Government of Kerala

Evaluation Study on Soil Conservation in Kerala 2011-12

Department of Economics & Statistics
Thiruvananthapuram
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PREFACE

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

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

This report relates to the survey results of 51 schemes completed by the Soil Conservation Department and various agencies. The field survey was conducted during the agricultural year 2011-12. The schemes implemented and completed before five years are taken up for study so that full benefit of the scheme could be evaluated and assessed. This evaluation study results may be much of use to Administrators, Statisticians, Research Scholars and Agricultural Geologists and others interested in the subject.

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

V RAMACHANDRAN
DIRECTOR

Thiruvananthapuram,

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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 for the State

1.2 Objectives and Methodology of the Survey:-

The main objectives of the evaluation study are:

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

For this schemes were selected which were executed five years before ie during 2006-07 in the State by the Soil Conservation Department and other local bodies. The study covered all the districts of the State except Wayanad where the same is directly done by the Central Government. The list of beneficiaries under each scheme is obtained from the Soil Conservation Department and other local bodies. The beneficiaries are selected by stratified random sampling method on the basis of the area of the holding. The holdings are stratified in to four viz.

Holdings with less than 1 acre	-	Stratum I
Holdings with 1 acre or more but less than 3 acres	-	Stratum II
Holdings with 3 acre or more but less than 5 acres	-	Stratum III
Holdings with 5 acres and above	-	Stratum IV

Selection of Beneficiaries

Selection of beneficiaries is done by the District Level Officers from the list of beneficiaries collected from Soil Conservation Department and from other local bodies. A total number of 25 beneficiaries are selected from each scheme by simple random sampling covering all the above 4 stratum with at least 6 from each stratum. If in any stratum, the total number of beneficiaries in the frame is less than the number to be selected the shortfall is compensated from another stratum with the nearest area of the holding. If the beneficiaries in a scheme are less than 25, all of them are selected. For the purpose of comparison 5 control plots are also selected from the scheme area, where the soil conservation works are not carried out under any scheme. The district wise selection details of beneficiary plots and control plots are given in the table 1 & 1 (a).

Table – 1

Statement showing stratum wise distribution of selected beneficiaries

(Area in Acres)

			Stratum – I		Stratum – II		Stratum – III		Stratum – IV		Total	
Sl. No	Districts	No. of schemes selected	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	108	23.23	15	20.28	2	6.00	0	0	125	49.51
2	Kollam	5	125	19.37	0	0	0	0	0	0	125	19.37
3	Pathanamthitta	3	125	43.03	0	0	0	0	0	0	125	43.03
4	Alappuzha	5	123	8.38	2	3.50	0	0	0	0	125	11.88
5	Kottayam	2	51	29.81	72	128.01	1	3.00	1	7.50	125	168.32
6	Idukki	5	36	17.24	88	155.58	1	4.50	0	0	125	177.32
7	Eranakulam	4	97	30.96	20	35.25	6	21.20	2	12.44	125	99.85
8	Thrissur	5	29	22.28	36	71.35	29	115.04	31	258.10	125	466.77
9	Palakkad	5	49	22.67	52	89.56	16	59.77	8	56.73	125	228.73
10	Malappuram	5	51	22.50	59	112.05	15	59.28	0	0	125	193.83
11	Kozhikkode	5	66	28.39	54	77.45	5	19.67	0	0	125	125.51
12	Kasaragod	2	23	16.13	67	117.74	24	90.95	11	66.13	125	290.95
Total		**51**	**883**	**284**	**465**	**811**	**99**	**379**	**53**	**401**	**1500**	**1875**

Table –I (a)

Statement showing stratum wise distribution of selected Control Plots

(Area in acres)

Sl. No	Districts	No. of schemes selected	Stratum – I		Stratum – II		Stratum – III		Stratum – IV		Total	
			No.	Area in acre	No.	Area in acre	No.	Area in acre	No.	Area in acre	No.	Area in acre
1	2	3	4	5	6	7	8	9	10	0	12	13
1	Thiruvananthapuram	5	21	7.11	4	6.10	0	0	0	0	25	13.21
2	Kollam	5	25	2.61	0	0	0	0	0	0	25	2.61
3	Pathanamthitta	3	22	12.64	3	3.70	0	0	0	0	25	16.34
4	Alappuzha	5	25	4.51	0	0	0	0	0	0	25	4.51
5	Kottayam	2	6	3.45	3	6.25	1	3.05	0	0	10	12.75
6	Idukki	5	15	3.62	9	13.75	0	0	1	5.00	25	22.37
7	Eranakulam	4	18	6.91	2	2.19	0	0	0	0	20	9.1
8	Thrissur	5	5	3.30	11	21.17	6	22.55	3	17.60	25	64.62
9	Palakkad	5	9	6.10	11	18.35	4	12.10	1	5.00	25	41.55
10	Malappuram	5	17	6.20	8	12.35	0	0	0	0	25	18.55
11	Kozhikkode	5	7	3.36	10	17.30	7	25.29	1	5.30	25	51.25
12	Kasaragod	2	2	1.25	5	9.00	2	7.20	1	6.40	10	23.85
Total		**51**	**172**	**61.06**	**66**	**110.16**	**20**	**70.19**	**7**	**39.3**	**265**	**280.71**

The total number of beneficiaries comes to 1500 About 58.87% of the beneficiaries are having holding less than one acre, 31% are having holdings one acre or more but less than 3 acres, 6.6% are having holding 3 acre or more but less than 5 acres and only 3.53% 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 64.91%, 24.9%, 7.55% and 2.64 % 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, convertion 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 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 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. 1664.19 acres to 1698.85 acre after the implementation of soil conservation programme. An additional area of 34.66 acre of

land has brought under cultivation which was not cultivated earlier. Hence it can be stated that 2.08% 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 88.75% to 90.60% by decreasing the current fallow.

On examining the district wise data a marginal increase is noted in the area additionally brought under cultivation in Malappuram, Kasaragod,Kottayam, ,.

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.

In Kannur district the list of schemes was not available for the survey.

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	49.52	330318	187	125
2	Kollam	19.37	1673567	125	125
3	Pathanamthitta	43.03	16314104	829	125
4	Alappuzha	11.88	3833823	125	125
5	Kottayam	168.32	17542000	125	125
6	Idukki	177.32	3683543	125	125
7	Eranakulam	99.85	2810723	125	125
8	Thrissur	466.77	13001268	330	125
9	Palakkad	228.73	2882057	125	125
10	Malappuram	193.83	5558236	125	125
11	Kozhikkode	125.51	100004	125	125
12	Kasaragod	290.95	1272470	125	125
Total		**1875.08**	**69002113**	**2471**	**1500**

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	45.16	91.20	45.3	91.48	1.73	3.49	1.61	3.25
2	Kollam	15.34	79.19	15.34	79.19	0	0.00	0	0.00
3	Pathanamthitta	36.06	83.80	36.29	84.34	0.45	1.05	0.25	0.58
4	Alappuzha	7.39	62.21	6.98	58.75	2.10	17.68	1.90	15.99
5	Kottayam	143.2	85.08	149.45	88.79	10.21	6.07	4.56	2.71
6	Idukki	167.03	94.20	167.88	94.68	1.26	0.71	0.30	0.17
7	Eranakulam	93.38	93.52	93.38	93.52	0	0	0	0
8	Thrissur	455.64	97.62	455.64	97.62	0	0.00	0	0.00
9	Palakkad	219.24	95.85	219.24	95.85	1.38	0.60	1.38	0.60
10	Malappuram	147.29	75.99	168.51	86.94	38.47	19.85	20.54	10.60
11	Kozhikkode	118.95	94.77	118.88	94.72	1.19	0.95	1.05	0.84
12	Kasaragod	215.51	74.07	221.96	76.29	26.50	9.11	20.05	6.89
Total		**1664.19**	**88.75**	**1698.85**	**90.60**	**83.29**	**4.44**	**51.64**	**2.75**

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	2.60	5.25	2.60	5.25	0.03	0.06	0.01	0.02	49.52	100	49.52	100
2	Kollam	3.93	20.29	3.93	20.29	0.10	0.52	0.10	0.52	19.37	100	19.37	100
3	Pathanamthitta	6.32	14.69	6.29	14.62	0.20	0.46	0.20	0.46	43.03	100	43.03	100

4	Alappuzha	2.29	19.28	2.90	24.41	0.10	0.84	0.10	0.84	11.88	100	11.88	100
5	Kottayam	9.72	5.77	9.12	5.42	5.19	3.08	5.19	3.08	168.32	100	168.32	100
6	Idukki	8.73	4.92	8.84	4.99	0.30	0.17	0.30	0.17	177.32	100	177.32	100
7	Eranakulam	6.47	6.48	6.47	6.48	0	0	0	0	99.85	100	99.85	100
8	Thrissur	11.13	2.38	11.13	2.38	0	0.00	0	0.00	466.77	100	466.77	100
9	Palakkad	8.07	3.53	8.07	3.53	0.04	0.02	0.04	0.02	228.73	100	228.73	100
10	Malappuram	7.87	4.06	4.58	2.36	0.20	0.10	0.20	0.10	193.83	100	193.83	100
11	Kozhikkode	2.85	2.27	3.06	2.44	2.52	2.01	2.52	2.01	125.51	100	125.51	100
12	Kasaragod	21.33	7.33	21.23	7.30	27.61	9.49	27.71	9.52	290.95	100	290.95	100
Total		**91.31**	**4.87**	**88.22**	**4.70**	**36.29**	**1.94**	**36.37**	**1.94**	**1875.08**	**100**	**1875.08**	**100**

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

Sl. No	Districts	Area cultivated		Current follow		Other use		Area not cultivated		Total	
		Area	%	Area	%	Area	%	Area	%	Area	%
1	2	3	4	5	6	7	8	9	10	11	12
1	Thiruvananthapuram	12.69	96.06	0.08	0.61	0.44	3.33	0.00	0.00	**13.21**	**100**
2	Kollam	1.6	61.30	0.03	1.15	0.75	28.74	0.23	8.81	**2.61**	**100**
3	Pathanamthitta	12.81	78.40	0.47	2.88	2.96	18.12	0.10	0.61	**16.34**	**100**

4	Alappuzha	3.5	77.61	0.22	4.88	0.77	17.07	0.02	0.44	**4.51**	100
5	Kottayam	8.95	70.20	0.45	3.53	3.35	26.27	0.00	0.00	**12.75**	100
6	Idukki	21.11	94.37	0.00	0.00	1.16	5.19	0.10	0.45	**22.37**	100
7	Eranakulam	8.44	92.75	0.00	0.00	0.66	7.25	0.00	0.00	**9.10**	100
8	Thrissur	63.47	98.22	0.00	0.00	1.15	1.78	0.00	0.00	**64.62**	100
9	Palakkad	38.44	92.52	0.00	0.00	3.11	7.48	0.00	0.00	**41.55**	100
10	Malappuram	15.95	85.98	2.45	13.21	0.15	0.81	0.00	0.00	**18.55**	100
11	Kozhikkode	48.32	94.28	0.55	1.07	2.18	4.25	0.20	0.39	**51.25**	100
12	Kasaragod	14.7	61.64	3.50	14.68	2.25	9.43	3.40	14.26	**23.85**	100
13	**Total**	**249.98**	**89.05**	**7.75**	**2.76**	**18.93**	**6.74**	**4.05**	1.44	**280.71**	**100**

Crop Pattern

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

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

Contour Farming

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

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

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

Consequent in the introduction of the soil conservation programmes significant changes in the cropping pattern occurred which favours perennial crops. The area under perennial crops has increased from 1378.31 acre to 1465.50 acre. It showed an increase of

6.32%. At the same time the percentage change occurred in the cultivation of seasonal crops recorded as 14.20 %. From this we can arrive at the conclusion that the farmers have shown a tendency to cultivate perennial crops in sloppy regions where the soil conservation measures are carried out. The cultivation of seasonal crops in such regions is likely to increase soil erosion. In seasonal crops the cultivation of Plantain,Tapioca, Banana are exhibited increases. The respective percentage changes recorded as 31.44%.12.51%,6.61%

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 10.7 %. coconut comes next with an increase of 1.95%. The area under Arecanut has decreased to 15.92% after the Soil Conservation Programme.

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

Table – 4

Crop Pattern (Area wise)

Sl. No.	Districts	Perennial crops				Seasonal Crops			
		Before SC work	%	After SC work	%	Before SC work	%	After SC work	%
1	2	3	4	5	6	7	8	9	10
1	Thiruvananthapuram	33.49	87.03	36.84	83.01	4.99	12.97	7.54	16.99
2	Kollam	11.90	87.37	20.82	95.16	1.72	12.63	1.06	4.84
3	Pathanamthitta	31.78	97.1	32.40	96.57	0.95	2.9	1.15	3.43
4	Alappuzha	8.54	87.41	10.38	92.6	1.23	12.59	0.83	7.4
5	Kottayam	124.70	96.66	129.96	96.7	4.31	3.34	4.44	3.3
6	Idukki	137.63	98.54	154.90	94.55	2.04	1.46	8.93	5.45
7	Eranakulam	81.51	98.74	81.51	98.80	1.04	1.26	0.99	1.20
8	Thrissur	389.26	99.99	390.58	99.99	0.03	0.01	0.05	0.01
9	Palakkad	165.55	99.08	168.50	98.9	1.54	0.92	1.88	1.1
10	Malappuram	142.06	99.92	165.84	99.63	0.12	0.08	0.62	0.37
11	Kozhikkode	91.61	86.57	99.87	91.46	14.21	13.43	9.32	8.54
12	Kasaragod	160.28	92.48	173.90	92.14	13.04	7.52	14.83	7.86
Total		**1378.31**	**96.82**	**1465.5**	**96.6**	**45.22**	**3.18**	**51.64**	**3.4**

Table – 4 Contd..

Sl. No	Districts	Total Gross area cropped			
		Before SC work	%	After SC work	%
1	2		12	13	14
1	Thiruvananthapuram	38.48	100	44.38	100
2	Kollam	13.62	100	21.88	100
3	Pathanamthitta	32.73	100	33.55	100
4	Alappuzha	9.77	100	11.21	100
5	Kottayam	129.01	100	134.40	100
6	Idukki	139.67	100	163.83	100
7	Eranakulam	82.55	100	82.50	100
8	Thrissur	389.29	100	390.63	100
9	Palakkad	167.09	100	170.38	100
10	Malappuram	142.18	100	166.46	100
11	Kozhikode	105.82	100	109.19	100
12	Kasaragod	173.32	100	188.73	100
Total		**1423.53**	**100**	**1517.14**	**100**

Table 5 – Area under selected perennial crops

Sl. No	Districts	Coconut			Arecanut			Cashew		
		Before SC work	After SC work	% increase	Before SC work	After SC work	% increase	Before SC work	After SC work	% increase
1	2	3	4	5	6	7	8	9	10	11
1	Thiruvananthapuram	14.22	15.16	6.61	.06	.11	83.33	.08	.08	0
2	Kollam	3.83	6.34	65.54	.19	.41	115.79	0.17	0.25	47.06
3	Pathanamthitta	3.38	3.57	5.62	.09	.09	0	0.4	0.4	0
4	Alappuzha	7.21	8.29	14.98	.17	.34	100	0.27	0.33	22.22
5	Kottayam	16.74	17.08	2.03	.54	.55	1.85	1.16	1.16	0
6	Idukki	5.54	7.5	35.38	8.82	7.73	-12.36	0	0	0
7	Ernakulam	14.18	14.18	0.	1.2	1.2	0	0	0	0
8	Trissur	109.41	108.8	-0.56	4.84	5.46	12.81	0	0	0
09	Palakkad	106.27	109.22	2.78	3.04	3.04	0	0.22	0.22	0
10	Malappuram	58.88	59.47	1.00	.18	.18	0	17.28	13.86	-19.79
11	Kozhikode	46.64	44.79	-3.97	15.57	8.59	-44.83	1.4	2.36	68.57
12	Kasaragod	29.02	29.02	0	9.15	9.17	0.22	7.57	7.07	-6.61
Total		**415.32**	**423.42**	**1.95**	43.85	**36.87**	**-15.92**	**28.55**	**25.73**	**-9.88**

Table – 5 Contd..

Sl.	Districts	Rubber	Pepper	Jack	Mango

No		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	17.01	19.05	11.99	0.91	1.21	32.97	1.12	1.06	-5.36	0.09	0.17	88.89
2	Kollam	4.06	8.49	109.11	1.46	1.7	16.44	1.47	2.37	61.22	0.48	0.9	87.5
3	Pathanamthitta	27.06	27.47	1.52	0.61	0.63	3.28	0.02	0.02	0	0	0	0
4	Alappuzha	0	0	0	0.07	0.1	42.86	0.16	0.31	93.75	0.57	0.79	38.6
5	Kottayam	97.51	102.51	5.13	4.02	4.02	0	0	0	0	0	0	0
6	Idukki	18.49	24.78	34.02	71.04	58.46	-17.71	2.54	2.92	14.96	0	0	0
007	Ernakulam	63.93	63.93	0	0.62	0.62	0	0	0	0	0	0	0
8	Thrissur	274.58	275.85	.46	0.22	0.26	18.18	0	0	0	0	0	0
9	Palakkad	39.08	39.08	0.	1.85	1.85	0	0.09	0.09	0	15	15	0
10	Malappuram	64.7	91.43	41.31	0.12	0.12	0	0.90	0.78	-13.33	0	0	0
11	Kozhikkode	14.48	32.99	127.83	8.19	2.69	-67.16	1.57	1.61	2.55	0.42	0.39	-7.14
12	Kasaragod	110.27	123.92	12.38	0.8	1.33	66.25	2.87	2.77	-3.48	0.41	0.41	0
Total		**731.17**	**809.5**	**10.71**	**89.91**	**72.99**	**-18.82**	**10.74**	**11.93**	**11.08**	**16.97**	**17.66**	**4.07**

Table – 5 Contd..

Sl No	Districts	Coco			Coffee			Others			Total		
		Before SC work	After SC work	% increase	Before SC work	After SC work	% increase	Before SC work	After SC work	% increase	Before SC work	After SC work	% increase

1	2	12	13	14	15	16	17			20	21	22	23
1	Thiruvananthapuram	0.2	0.2	0	0	0	0	0	0	0	33.49	36.84	10.00
2	Kollam	0	0	0	0.01	0.01	0	.23	.35	52.17	11.90	20.82	74.9
3	Pathanamthitta	0	0	0	.02	.02	0	0.00	0.00	0	31.78	32.4	1.95
4	Alappuzha	0	0	0	0	0	0	.09	.22	144.4	8.54	10.38	21.54
5	Kottayam	4.73	4.64	-190	0	0	0	0	0	0	124.7	129.96	4.2
6	Idukki	7.56	15.5	105.03	15.84	18.46	16.54	7.8	19.55	150.64	137.63	154.9	12.55
7	Ernakulam	0.31	0.31	0	0	0	0	1.27	1.27	0	81.51	81.51	0
7	Thrissur	0	0	0	0	0	0	0.21	0.21	0	389.26	390.58	0.34
08	Palakkad	0	0	0	0	0	0	0.00	0.00	0	165.55	168.5	1.78
9	Malappuram	0	0	0	0	0	0	0	0	0	142.06	165.84	16.74
10	Kozhikkode	1.91	4.56	138.74	0.64	0.65	1.56	0.79	1.24	22.00	91.61	99.87	9.02
12	Kasaragod	0.16	0.16	0	0.03	0.05	66.67	0.00	0.00	0	173.9	160.28	-7.83
0**Total**		**14.87**	**25.37**	**70.61**	**16.54**	**19.19**	**16.02**	**10.39**	**22.84**	**119.82**	**1378.31**	**1465.5**	**6.33**

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	3	4	5	6	7	8	9	10	11
1	Thiruvananthapuram	0	0	0	1.96	1.81	-7.65	2.83	5.35	89.05
2	Kollam	0	0	0	0.65	0.13	-80.00	0.52	0.60	15.38
3	Pathanamthitta	0	0	0	0.75	0.85	13.33	0.17	0.25	47.06
4	Alappuzha	0.63	0	-100	0.07	0.10	42.86	0.31	0.43	38.71
5	Kottayam	0	0	0	3.45	3.05	-11.59	0.46.	0.59	28.26
6	Idukki	0	0	0	0.6	4..45	641.67	1.19	3.19	168.07
7	Ernakulam	0	0	0	0	0	0	0.91	0.86	-5.49
8	Trissur	0	0	0	0	0	0	0.03	0.05	66.67
9	Palakkad	0	0	0	0	0	0	0.97	1.31	35.05
10	Malappuram	0	0	0	0	0	0	0.03	0.06	100
11	Kozhikkode	0.11	0.08	-27.27	2.97	1.61	-45.79	4.33	2.66	-38.57
12	Kasaragod	0.05	0.05	0	3.7	3.92	5.95	3.2	4.3	3.4.37
Total		**0.79**	**0.13**	**-83.54**	**14.15**	**15.92**	**12.51**	**14.95**	**19.65**	**31.44**

Table – 6 Contd..

Sl.	Districts	Ginger	Banana	Vegitables	Pineapple

No		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	0.05	0.07	40.00	0	0.01	0	0.14	0.28	100	0.01	0.02	100
2	Kollam	0.05	0.02	-60.00	0.05	0.05	0	0	0	0	0.06	0.07	16.67
3	Pathanamthitta	0	0	0	0.02	0.02	0	0.01	0.03	200	0	0	0
4	Alappuzha	0.01	0.01	0	0	0	0	0.2	0.25	25.00	0	0	0
5	Kottayam	0.03	0.19	533.33	0	0.13	0	0.10	0.10	0	0.27	0.28	3.70
6	Idukki	0	0.2	0	0.25	0.44	0	0	0	0	0	0.65	0
7	Ernakulam	0	0	0	0.13	0.13	0	0	0	0	0	0	0
7	Thrissur	0	0		0	0	0	0	0	0	0	0	
8	Palakkad	0	0	0	0.57	0.57	0	0	0	0	0	0	0
9	Malappuram	0	0.05	0	0	0	0	0.05	0.15	200.00	0.04	0.36	800
10	Kozhikode	1.84	0.6	-67.39	1.23	1.02	-17.07	0.27	0.22	-18.52	0.56	0.39	-30.36
11	Kasaragod	2.69	2.80	4.09	1.53	1.66	8.55	1.37	1.55	13.13	0.16	0.19	18.75
Total		**4.67**	**3.94**	**-15.63**	**3.78**	**4.03**	**6.61**	**2.14**	**2.58**	**20.56**	**1.1**	**1.96**	**78.18**

Table – 6 Contd..

Sl.	Districts	Chenai	Kolacasia	Others	Total

No		Before SC work	After SC work	% increase	Before SC work	After SC work	% increase	Before SC work	After SC work	% increase	Before SC work	After SC work	% increase
1	2	12	13	14	15	16	17	18	19	20	21	22	23
1	Thiruvananthapuram	0	0	0	0	0	0	0	0	0	4.99	7.54	51.10
2	Kollam	0.02	0.08	300	0.2	0.07	-65.00	.17	.04	-76.5	1.72	1.06	58.5
3	Pathanamthitta	0	0	0	0	0	0				0.95	1.15	21.05
4	Alappuzha	0	0.01	0	0.01	0.03	200.00				1.23	.83	-32.5
5	Kottayam	0	0	0	0	0	0	0	.10	0	4.31	4.44	56.03
6	Idukki	0	0	0	0	0	0				2.04	8.93	337
7	Ernakulam										1.04	.99	-4.81
8	Thrissur	0	0	0	0	0	0				.03	.05	66.67
9	Palakkad	0	0	0	0	0	0				1.54	1.88	22.08
10	Malappuram	0	0	0	0	0	0				0.12	.62	416.67
11	Kozhikode	0.87	0.83	-4.60	1.58	1.55	-1.90	.45	.36	-.20.	14.21	9.32	-34.41
12	Kasaragod	0	0	0	0	0	0	.34	.36	5.88	13.04	14.83	13.73
Total		**0.89**	**0.92**	**3.37**	**1.61**	**1.65**	**2.48**	**.96**	**.86**	**-10.42**	**45.22**	**51.64**	**14.20**

-58.5.96

Impact of Soil Conservation Treatment on the Yield of Crops

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

For example in Malappuram district total cropped area before soil conservation works was 142.18 acres. It increases to 166.46 acres after the implementation of soil conservation measures. The increase in area is accounted as 24.28 acres. The percentage increase recorded as 17.08 When we analyse the yield of perennial crops in this district it can be seen that production of Coconut,Rubber Cocco,Cardamom Nutmug,etc. increased. .

In Idukki,Kasaragod,Kollam, and Thiruvananthapuram districts before soil conservation work the area were 139.67 acres, 173.32 acres, 13.62 acres and 38.48 acres respectively. It increased 163.83, 188.73, 21.88, 44.38 acres after the implementation of soil conservation work. Increase in area accounted as 24.28, 15.41, 8.26, 5.90 acres respectivily.

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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 plaintain area and production increased and in the case of banana, vegitables and tapioca also the 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	19425	96348	27880	214682	149577
	Arecanut	Nos.	700.00	343	1500.00	810	378
	Pepper	Qtl.	0.42	2349	0.90	17543	8187
	Cashew	Qtl.	0.51	1496	0.51	2805	2805
	Rubber	Qtl.	185.50	1283475	409.75	7815166	3538043
	Jack	Qtl	43.18	11227	71.84	8621	5182
	Total			**1395238**		**8059627**	**3704172**
Kollam	**Pappaya**		**2.30**	**690**	**3.25**	**1950**	**1360**
	Coconut	Nos	3318.00	19977	4409.00	41441	31186
	Arecanut	Nos.	3455.00	1868	5422.00	3144	2003
	Pepper	Qtl.	0.95	5800	1.16	224647	18400
	Cashew	QTL	0.40	1184	0.75	5250	2800
	Rubber	Qtl.	50.47	360155	42.62	846347	1002232
	Jack	Qtl	15.31	5372	20.95	11821	8639
	Mango	Qtl	1.81	1086	2.87	3496	2205
	Total			**396132**		**935916**	**1058845**
Pathanamthitta	Coconut	Nos	2945.00	16642	3076.00	28547	27331
	Arecanut	Nos.	2345.00	1173	2672.00	1309	1149
	Pepper	Qtl.	2.96	17685	3.49	72638	61607
	Rubber	Qtl.	142.07	1012107	158.21	3191579	2865986
	Jack	Qtl	1.00	150	1.15	490	426
	Coco	Qtl	2.00	3520	2.35	7040	5991
	Total			**1051277**		**3301603**	**2962490**

(Table 7 Contd..)

1	2	3	4	5	6	7	8
Alappuzha	Coconut	Nos	17787.00	94817	20972.00	187295	158851
	Arecanut	Nos.	3020.00	1150	3625.00	1739	1449
	Cashew	Qtl.	0.81	2316	0.91	4598	4093
	Mango	Qtl	10.27	6990	11.44	17392	15613
	Kudampuli	Qtl	0.20	808	0.25	6250	5000
	Total			**106081**		**217274**	**185006**
Kottayam	Coconut	Nos	67766.00	387620	123710.00	1113390	609894
	Arecanut	Nos	20430.00	9398	25835.00	25835	20430
	Pepper	Qtl.	4.42	26989	5.46	117686	95270
	Cashew	Qtl	10.00	29730	12.00	71664	59720
	Rubber	Qtl.	1683.00	12452520	1725.00	34838100	33989868
	Coco	Qtl	300.60	519436	293.75	1032239	1056310
	Total			**13425693**		**37198914**	**35831492**
Idukki	Coconut	Nos	20735.00	131256	27945.00	243120	180393
	Arecanut	Nos	702250.00	294945	382900.00	191450	351125
	Pepper	Qtl.	164.10	1008407	93.65	2022756	3544413
	Rubber	Qtl.	80.90	581348	73.70	1486970	1632237
	Coffee	Qtl	149.90	657621	133.25	489564	55037
	Coco	Qtl	66.80	143087	128.60	608537	316099
	Cardamum	Qtl	11.70	244530	42.61	4277269	1166256
	Nutmeg		0	0	99.50	28358	0
	Total			**3061194**		**9348024**	**7741260**

(Table 7 Contd..)

1	2	3	4	5	6	7	8
Ernakulam	Coconut	Nos	40024.00	219336	41838.00	359806	344206
	Arecanut	Nos.	177500.00	88750	193900.00	116340	106500
	Pepper	Qtl.	0.59	3599	0.71	15004	12468
	Rubber	Qtl.	438.45	3198931	447.70	8933859	8749275
	Coco	Qtl	0.98	1705	1.18	3751	3115
	Nutmeg	Qtl	28.06	5612	31.84	8758	7718
	Total			**3517933**		**9437518**	**9223282**
Trissur	Coconut	Nos	780400.00	3199640	948183.00	6258008	5150640
	Arecanut	Nos.	605000.00	290400	765000.00	535500	423500
	Pepper	Qtl.	15.00	88350	28.50	575928	303120
	Rubber	Qtl.	3685.80	26998491	4163.00	79159449	70085491
	Total			**30576881**		**86528885**	**75962751**
Palakkad	Coconut	Nos	739356.00	2787381	860961.00	2768443	4953689
	Arecanut	Nos.	392500.00	129525	499600.00	249800	196250
	Pepper	Qtl.	5.19	30595	6.40	132914	107785
	Cashew	Qtl.	1.45	3545	1.75	9993	8280
	Rubber	Qtl.	337.67	2455537	425.55	8479509	6728412
	Jack	Qtl	10.10	2980	11.08	4210	3838
	Mango	Qtl	1127.30	647464	1283.60	1586529	1393342
	Total			**6057027**		**1623139 8**	**1339159 6**
Malappuram	Coconut	Nos	137610.00	550440	188596.00	1074998	487378
	Pepper	Qtl.	0.10	547	13.75	283827	2064
	Cashew	Qtl.	23.76	68716	31.35	199134	150923
	Rubber	Qtl.	65.70	474157	276.05	5582561	1328652
	Total			**1093860**		**7140520**	**2266017**
Kozhikkode	**Coconut**	**Nos**	**196284**	**818508**	**219979**	**1407864**	**1256216**
	Aracanut	**Nos**	**2073420**	**767166**	**1252700**	**626350**	**1036710**
	Pepper	**Qtl**	**9.34**	**53050**	**2.79**	**58585**	**196123**
	Cashew	**Qtl**	**6.41**	**18239**	**5.43**	**35621**	**42050**
	Rubber	**Qtl**	**78.45**	**548522**	**53**	**998573**	**1478076**
	Coffee	**Qtl**	**2.85**	**7238**	**2.95**	**13087**	**12643**

	Ccco	**Qtl**	**5.70**	**8472**	**15.16**	**52501**	**19740**
	Nutmeg	**Qtl**	**0**	**0**	**37.03**	**10924**	**0**
Total				**222119 5**		**3203505**	**4041558**

(Table 7 Contd..)

1	2	3	4	5	6	7	8
Kasargod	Coconut	Nos	221683.00	1028609	250075.00	1605481	1423204
	Arecanut	Qtl.	1813200.0 0	689016	1940100.0 0	1784892	166814
	Pepper	Qtl.	4.70	27730	6.70	138662	97270
	Cashew		206.50	728945	213.05	1525438	1478540
	Rubber		1031.65	7085373	1139.90	22239449	20127492
	Total			**9559673**		**2729392 3**	**2479465 0**
STATE	Pappaya	Qtl	**2.30**	**690**	**3.25**	**1950**	**1380**
	Coconut	Nos	2247333.0 0	9350574	2717624.00	18303075	15069565
	Arecanut	Nos.	5793820.00	2273734	5073254.00	3537169	3807638
	Pepper	Qtl.	207.77	1265101	163.51	3458010	4446707
	Cashew	Qtl.	249.84	854171	265.75	1854503	1749211
	Rubber	Qtl.	7779.66	56450616	8914.48	13357156 3	15152576 4
	Jack	Qtl	69.59	19729	105.02	25142	18085
	Mango	Qtl	1139.38	655540	1297.91	1607417	1411160
	Coffee	Qtl	152.75	664859	136.20	502651	563380
	Coco	Qtl	376.08	676220	441.04	1704068	1401255
	Cardamum	Qtl	11.70	244530	42.91	4277269	1166256
	Nutmeg	Qtl	28.06	5612	168.37	48040	7718
	Kudampuli	Qtl	0.20	808	2.25	6250	5000
	Total			**72462184**		**208897106**	**181173119**

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	Tapioca	Qtl	26.00	10400	28.50	26935	24572
	Ginger	Qtl	0.10	236	0.11	381	346
	Plantain	Qtl	126.81	93839	152.86	157905	130995
	Banana	Qtl	0.00	0	0.01	22	0
	Vegetabies	Qtl	0.24	96	0.42	618	353
	Total			104571		185861	156266
Kollam	Tapioca	Qtl	17.61	6748	16.89	16049	16733
	Ginger	Qtl	0.97	988	1.28	4470	3387
	Plantain	Qtl	4.56	3119	5.21	5484	4800
	Banana	Qtl	0.44	555	0.50	1093	962
	Pineapple	Qtl	5.22	2986	5.46	6377	6097
	Chenai	Qtl	1.40	840	1.81	3020	2336
	Kolacasia	Qtl	4.74	2844	4.71	12742	12833
	Total			18080		49235	47138

Table – 8 Contd.

1	2	3	4	5	6	7	8
Pathanamthitta	Tapioca	Qtl	16.95	7238	23.05	27267	20051
	Plantain	Qtl	16.47	10905	18.50	17744	15797
	Banana	Qtl	1.85	2522	1.95	4216	4000
	Total			**20665**		**49227**	**39848**
Alappuzha	Paddy	Qtl	9.00	5733	0.00	0	11979
	Tapiioca	Otl	1.26	542	1.97	2055	1314
	Plantain	Qtl	20.85	12447	31.59	32982	21769
	Banana	Qtl	0.00	0	2.04	4580	0
	Total			**18722**		**39617**	**35062**
Kottayam	Tapioca	Qtl	366.50	199376	356.00	376294	387393
	Ginger	Qtl	0.25	1260	1.80	5774	802
	Plantain	Qtl	53.00	33551	85.50	78404	48601
	Banana	Qtl	1.50	2016	43.00	96578	3369
	Pineapple	Qtl	11.10	6251	12.80	13786	11955
	Total			**242454**		**570836**	**452120**
Idukki	Tapioca	Qtl	26.50	12111	119.00	122453	27269
	Plantain	Qtl	28.25	15707	157.20	149969	26951
	Banana	Qtl	37.75	43488	52.75	104551	74821
	Pineapple		0.00	0	3.20	3395	0
	Total			**71306**		**380368**	**129041**
Ernakulam	Plantain	Qtl	37.12	**20716**	36.82	**32402**	**32666**
	Banana	Qtl	2.69	**3360**	2.59	**5395**	**5603**
	Total			**24076**		**37797**	**38269**
Trissur	Plantain	Qtl	1.80	941	5.00	3940	1418
	Total			**941**		**3940**	**1418**

Table – 8 Contd..

1	2	3	4	5	6	7	8

Palakkad	Plantain	Qtl	123.92	65314	165.48	131557	98517
	Banana	Qtl	32.50	34060	42.00	80724	62465
	Total			**99374**		**212281**	**160982**
Malappuram	Plantain	Qtl	0.20	146	0.40	398	199
	Total			**146**		**398**	**199**
Kozhikode	Paddy	Qtl	0.03	20	0.05	56	34
	Tapioca	Qtl	63.72	30204	50.33	52445	66398
	Ginger	Qtl	16.86	21918	12.10	31909	44462
	Plantain	Qtl	190.43	152922	111.23	117133	200536
	Banana	Qtl	45.45	57085	47.05	102569	99081
	Vegetables	Qtl	2.40	2880	0.50	646	3101
	Pineapple	Qtl	1.44	702	1.16	1788	2220
	Chenai	Qtl	32.80	26011	25.80	47399	60259
	Kolacasia	Qtl	26.80	26800	17.95	31592	47168
	Turmeric	Qtl	2.56	246	1.93	19723	26161
	Total			**318788**		**405260**	**549420**
Kasaragod	Paddy	Qtl	0.00	**0**	0.00	**0**	**0**
	Tapioca	Qtl	222.50	**113698**	235.00	**221605**	**209818**
	Ginger	Qtl	27.00	**29241**	28.00	**75600**	**72900**
	Plantain	Qtl	138.80	**106876**	204.00	**201144**	**136857**
	Banana	Qtl	60.50	**75686**	71.00	**109269**	**93110**
	Total			**325501**		**607618**	**512685**
STATE	Paddy	Qtl	9.03	5753	0.05	56	12013
	Tapioca	Qtl	741.04	380317	830.74	845103	753548
	Ginger	Qtl	45.18	53643	43.29	118134	121897
	Plantain	Qtl	742.21	516483	973.79	929062	719106
	Banana	Qtl	182.68	218772	262.89	508997	343411
	Vegitables	Qtl	2.64	2976	0.92	1264	3454
	Pineapple	Qtl	17.76	9939	22.62	25346	20272
	Chenai	Qtl	34.20	26851	27.61	50419	62595
	Kolacasia	Qtl	31.54	29644	22.66	44334	59991
	Turmeric	Qtl	2.56	246	1.93	19733	26161
	Total			**1244624**		**2542438**	**2122448**

Table 9

Quantity and Value of Selected perennial and seasonal crops for the years 2011-12

	Name of Crops	Units	Before SC Work		After SC Work		Value at constant Price
			Quantity	Values (Rs)	Quantity	Value (Rs)	
1	2	3	4	5	6	7	8
A. Perennial Crops	Coconut	Nos	2247333	9350574	2717624	18303075	15069565
	Arecanut	Nos.	5793820	2273734	5073254	3537169	3807638
	Cashew	Qtl.	249.84	854171	265.75	1854503	1749211
	Pepper	Qtl.	207.77	1265101	163.51	3458010	4446707
	Rubber	Qtl.	7779.66	56450616	8914.48	173571562	151525764
	Pappaya	Qtl	2.30	690	3.25	1950	1380
	Jack	Qtl	69.59	19729	105.02	25142	18085
	Mango	Qtl	1539.38	655540	1297.91	1607417	1411160
	Coffee	Qtl	152.75	664859	136.20	502651	563380
	Coco	Qtl	376.08	676220	441.04	1704068	1401255
	Kudampuli	Qtl	.20	808	.25	6250	5000
	Nutmug	Qtl	28.06	5612	168.37	48040	7718
	Cardamum	Qtl	11.70	244530	42.91	4277269	1166256
	Total(A)			**72462184**		**208897106**	**181173119**
B. Seasonal Crops	Paddy	Qtl	9.03	5753	0.05	56	12013
	Tapioca	Qtl	741.04	380317	830.74	845103	753548
	Ginger	Qtl	45.18	53643	43.29	118134	121897
	Plantain	Qtl	742.21	516483	973.79	929062	719106
	Banana	Qtl	182.68	218772	262.89	508997	343411
	Vegitables	Qtl	2.64	2976	0.92	1264	3454
	Pineapple	Qtl	17.76	9939	22.62	25346	20272
	Chenai	Qtl	34.20	26851	27.61	50419	62595
	Kolacasia	Qtl	31.54	29644	22.66	44334	59991
	Turmeric	Qtl	2.56	246	1.93	19723	26161
	Total			**1244624**		**2542438**	**2122448**
	All Crops (A+B)			**73706808**		**211439544**	**123295567**

2.2. Cost Benefit Analysis of the Soil Conservation Programmes

An important objective of a project evaluation is to estimate the various impacts of its operation such as income, employment, demographic change, regional development and so on. Hence an analysis to appraise the performance of operating investment projects is essential for improved planning process. Degradation of land due to soil erosion leads to destruction of agricultural land. If it continue over a period, the entire soil will be lost and the land will become barren and unproductive. In the case of sloppy regions, soil erosion deplete the fertility of the soil and production and degradation of the area under agriculture is to be assessed in terms of production and protection benefits accrued from these areas. These benefits are to be further compared with the investments to arrive at benefit cost ratio which gives an indication of viability of the programme implemented.

Productive benefits are the direct returns from the programmes implemented. In regular agricultural lands, increase in the yield provides the productive benefits. In addition., production from degraded land, which are cultivated after the soil conservation measures are also taken into consideration.

Protective benefits are the intangible benefits derived from implementation of soil conservation programme. These benefits are more stable and provide base for the continued prosperity in the area. In the case of agricultural land, protective benefits are assessed in terms of these increased values because of the prevention of further soil erosion and it's increased productive potentialities.

In the light of the present study an attempt is made for cost benefit analysis with the collected data. Total cost incurred for the soil conservation works, including maintenance work for the 51schemes is Rs.69002113/-

The total area under cultivation after soil conservation work was 1698.85 acres. The value of crops before the soil conservation programme comes to Rs.73706808 The value of crops after the implementation of soil conservation programme has also been calculated as Rs. 211439544/- Thus the additional benefits due to the implementation of soil conservation programme is worked out to be Rs.137732736 /-. It is estimated that the value at constant price as Rs. 183295567/- .

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 34.66 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 20.93%, cardamom 258.33%, Rubber 14.60%, Plantain 31.44%..

(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 dissimination 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 (6.78%). Growing of perennial crops will accelerate conservation of soil more affectively.

Occupational Profile

The occupational profile of the selected beneficiaries reveals that 40.38% included agriculture job, 27.89% are accounted as non-agriculture; 15.47% agricultural labourers and 16.26% are categorized as non-agricultural labourers. Details are presented in Table No. 14 and 14 (a)

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

Sl No	Name of District	Income (Rs)		Expenditure (Rs)		Net Income (Rs)	
		Before SC work	After SC work	Before SC work	After SC work	Before SC work	After SC work
1	2	3	4	5	6	7	8
1	Thiruvananthapuram	1499809	8245488	1006870	2425195	492939	5820293
2	Kollam	414212	985151	120077	219843	294135	765308
3	Pathanamthitta	1071942	3350830	416460	1104389	655482	2246441
4	Alappuzha	124803	256891	80786	156101	44017	100790
5	Kottayam	13668147	37769750	3823426	6526090	9844721	31243660
6	Idukki	3132500	9728392	1536210	3216471	1596290	6511921
7	Eranakulam	3542009	9475315	1094075	3102785	2447934	6372530
8	Thrissur	30577822	86532825	17684040	33549275	12893782	52983550
9	Palakkad	6156401	16443679	1358265	2608170	4798136	13835509
10	Malappuram	1094006	7140918	1251850	3404580	-157844	3736338
11	Kozhikkode	2539983	3608765	1199305	1882165	1340678	1726600
12	Kasaragod	9885174	27901540	2897465	4643530	6987709	23258010
State		**73706808**	**211439544**	**32468829**	**62838594**	**41237979**	**148600950**

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

Sl No	Name of District	Income	Expenditure	Net Income
1	2			
1	Thiruvananthapuram	1183685	745865	437820
2	Kollam	32137	19146	12991
3	Pathanamthitta	800484	298960	501524
4	Alappuzha	105666	55900	49766
5	Kottayam	1835349	206370	1628979
6	Idukki	983487	379980	603507
7	Eranakulam	878324	288745	589579
8	Thrissur	9467009	4020900	5446109

9	Palakkad	1381871	424850	957021
10	Malappuram	274209	275850	-1641
11	Kozhikkode	1735110	928400	806710
12	Kasaragod	1130398	341000	789398
State		**19807729**	**7985966**	**11821763**

Table 11 – Income per Acre before and after soil conservation programme

(Income in Rs)

Sl 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	45.16	492939	10915	45.30	5820293	128483
2	Kollam	15.34	294135	19174	15.34	765308	49890
3	Pathanamthitta	36.06	655482	18178	36.29	2246441	61902
4	Alappuzha	7.39	44017	5956	6.98	100790	14440
5	Kottayam	143.20	9844721	68748	149.45	31243660	209058
6	Idukki	167.03	1596290	9557	167.88	6511921	38789
7	Eranakulam	93.38	2447934	26215	93.38	6372530	68243
8	Thrissur	455.64	12893782	28298	455.64	52983550	116284
9	Palakkad	219.24	4798136	21885	219.24	13835509	63107
10	Malappuram	147.29	-157844	-1072	168.51	3736338	22173
11	Kozhikkode	118.95	1340678	11271	118.88	1726600	14524
12	Kasaragod	215.51	6987709	32424	221.96	23258010	104785
State		**1664.19**	**41237979**	**24780**	**1698.85**	**148600950**	**87471**

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

Sl No	Name of District	Area in acre	Net Income (Rs)	Net Income per acre
1	2	3	4	5
1	Thiruvananthapuram	12.69	437820	34501

2	Kollam	1.60	12991	8119
3	Pathanamthitta	12.81	501524	39151
4	Alappuzha	3.50	49766	14219
5	Kottayam	8.95	1628979	182009
6	Idukki	21.11	603507	28589
7	Eranakulam	8.44	589579	69855
8	Thrissur	63.47	5446109	85806
9	Palakkad	38.44	957021	24896
10	Malappuram	15.95	-1641	103
11	Kozhikkode	48.32	806710	16695
12	Kasaragod	14.70	789398	53701
State		**249.98**	**11821763**	**47291**

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 58.87% of the beneficiary holding belongs to less than one acre, 31% have holding area between one acre to 3 acre. And above 3 acre were 6.6%, up to 5 acres were 3.53% respectively.

The opinion of selected beneficiaries are collected. Out of that 17.87% of the beneficiaries reported that contour bunds effectively control soil erosion while about 73.47

percent opinioned that it moderately controls soil erosion. The rest 8.66% are of opinion that it has no effect.

About the fertility of the soil 11.93% are of the view that the conservation measures have improved the fertility of the soil remarkably. While 87.27% reported that the fertility of the soil has improved moderately and 0.8% opinioned that it has no effect on the fertility of the soil.

Similarly regarding the moisture retention 10.6% reported that the scheme has substantially increased moisture retention while 88.67% reported that the scheme has caused moisture retention moderately only. 0.73% are of no effect. Details are presented in table No. 12

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

Sl No	Name of District	Effectiveness of contour bunds			Fertility of soil			Moisture retention			
		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	2	123	0	2	124	1	2	123	0	125
2	Kollam	0	3	122	1	124	0	0	125	0	125
3	Pathanamthitta	2	123	0	1	124	0	0	124	1	125
4	Alappuzha	0	120	5	1	118	6	0	119	6	125
5	Kottayam	18	107	0	10	115	0	7	118	0	125
6	Idukki	20	104	1	4	121	0	2	123	0	125
7	Ernakulam	6	119	0	0	125	0	0	125	0	125
8	Thrissur	23	102	0	21	104	0	21	104	0	125
9	Palakkad	118	7	0	117	8	0	118	7	0	125
10	Malappuram	32	93	0	13	112	0	6	119	0	125
11	Kozhikkode	35	88	2	6	116	3	2	123	0	125
12	Kasaragod	12	113	0	3	120	2	1	120	4	125
State		**268**	**1102**	**130**	**179**	**1309**	**12**	**159**	**1330**	**11**	**1500**

Table 13

Conditions of Bund

(Scheme Area)

Sl	Name of District	Good	Partially	Seriously	Total
1	2	3	4	5	6
1	Thiruvananthapuram	67	58	0	**125**
2	Kollam	105	20	0	**125**
3	Pathanamthitta	123	2	0	**125**
4	Alappuzha	118	6	1	**125**
5	Kottayam	104	21	0	**125**
6	Idukki	114	11	0	**125**
7	Ernakulam	111	14	0	**125**
8	Thrissur	120	5	0	**125**
9	Palakkad	121	4	0	**125**
10	Malappuram	62	62	1	**125**
11	Kozhikkode	87	33	5	**125**
12	Kasaragod	111	13	1	**125**
State		**1243**	**249**	**8**	**1500**

Table 14

Occupational profile

(Scheme Area)

Sl No	Name of District	Occupation				
		Agriculture	Non-agriculture	Agricultural Labours	Non-agriculture	Total
1	2	3	4	5	6	7
1	Thiruvananthapuram	42	33	31	19	125
2	Kollam	34	4	70	17	125
3	Pathanamthitta	85	34	6	0	125
4	Alappuzha	1	18	21	85	125
5	Kottayam	44	77	3	1	125
6	Idukki	87	9	26	3	125
7	Ernakulam	24	67	13	21	125
7	Thrissur	54	70	0	1	125
8	Palakkad	99	1	25	0	125
9	Malappuram	42	75	7	1	125
10	Kozhikkode	76	42	4	3	125
12	Kasaragod	64	36	7	18	125
State		**652**	**466**	**213**	**169**	**1500**

Table 14 (a)

Occupational profile (Control Plots)

Sl No	Name of District	Occupation				
		Agriculture	Non-agriculture	Agriculture labours	Non-agriculture labours	Total
1	2	3	4	5	6	7
1	Thiruvananthapuram	9	6	9	1	25
2	Kollam	6	2	11	6	25
3	Pathanamthitta	14	11	0	0	25
4	Alappuzha	1	8	2	14	25
5	Kottayam	5	5	0	0	10
6	Idukki	10	8	6	1	25
7	Ernakulam	5	12	1	2	20
7	Thrissur	0	25	0	0	25
8	Palakkad	22	0	2	1	25
9	Malappuram	4	20	1	0	25
10	Kozhikkode	18	7	0	0	25
11	Kasaragod	6	3	1	0	10
Total		**100**	**107**	**33**	**25**	**265**

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 82.87% are in good condition 16.6% are partially damaged and 0.53% 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 2011-12. 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 51 schemes were selected. The total number of beneficiaries comes to 2471. Out of this 1500 number of beneficiaries were selected for the detailed study. Land use particulars of beneficiary plots gives us certain positive trends while comparing with the area before and after the soil conservation programme. The study revealed that 34.66 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 260.35%. It is estimated that the percentage increase of net income per acre in beneficiary plots of the scheme area as 252.99%

Analysis of data collected from the beneficiary and control plots reveals that the net income per acre, received from the beneficiary plot is Rs.87471/- and from the control plot is Rs47291/- 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 10.71% recorded in the case of Rubber. Production of coconut also increased 1.95%. Whereas the increase of area was 8.1 acers. Likewise in coffee production area increase is recorded as 2.65 acers., the area of cardamom increases 11.67 acers.

Cost benefit analysis of the collected data reveals that 199% 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	45.16	45.30	38.48	44.36	85.21	97.62
2	Kollam	15.34	15.34	13.62	21.89	88.79	142.70
3	Pathanamthitta	36.06	36.29	32.72	33.54	90.74	92.42
4	Alappuzha	7.39	6.98	9.80	11.21	132.61	160.60
5	Kottayam	143.20	149.45	129.02	134.41	90.10	89.44
6	Idukki	167.03	167.88	139.67	163.83	83.62	97.59
7	Ernakulam	93.38	93.38	82.54	82.49	88.39	88.34
7	Thrissur	455.64	455.64	389.30	390.62	85.44	85.73
8	Palakkad	219.24	219.24	167.11	170.40	76.22	77.72
9	Malappuram	147.29	168.51	142.20	166.47	96.54	98.79
10	Kozhikkode	118.95	118.88	105.85	109.19	88.99	91.85
12	Kasaragod	215.51	221.96	173.35	188.74	80.44	85.03
State		**1664.91**	**1698.85**	**1423.66**	**1517.14**	**85.55**	**89.30**

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 85.55% 89.30%.Districtwise details are presented in Table No.15.