal	3.800	6359.45	5.550	13458.75	9288.15	46.053
	Total			**1642666.00**		**2924958.70**	**1770844.29**	
Thrissur	plantain	Quintal	66.770	48539.86	166.250	212937.90	120858.76	148.989
	Paddy(Paddy High yeild)	Quintal	0.000	0.00	12.000	21822.24	12083.04	Infinity
	Total			**48539.86**		**234760.14**	**132941.80**	
Palakkad	banana	Quintal	345.300	619813.50	243.200	680553.86	436544.00	-29.568
	Total			**619813.50**		**680553.86**	**436544.00**	
Malappuram	plantain	Quintal	53.710	53226.61	72.230	102626.55	71579.93	34.481
	banana	Quintal	77.100	140431.49	82.050	235198.78	149447.51	6.420
	cheera	Quintal	2.400	1674.55	2.950	3045.88	2058.30	22.917
	Paddy(Paddy Local)	Quintal	34.800	33443.15	39.650	62236.22	38104.05	13.937
	Ginger(Ginger green)	Quintal	2.500	5240.75	1.200	5510.00	2515.56	-52.000
	Turmeric (Turmeric dry)	Quintal	0.250	475.00	0.310	2224.25	589.00	24.000
	Total			**234491.55**		**410841.68**	**264294.35**	
Kozhikkode	banana	Quintal	36.980	73624.98	63.760	202482.00	126942.33	72.418
	tapiaco(Tapioca raw)	Quintal	118.000	85185.38	50.500	60196.52	36456.46	-57.203
	Total			**158810.36**		**262678.52**	**163398.79**	
Kannur	plantain	Quintal	70.100	82415.87	87.650	176699.77	103049.23	25.036
	banana	Quintal	27.700	54418.87	32.650	104094.41	64143.54	17.870
	tapiaco(Tapioca raw)	Quintal	28.400	19539.20	34.000	43444.52	23392.00	19.718
	Total			**156373.94**		**324238.70**	**190584.77**	
Kasaragod	plantain	Quintal	153.260	133463.47	213.360	401827.27	185800.29	39.214
	banana	Quintal	123.850	237637.22	183.750	535554.07	352570.31	48.365
	pineapple	Quintal	27.850	26979.74	38.370	84414.00	37170.94	37.774
	tapiaco(Tapioca raw)	Quintal	14.500	10823.22	19.000	30535.66	14182.17	31.034
	Paddy(Paddy High yeild)	Quintal	80.500	73305.72	88.500	137544.04	80590.76	9.938
	Total			**482209.37**		**1189875.04**	**670314.46**	

Table - 8 Contd...

District	Name of Crop	Unit	Before SC Work		After SC Work		Value at constant price	% of Change Over Quantity
			Quantity	Value	Quantity	Value		
1	2	3	4	5	6	7	8	9
STATE	Plantain	Quintal	968.90	959281.52	1157.55	1873077.47	1121703.38	19.47
	Banana	Quintal	2213.73	4443090	2544.18	8374050.13	5154429.45	16.01
	pineapple	Quintal	27.850	26979.74	38.370	84414.00	37170.94	37.774
	tapiaco(Tapioca raw)	Quintal	1758.130	1038869.44	2114.130	2109253.02	1268895.86	20.249
	Cheera	Quintal	3.260	3269.85	5.490	14394.25	6770.00	68.405
	Paddy(Paddy High yeild)	Quintal	5407.920	6553759.88	5629.360	10124496.88	6816887.58	4.095
	Paddy(Paddy Local)	Quintal	227.240	272438.20	234.440	425494.39	279723.70	3.168
	Ginger(Ginger green)	Quintal	2.500	5240.75	1.200	5510.00	2515.56	-52.000
	Yam	Quintal	1.790	3445.75	2.140	6211.09	4119.50	19.553
	Elephant Foot yam	Quintal	1.710	2297.47	3.370	8127.20	4938.58	97.076
	Colocasia	Quintal	3.165	10620.07	5.780	17980.61	18855.54	82.622
	Cowpea	Quintal	3.800	6359.45	6.050	15738.25	10550.65	59.211
	Ladies finger	Quintal	0.050	65.00	0.060	144.00	78.00	20.000
	Turmeric (Turmeric dry)	Quintal	0.250	475.00	0.310	2224.25	589.00	24.000
	Poovan	Quintal	1.750	4824.05	2.100	10394.26	5788.86	20.000
	Total			**13331016.83**		**23071509.8**	**14784034.55**	

Table – 9								
Quantity and Value of Selected Perennial and Seasonal Crops for the year 2015-2016								
	Name of Crops	Units	Before SC Work		After SC Work		Value at	% change over quantity
			Quantity	Values(Rs)	Quantity	Values(Rs)	Constant Price	
1	2	3	4	5	6	7	8	9
A. Perennial	pepper(garbled)	Quintal	0.375	5056.76	0.475	27188.08	6405.24	26.667
	pepper(Pepper dry)	Quintal	125.770	1689011.34	175.281	10677728.98	2353958.67	39.366
	pepper(Pepper green)	Quintal	2.545	8911.04	3.095	56096.88	10836.80	21.611
	Rubber(Rubber garbled)	Quintal	6309.130	80256307.31	8255.730	97717362.81	105162073.51	30.854
	coconut(With husk)	Number	532051.870	2140913.53	607911.00	8073763.51	2450432.35	14.258
	Coconut (With out husk)	Number	1482884.000	5559017.40	1756568.500	23113152.11	6669249.59	18.456
	Arecanut	Number	5811771.000	2451983.72	6770564.000	9595762.29	2904628.01	16.497
	Jack	Quintal	160.050	37890.55	180.550	136591.68	42728.04	12.808
	Mango	Quintal	14.750	20065.23	20.850	44777.66	28326.91	41.356
	Cashew	Quintal	261.780	1100676.38	302.360	2376151.81	1278295.04	15.502
	Nutmeg	Quintal	4.640	82399.06	10.800	284243.33	192713.39	132.759
	coco(with husk)	Quintal	1.430	4882.36	2.500	10725.70	8535.60	74.825
	coco(without husk)	Quintal	9.980	36399.25	13.010	59401.49	47794.02	30.361
	Total			**93393513.93**		**152172946.33**	**121155977.17**	
B. Seasonal	Plantain	Quintal	968.900	959281.52	1157.55	1873077.47	1121703.38	19.47
	Banana	Quintal	2213.73	4443090.66	2544.18	8374050.13	5244548.70	16.678
	pineapple	Quintal	27.850	26979.74	38.370	84414.00	37170.94	37.774
	tapiaco(Tapioca raw)	Quintal	1758.130	1038869.44	2114.130	2109253.02	1268895.86	20.249
	Cheera	Quintal	3.260	3269.85	5.490	14394.25	6770.00	68.405
	Paddy(Paddy High yeild)	Quintal	5407.920	6553759.88	5629.360	10124496.88	6816887.58	4.095
	Paddy(Paddy Local)	Quintal	227.240	272438.20	234.440	425494.39	279723.70	3.168
	Ginger(Ginger green)	Quintal	2.500	5240.75	1.200	5510.00	2515.56	-52.000
	Yam	Quintal	1.790	3445.75	2.140	6211.09	4119.50	19.553
	Elephant Foot yam	Quintal	1.710	2297.47	3.370	8127.20	4938.58	97.076
	Colocasia	Quintal	3.165	10620.07	5.780	17980.61	18855.54	82.622
	Cowpea	Quintal	3.800	6359.45	6.050	15738.25	10550.65	59.211
	Ladies finger	Quintal	0.050	65.00	0.060	144.00	78.00	20.000
	Turmeric (Turmeric dry)	Quintal	0.250	475.00	0.310	2224.25	589.00	24.000
	Poovan	Quintal	1.750	4824.05	2.100	10394.26	5788.86	20.000
	Total			**13331016.83**		**23071509.8**	**14733016.58**	
	All Crops			**106724530.76**		**175244456.13**	**135888993.75**	

2.2. Cost Benefit Analysis of the Soil Conservation Programmes

An important objective of a project evaluation is to estimate 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 continues 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 depletes 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 compared further 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. Total cost incurred for the soil conservation works, including maintenance work for the 43 schemes is Rs.80336402/-.

The total area under cultivation after soil conservation work was 1941.42 acres. The value of crops before the soil conservation programme comes to Rs.106724530.76.The value of crops after the implementation of soil conservation programme has also been calculated as Rs. 175244456.13 /- .It is estimated that the value at constant price as Rs 135888993.75 /- .

Several benefits flow from the soil conservation programme implementation, three of them, which derive special attention s 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 1.76 acres 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 Production

Production also increased due to the implementation of soil conservation programme. In the case of perennial crops Nutmeg 132.76%, Coco(with husk)74.83%, Mango 41.36%, Pepper dry 39.37%, Rubber(garbled) 30.85% Coco(without husk,) 30.36%, Pepper (garbled) 26.67%, Pepper (green) 21.6% . In the case of seasonal crops, percentage increase in production of Elephant Foot Yam is 97.08%, Colocasia 82.62%, Cheera 68.41%, Cowpea 59.21%, Pineapple 37.77%, Plantain 19.47% and Banana 16.68 % respectively.

(iii) Diversification of cropping pattern

Soil Conservation Programmes increased 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, the increase area of perennial crop is 0.71% and that of seasonal crop is 5.03%. Growing of perennial crops will accelerate conservation of soil more affectively.

Occupational Profile

The occupational profile of the selected beneficiaries reveals that 40% of beneficiaries engaged in agriculture job, 41.4% are accounted as non-agriculture; 9.93% agricultural labourers and 8.67% 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
					Wages	Fertilizers	Pesticides	Others	Total		
1	2	3	4	5	6	7	8	9	10	11	12
1	Thiruvananthapuram	3639013	4762921	1661566	1948396	611790	11813	71880	2643879	1977447	2119042
2	Kollam	7890069	10415765	2050080	3301620	231050	1750	83250	3617670	5839989	6798095
3	Pathanamthitta	1778589	3260296	1251900	1255230	169000	11650	273305	1709185	526689	1551111
4	Alappuzha	6330534	9942360	5240008	4016230	453108	417835	1388692	6275865	1090526	3666495
5	Kottayam	29025375	36613599	7992329	9359301	3099633	186960	2249430	14895324	21033046	21718275
6	Ernakulam	6370300	8221367	2576780	755300	368630	157100	1798990	3080020	3793520	5141347
7	Thrissur	4768813	16962141	2861980	5781450	296750	0	121100	6199300	1906833	10762841
8	Palakkad	14495103	16691026	2598180	3954770	333205	0	477950	4765925	11896923	11925101
9	Malappuram	6362747	12562124	5277500	7075350	358090	78100	1462130	8973670	1085247	3588454
10	Kozhikode	2108436	4313989	1422850	2056000	319700	5000	824900	3205600	685586	1108389
11	Kannur	6800346	11897181	2578125	3152000	175400	17400	517750	3862550	4222221	8034631
12	Kasargod	17155205	39601687	3385129	3254050	1551518	0	2000	4807568	13770076	34794119
State		106724530	175244456	38896427	45909697	7967874	887608	9271377	64036556	67828103	111207900

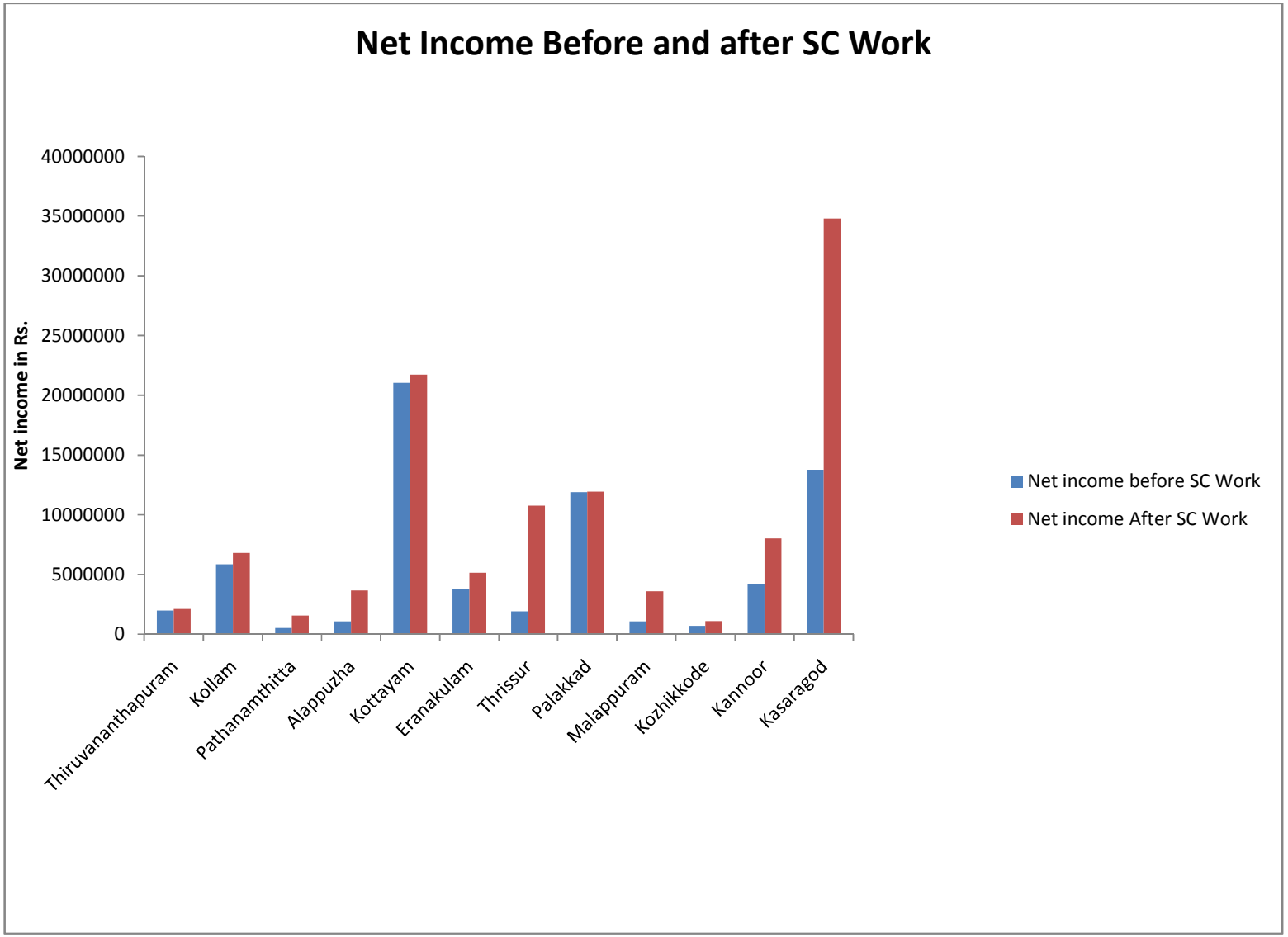

Net Income Before and after SC Work
Net income in Rs.
40000000
35000000
30000000
25000000
20000000
15000000
10000000
5000000
0
Thiruvananthapuram
Kollam
Pathanamthitta
Alappuzha
Kottayam
Eranakulam
Thrissur
Palakkad
Malappuram
Kozhikkode
Kannoor
Kasaragod
Net income before SC Work
Net income After SC Work

Table 10(A) - Income, Expenditure and Net Income of Control Plot (Rs)				
Sl.No.	Name of District	Income	Expense	Net Income
1	*2*	*3*	*4*	*5*
1	Thiruvananthapuram	1100429.74	652800	447629.7
2	Kollam	843676.44	614834	228842.4
3	Pathanamthitta	545041.39	301140	243901.4
4	Alappuzha	756372.96	147550	608823
5	Kottayam	1360949.21	1720510	-359561
6	Eranakulam	2281223.88	464800	1816424
7	Thrissur	3039124.48	981900	2057224
8	Palakkad	2964229.28	914700	2049529
9	Malappuram	1865387	1275400	589987
10	Kozhikkode	752662.16	568000	184662.2
11	Kannoor	1898366.92	780500	1117867
12	Kasaragod	4823186.22	880520	3942666
	Total	**22230649.68**	**9302654**	**12927996**

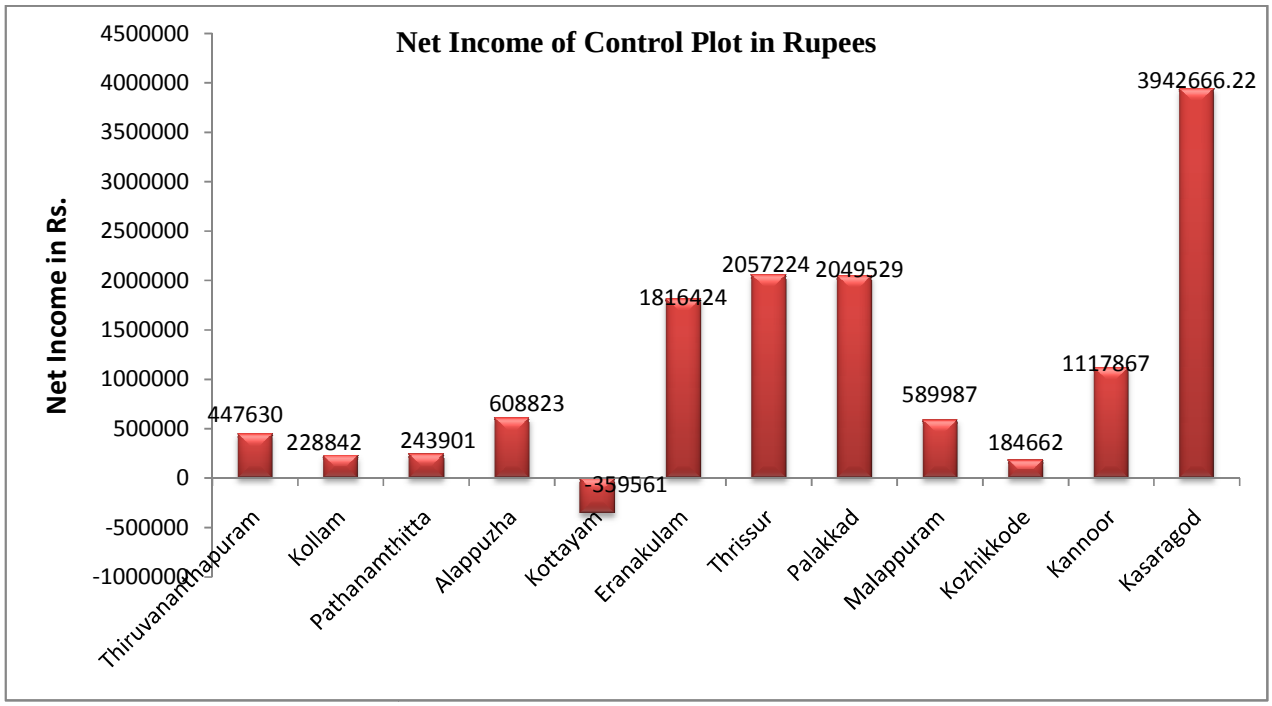
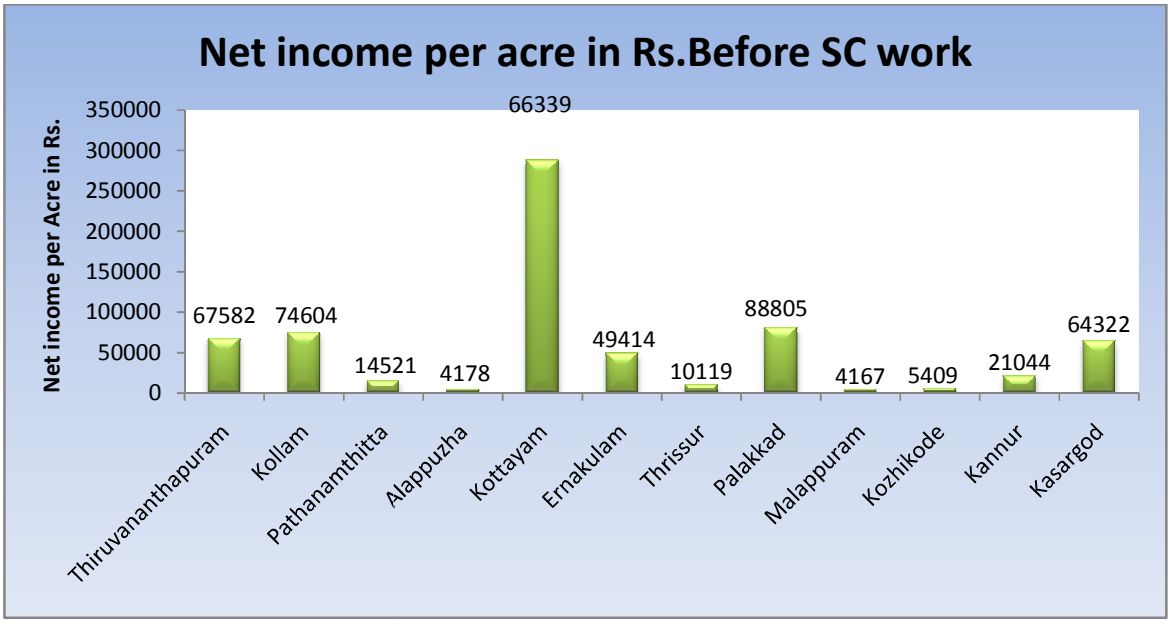


Table 11 - Income Per Acre Before And After Soil Conservation Programme

(Income in Rs.)

Sl. No	District Name	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
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	Thiruvananthapuram	29.260	1977447	67582	30.630	2119042	69182
2	Kollam	78.280	5839989	74604	78.280	6798095	86843
3	Pathanamthitta	36.270	526689	14521	36.270	1551111	42766
4	Alappuzha	264.470	1090526	4178	264.970	3666495	13837
5	Kottayam	317.055	21033046	66339	317.055	21718275	68500
6	Eranakulam	76.770	3793520	49414	76.770	5141347	66971
7	Thrissur	188.450	1906833	10119	189.250	10762841	56871
8	Palakkad	147.230	11896923	88805	147.080	11925101	81079
9	Malappuram	260.440	1085247	4167	258.990	3588454	13856
10	Kozhikkode	126.760	685586	5409	127.400	1108389	8700
11	Kannoor	200.640	4222221	21044	200.640	8034631	40045
12	Kasaragod	214.080	13770076	64322	214.080	34794119	162529
Total		1939.705	67828103	34968	1941.415	111207900	57282



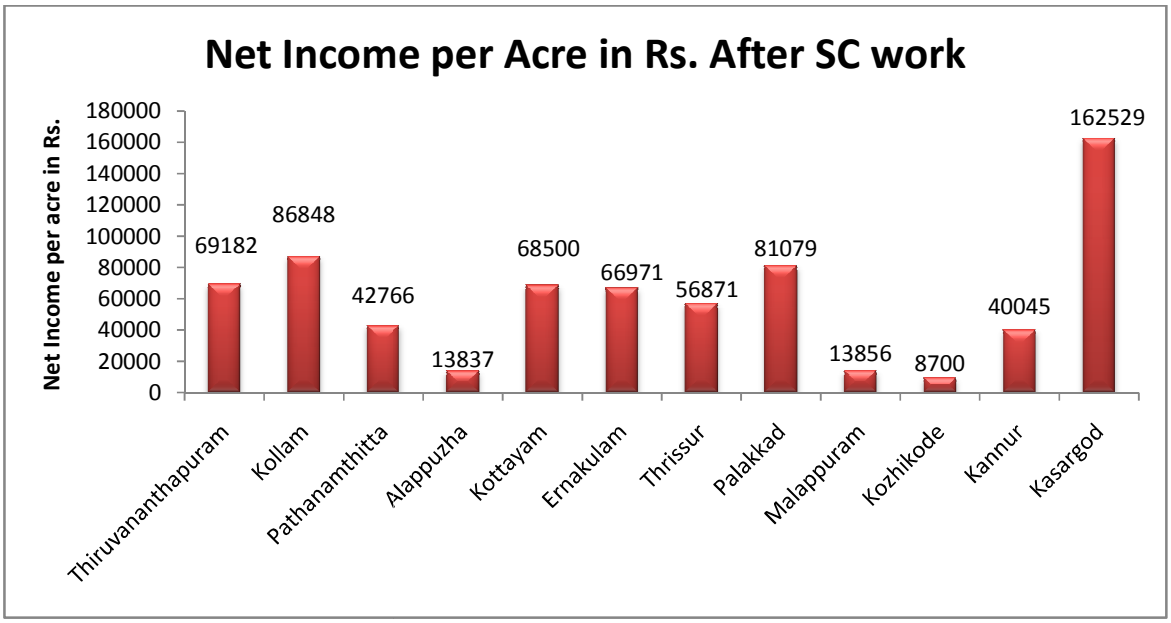
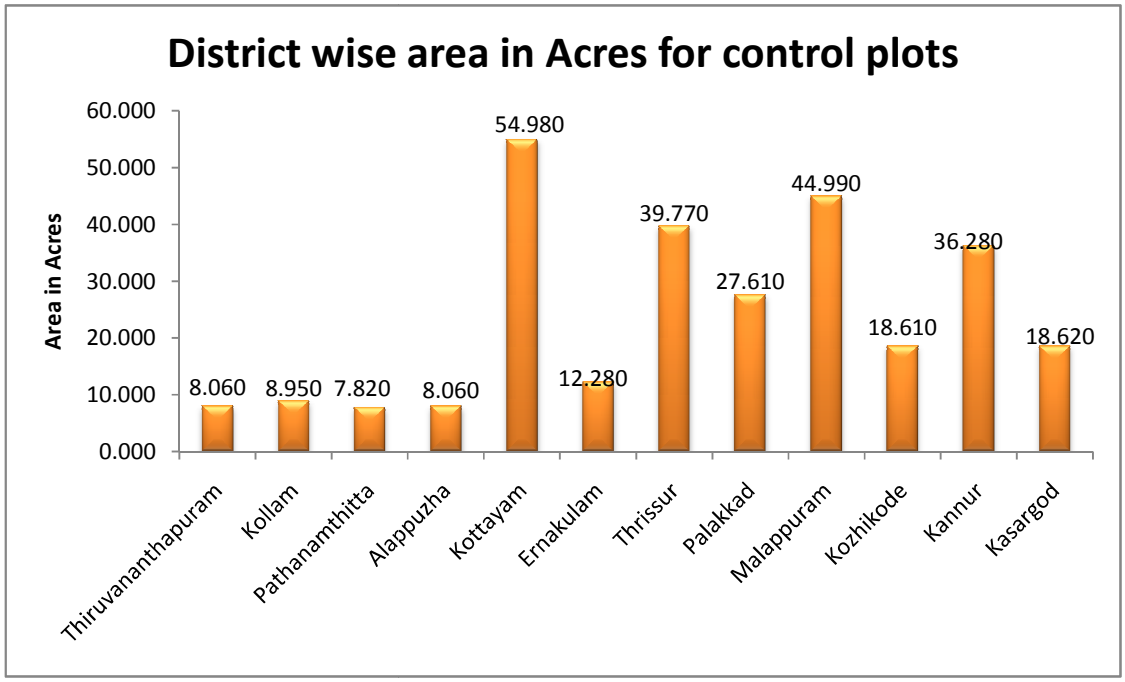
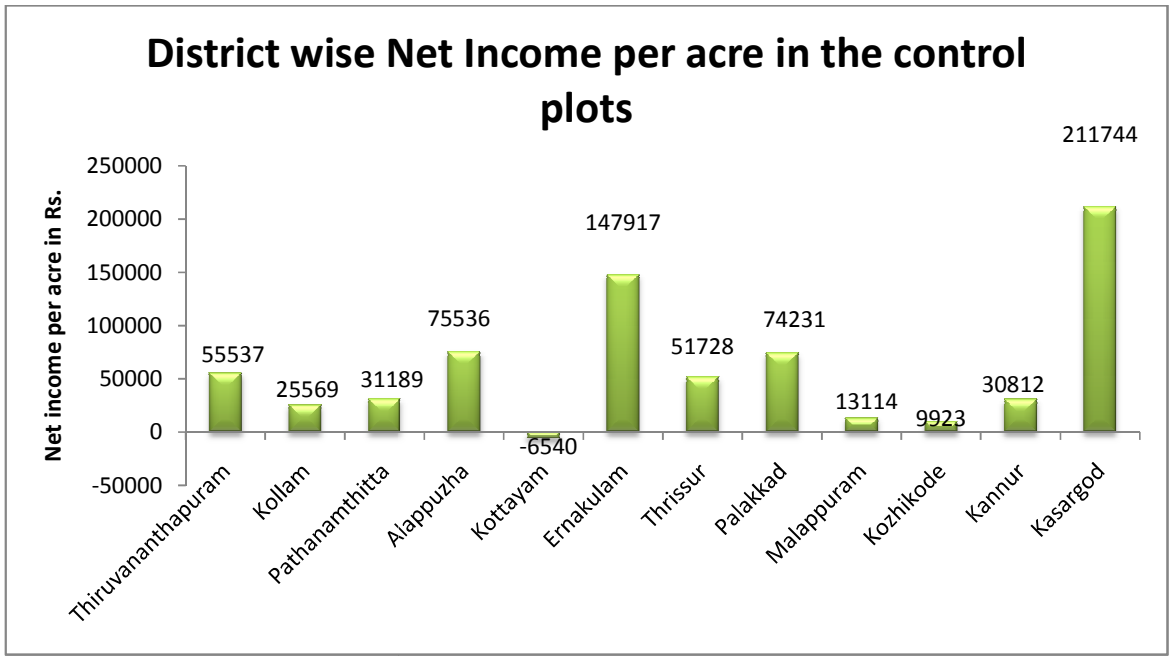


Table 11(A) - Income Per Acre in the Control Plots

Sl. No	District Name	Area in Acre	Net Income (Rs)	Net Income per Acre
1	*2*	*3*	*4*	*5*
1	Thiruvananthapuram	8.060	447630	55537
2	Kollam	8.950	228842	25569
3	Pathanamthitta	7.820	243901	31189
4	Alappuzha	8.060	608823	75536
5	Kottayam	54.980	-359561	-6540
6	Eranakulam	12.280	1816424	147917
7	Thrissur	39.770	2057224	51728
8	Palakkad	27.610	2049529	74231
9	Malappuram	44.990	589987	13114
10	Kozhikkode	18.610	184662	9923
11	Kannoor	36.280	1117867	30812
12	Kasaragod	18.620	3942666	211744
Total		286.030	12927996	45198


District wise area in Acres for control plots
Area in Acres
60.000
50.000
40.000
30.000
20.000
10.000
0.000
8.060
8.950
7.820
8.060
54.980
12.280
39.770
27.610
44.990
18.610
36.280
18.620
Thiruvananthapuram
Kollam
Pathanamthitta
Alappuzha
Kottayam
Ernakulam
Thrissur
Palakkad
Malappuram
Kozhikode
Kannur
Kasargod


District wise Net Income per acre in the control plots
Net income per acre in Rs.
250000
200000
150000
100000
50000
0
-50000
55537
25569
31189
75536
-6540
147917
51728
74231
13114
9923
30812
211744
Thiruvananthapuram
Kollam
Pathanamthitta
Alappuzha
Kottayam
Ernakulam
Thrissur
Palakkad
Malappuram
Kozhikode
Kannur
Kasargod

Chapter III

3.1 General Observations

During the survey period the staffs of this department has visited all the beneficiary plots.

The distribution of holdings of the selected beneficiaries of the soil conservation programmes reveals that 54.2% of the beneficiary holding belongs to less than one acre, 31.4% have holding area between one acre to 3 acres. And above 3 acre were 10.13% and up to 5 acres were 4.27% respectively.

The opinion of selected beneficiaries is collected. Out of this, 24.47% of the beneficiaries reported that contour bunds effectively controlled soil erosion while about 75.47% rests in the opinion that it moderately controlled soil erosion.

About the fertility of the soil 17.6% are of the view that the conservation measures have improved the fertility of the soil remarkably while 82.27% reported that the fertility of the soil has improved moderately and .13% opinioned that it has no effect on the fertility of the soil.

Similarly regarding the moisture retention 17.13% reported that the scheme has substantially controlled moisture retention while 82.73% reported that the scheme has controlled moisture retention moderately and only 0.13% reported that the scheme has no effect. Details are presented in Table No. 12

Table 12
Opinion of Cultivators About of Effectiveness of Bunds, Fertility of the Soil and Moisture Retention of Scheme Area

		Effectiveness of Contour Bunds			Fertility of Soil			Moisture Retention			
Sl. No	Name of District	Effectively Controlled	Moderately Controlled	No effect	Remarkably Controlled	Moderately Controlled	No effect	Substantially Controlled	Moderately Controlled	No effect	Total
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1	Thiruvananthapuram	29	96	0	0	125	0	0	125	0	125
2	Kollam	2	123	0	0	125	0	0	125	0	125
3	Pathanamthitta	0	125	0	0	125	0	0	125	0	125
4	Alappuzha	0	125	0	0	125	0	0	125	0	125
5	Kottayam	15	109	1	1	123	1	1	122	2	125
6	Eranakulam	115	10	0	117	8	0	117	8	0	125
7	Thrissur	1	124	0	1	124	0	1	124	0	125
8	Palakkad	119	6	0	69	55	1	64	61	0	125
9	Malappuram	5	120	0	0	125	0	0	125	0	125
10	Kozhikkode	2	123	0	0	125	0	0	125	0	125
11	Kannoor	7	118	0	4	121	0	1	124	0	125
12	Kasaragod	72	53	0	72	53	0	73	52	0	125
State		367	1132	**1**	**264**	**1234**	**2**	**257**	**1241**	**2**	**1500**

Table 13
Conditions of Bunds
(Scheme Area)

SLNO	District	Good	Partially damaged	Seriously damaged	Total
1	*2*	3	*4*	*5*	*6*
1	Thiruvananthapuram	124	1	0	125
2	Kollam	120	5	0	125
3	Pathanamthitta	125	0	0	125
4	Alappuzha	0	102	23	125
5	Kottayam	30	93	2	125
6	Eranakulam	119	6	0	125
7	Thrissur	94	31	0	125
8	Palakkad	125	0	0	125
9	Malappuram	108	17	0	125
10	Kozhikkode	125	0	0	125
11	Kannoor	124	1	0	125
12	Kasaragod	47	78	0	125
State		**1141**	**334**	**25**	**1500**

Table 14
Occupational Profile
(Scheme Area)

Sl. No	Name of District	Occupation				
		Agriculture	Non-Agriculture	Agricultural-Labours	Non-Agri. Labours	Total
1	*2*	*3*	*3*	*4*	*5*	*6*
1	Thiruvananthapuram	22	40	20	43	125
2	Kollam	82	38	4	1	125
3	Pathanamthitta	0	124	1	0	125
4	Alappuzha	30	80	10	5	125
5	Kottayam	72	45	2	6	125
6	Eranakulam	17	45	21	42	125
7	Thrissur	91	31	3	0	125
8	Palakkad	74	35	13	3	125
9	Malappuram	36	88	1	0	125
10	Kozhikkode	36	64	14	11	125
11	Kannoor	43	10	53	19	125
12	Kasaragod	97	21	7	0	125
State Total		**600**	**621**	**149**	**130**	**1500**

Table 14(a) Occupational Profile (Control Plots)						
Sl.No	Name of District	Occupation				
		Agriculture	Non-Agriculture	Agricultural-Labours	Non-Agri. Labours	Total
1	*2*	*3*	*4*	*5*	*6*	*7*
1	Thiruvananthapuram	6	5	2	12	25
2	Kollam	19	6	0	0	25
3	Pathanamthitta	25	0	0	0	25
4	Alappuzha	1	10	8	6	25
5	Kottayam	2	17	1	5	25
6	Eranakulam	6	16	3	0	25
7	Thrissur	19	6	0	0	25
8	Palakkad	12	3	7	3	25
9	Malappuram	7	16	2	0	25
10	Kozhikkode	5	11	4	5	25
11	Kannoor	10	0	12	3	25
12	Kasaragod	16	4	5	0	25
State Total		**128**	**94**	**44**	**34**	**300**

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 wide 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 includes 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 76.07% are in good condition 22.27% are partially damaged and 1.66% 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 2015-2016. The entire districts except Wayanad and Idukki were covered in this study. 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 are flowed from the soil conservation programme implementation. Some of the findings of the study are given below:

For the study purpose 43 schemes were selected. The total number of beneficiaries comes to 1723. Out of this 1500 number of beneficiaries were selected for the detailed study. Land use particulars of beneficiary plots give us certain positive trends while comparing with the area before and after the soil conservation programme. The study revealed that 1.71 acres of land has been additionally brought under cultivation by cultivating area which was 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 implementing various programmes in this direction. 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 64%. It is estimated that the percentage increase of net income per acre in beneficiary plots of the scheme area is 54%.

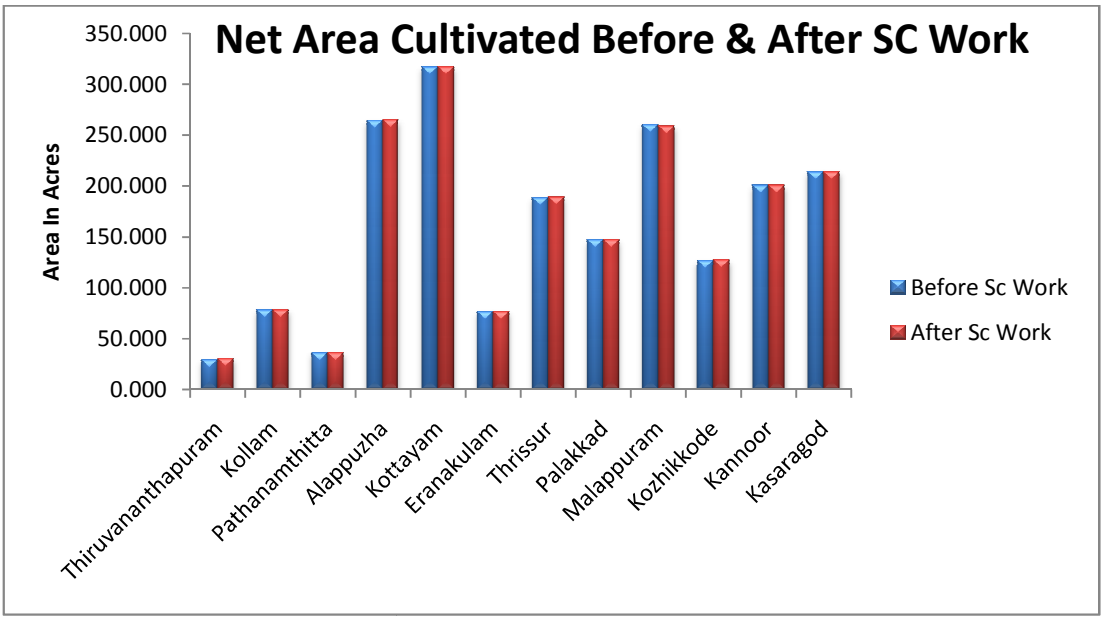
Analysis of data collected from the beneficiary and control plots reveals that the net income per acre, received from the beneficiary plot is Rs.57282/- and from the control plot is Rs.45198/- The district wise details are presented in Table No. 11 and 11 (a). The higher rate of income from the scheme area is due to the positive impact of soil conservation programme.

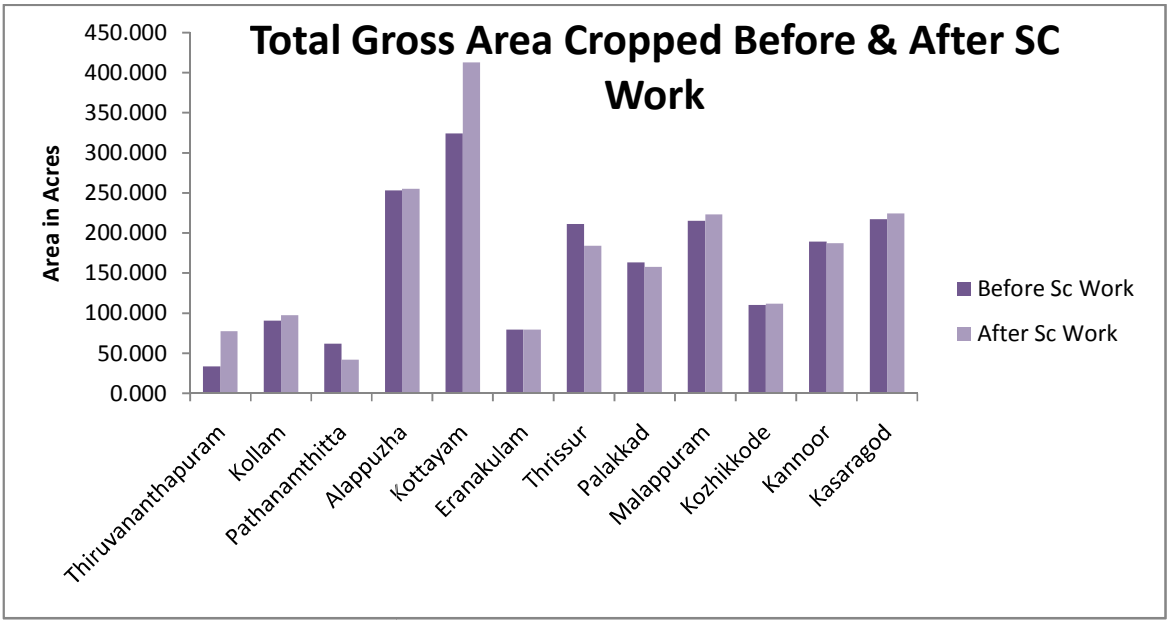
Cost benefit analysis of the collected data reveals that 85% of the cost of soil conservation programme has benefited in the year under study.

Table 15
Cropping Intensity in Scheme Area

(Area in Acres)

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 Sc Work
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1	Thiruvananthapuram	29.260	30.630	33.273	77.374	113.710	252.610
2	Kollam	78.280	78.280	90.453	97.028	115.550	123.950
3	Pathanamthitta	36.270	36.270	61.757	41.826	170.270	115.320
4	Alappuzha	264.470	264.970	252.970	255.321	95.650	96.360
5	Kottayam	317.055	317.055	324.113	338.066	102.230	106.630
6	Eranakulam	76.770	76.770	79.501	79.013	103.560	102.920
7	Thrissur	188.450	189.250	211.130	3.854	112.040	97.150
8	Palakkad	147.230	147.080	163.129	157.811	110.800	107.300
9	Malappuram	260.440	258.990	215.043	222.817	82.570	86.030
10	Kozhikkode	126.760	127.400	109.965	111.930	86.750	87.860
11	Kannoor	200.640	200.640	189.294	187.236	94.350	93.320
12	Kasargode	214.080	214.080	217.492	224.343	101.590	104.790
State Total		**1939.705**	**1941.415**	**1948.120**	**1976.619**	**100.43**	**101.81**





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 is increased from 100.43% to 101.81%. District wise details are presented in table No.15.