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EVALUATION STUDY ON SOIL CONSERVATION
PROGRAMME — 1986-87 — TRIVANDRUM DISTRICT

DEPARTMENT OF ECONOMICS AND STATISTICS, TRIVANDRUM

SOIL CONSERVATION PROGRAMME

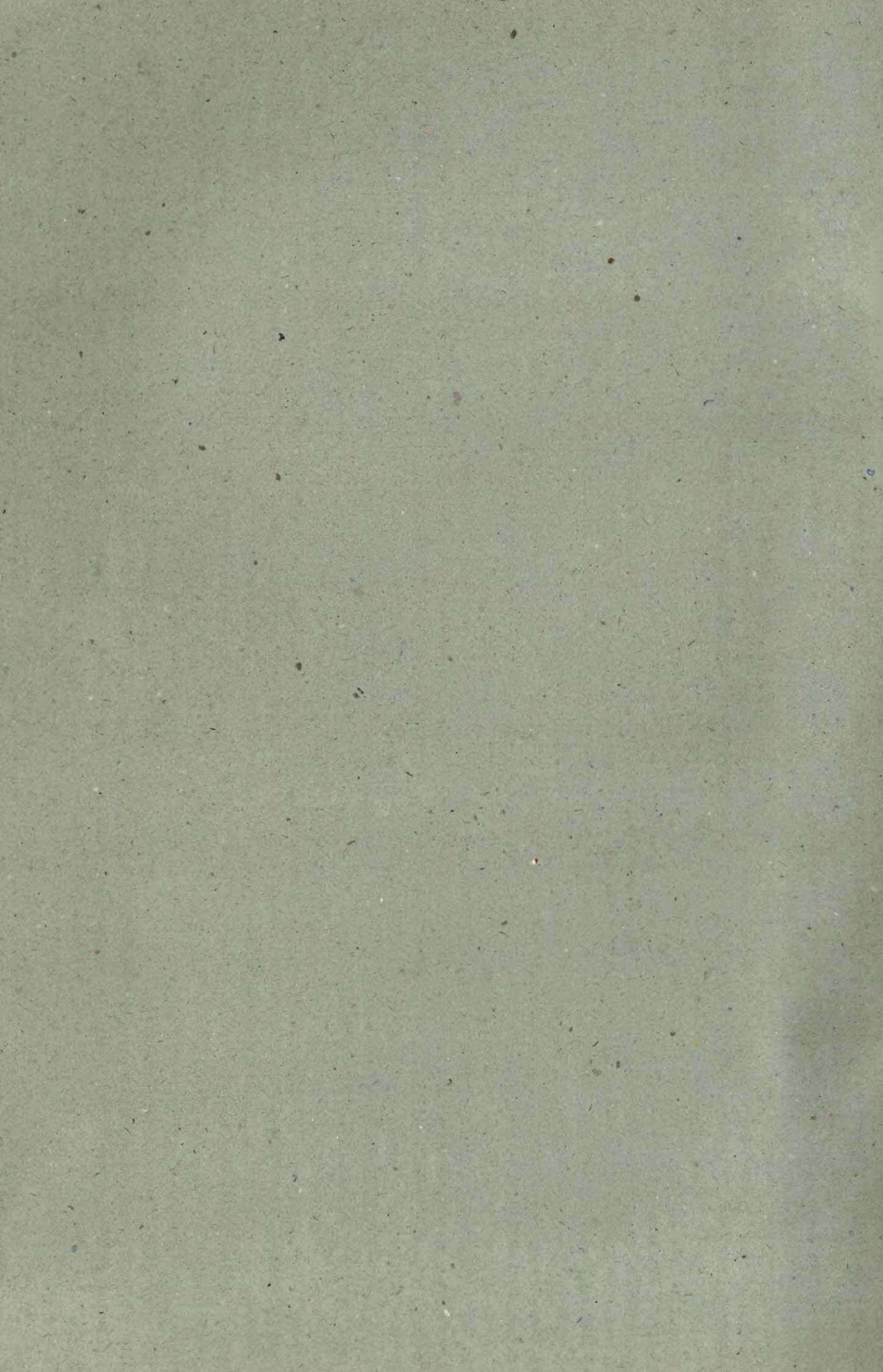
IN KERALA

TRIVANDRUM DISTRICT

AN EVALUATION STUDY

Department of Economics and
Statistics, Trivandrum
Kerala.

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P R E F A C E

The importance of soil conservation as a measure of land development has been recognised by our planners. Soil conservation schemes have been launched to protect and preserve the scarcest of the means of production, namely land, in the various districts of Kerala State.

This sample study seeks to evaluate the impact of the soil conservation programmes implemented in Trivandrum District.

The survey was conducted in the three scheme areas viz. Manickal, Pannimala and Adiyakalam of the District.

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We acknowledge the advice, suggestions and co-operation received from the Soil Conservation Department for the successful conduct of the survey.

Trivandrum,
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CHAPTER I

INTRODUCTION

1.1 GENERAL

1.1.1 One of the most valuable gifts of nature to mankind is soil. For the maintenance of soil, adequate protection and conservation are necessary. The main objective of soil conservation programmes has been repairing the damages done to land by erosion and, protection from further erosion through long lasting and repetitive measures. The schemes for soil conservation have been widened to include protection of land against all forms of soil deterioration and the adoption of a pattern of optimisation of land use. The list of objectives include (i) re-building the lost fertility of land, (ii) conservation of moisture in arid region (iii) proper and efficient water management (iv) promoting surface and sub-soil drainage in badly drained areas and (v) other managerial practices to optimise the benefits from investment on land. According to the Working Group set up for the IV plan, 'Soil conservation means applying all the necessary practices to maintain the capability of the land for which it is suited and to improve the productivity of agricultural land'.

1.1.2. The various measures currently adopted for conservation of soil are bunding, gully plugging, grassing of water ways etc. It is found that improved agricultural practices - afforestation, contour cultivation, cover cropping, strip cropping and crop rotation will also help to eliminate or lessen soil erosion.

1.1.3. Planned soil conservation programmes were initiated in India during the First Five Year Plan period. The Central Soil conservation Board was set up in 1953. The National policy on soil conservation was defined in the First Plan as the optimum use of land resources on a sustained basis in the interest of present and future generations. The plan emphasised the gravity of the erosion problem in the country and as a result, anti-erosion schemes formed the main item in the soil conservation programmes. The various measures under soil conservation programmes envisaged in the plans include engineering measures, improvement of land use practices, afforestation and preservation of forests and adoption of measures to ensure that each type of

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land is used according to its capability. The Second Five Year Plan gave stress on undertaking soil conservation programmes in River Valley Projects. The Third and subsequent plans carried forward the same policy defining the content of the programme in greater detail and enhancing the plan provisions.

1.1.4. This report is based on a sample survey conducted in three scheme areas of Trivandrum district during 1986-87 to assess the impact of soil conservation measures in the district.

1.2 Objectives and Methodology of the Survey:

1.2.1. The main objectives of the study will be (i) to assess the benefits of the programme particularly in relation to the cultivation of seasonal and perennial crops (2) to throw light on various aspects like cost benefit relatives, production potential etc. (3) to estimate the extent of additional area brought under cultivation consequent on the implementation of this programme and 4) to study the follow up action in respect of the programmes and the effects of extension works carried out by the concerned Department in this direction.

1.2.2. Methodology: Since the number of beneficiaries may vary and the extent of land covered also differ, we may not be able to fix a uniform procedure for the coverage of the survey. Where there are more beneficiaries, we may stratify the land covered according to the area of holdings and select samples from each stratum by random sampling method. Where the number of beneficiaries is small, all the beneficiaries are to be covered.

1.2.3. The land holdings will be classified as follows:

(i) Less than 1 Hactare	:	Stratum I
(ii) 1 to 3 Hectares	:	" II
(iii) 3 to 5 "	:	" III
(iv) 5 and above	:	" IV

1.2.4 Table 1.1 below gives the stratum-wise distribution of number of beneficiaries and control plots selected for detailed study.

Table - 1.1

Scheme	No. of beneficiaries selected					No. of Control plots				
	I	II	III	IV	Total	I	II	III	IV	Total
Manickal	15	7	2	Nil	24	2	2	1	Nil	5
Adiyakulam	21	1	Nil	Nil	22	2	1	Nil	Nil	3
Pannimala Harijan Colony	17	2	Nil	Nil	19	2	1	Nil	Nil	3
TOTAL	53	10	2	0	65	6	4	1	-	11

The total number of beneficiaries in Manickal, Adiyakulam and Pannimala are 235, 43 and 37 respectively. The control plots from the scheme areas were selected for comparative study purposes.

1.2.5 Schedules: A common pattern of schedules has been designed for the survey. The schedules are:

- Schedule I - list of selected beneficiaries
- II - Detailed study of selected beneficiaries
- III - Particulars of control plots
- IV - detailed enumeration of control plots

1.2.6. Field work and supervision: One Investigator was posted for the conduct of the survey. He was given training in the various aspects of the survey before the commencement of the field work. The work was supervised by the Deputy Director of the District Office of the Department and the Officer in charge of the scheme at the headquarters.

1.2.7 Period of the survey: The reference period of the survey was 1986-87. After completion of the field work, scrutiny and tabulation, the analysis of data was done in the headquarters. In addition to the collection of quantitative data, the Deputy Director (Evaluation) conducted detailed discussions with the officers of the soil conservation Department as well as a few beneficiaries and non-beneficiaries of the schemes with a view of gathering qualitative information.

1.3 Problems of Soil Erosion

- 1.3.1 The top soil is the most vital part of the soil. Lying at an average depth of about 18 to 20 cms over the face of land, the upper layer of the soil is the principal feeding zone of the plants which provide food for man and animal. However, under different conditions, it is the most unstable of all major natural resources.
- 1.3.2 Nature takes centuries to form top soil through several weathering and soil forming agencies, but man can destroy it by excessive exploitation and unintelligent use. For instance, while nature may take thousands of years to build up the fertile, top layer of 18 cm of Soil, it is lost by indiscriminate use in the short span of 25 years. The loss of valuable top soil results in deterioration of land.
- 1.3.3 Control of erosion is the first and most essential step in the direction of correct land utilisation. Looking into the future it appears that a good portion of valuable agricultural land will become severely impoverished through erosion unless adequate protection is provided. If no measures are taken to check the progressive impoverishment, the fertile area of farm land will be gradually reduced. Thus soil erosion constitutes a land problem of enormous importance, not only for individual farmers but also for the entire society.
- 1.3.4 Causes of erosion:
The destruction of the soil is mainly attributed to the catastrophic of soil erosion which brings about the slow death of the soil. The bare unprotected soil, especially on slopes starts moving out under the erosive forces of water and wind.
- 1.3.5. The factors which influence the extent of erosion are:
- 1) Climate
 - 2) Topography
 - 3) Physical and Chemical Characteristics of Soil
 - 4) Vegetation
- The above factors bring erosion according to the change in climate.

1.3.6 Methods of Soil Conservation

All measures of Soil Conservation basically aim at reducing soil as well as water losses and, at the same time, improving productivity. The Soil Conservation practices are grouped into two categories - agronomic and mechanical. The Agronomic practices protect the fertility of the soil and the mechanical practices include various engineering aspects that supplement the effect of agronomic measures. These are designed to reduce the flow of surface water, impound water for a longer time and allow surplus time run to flow. The various mechanical practices are contour bunding, contour cultivation, terracing, bench terracing etc.

1.3.7 Responsibility for prevention of erosion:

Conservation of the Soil requires the adoption of sound land use principles and cultural practices by the farming community as a whole. Thus the responsibility lies on the Nation as a whole and the individuals constituting it. *Eventhough* the evils of erosion are very serious, these are not recognised promptly. Further, the benefits of anti-erosion works could be reaped only gradually. The individual farmers are interested in quick return and hence may not show much interest in ~~invest-~~ investment on this account. Again, lack of technical knowledge and finance stand in the way of individual actions in this respect. Hence soil erosion appears to be a problem to be treated on a par with control of communicable diseases. Thus the responsibility of the state in the matter of Soil Conservation is no less important than that of the individual farmers. Without the close cooperation of the farmers, any Government action in this regard is deemed to failure.

1.3.8 The problem of Soil Conservation is of particular importance in Kerala where an explosive increase in population has significantly reduced the per capita availability of cultivable land. People have tried to exploit the land without treating it with adequate manures and fertilisers. This is because of wrong cropping pattern which also leads to the impoverishment of the soil.

1.3.9. The extent of erosion and run off depend upon rainfall, topography, Character of vegetation etc.

1.3.10 Extent of the problem in the state

The total geographical area of the state is about 38.59 lakh hectares of which 13.93 lakh hectares from forests, uncultivable waste and land put to non-agricultural uses. The remaining area of 24.66 lakh hectares is under cultivation, permanent pastures, cultivable waste and miscellaneous tree crops. Of this, nearly 5 lakh hectares are paddy lands which have a flat topography. A sizable portion of the remaining area (viz. 19.66 lakh hectares) is made up of steep hills and low valleys. Although no reconnaissance survey has been made; it is estimated that atleast $\frac{1}{3}$ to $\frac{1}{2}$ of the 19.66 lakh hectares are highly vulnerable to Soil erosion hazards which require effective conservation measures. In addition, nearly 2.43 lakh hectares under river vally projects require protection. Thus the total extent of the area requiring Soil Conservation measures in the State is estimated to be about 10 lakh hectares.

1.4 Soil conservation programmes:-

1.4.1 Soil, the primary ingredient of land, was till recently taken for granted in India. It was not recognised for long that soil was a wasting asset and that its depletion through natural agencies was accelerated by the indifference and the ignorance of the farmer.

1.4.2 The extent of the havoc may be ganged from an estimate that two percent of the valuable surface soil is lost every year through erosion. Knowledgable farmers, no doubt, adopted several measures to fight soil erosion through the ages, but these have been mostly empirical steps like bunding taken in a haphazard and customary manner.

1.4.3 Adoption of such measures is necessary to ensure that the different types of land are used according to capability.

1.4.4 This study is confined to the soil conservation measures undertaken in the district of Trivandrum.

2.1 Impact of soil conservation programmes on Land Use and Crop pattern.

2.1.1 Three soil conservation works have been taken for study in Trivandrum District. They are Manickal, Pannimala and Adiyakalam schemes.

The Manickal scheme (loan) is located in Manickal village of Nedumangad Taluk. It covers an area of 427 hectares and involves an estimated cost of Rs. 7,50,000. Actual conservation work commenced on 8-3-1973 and it was completed on 31-7-1982. The type of work is construction of contour bunds.

2.1.2 According to 1981 census this village comprised an area of 3334 hectares with a population of 28054 (13884 males and 14170 females). As many as 70% of the villages were literate. Out of 235 beneficiaries of the schemes in the area 24 persons were selected at random for detailed study.

2.1.3 Pannimala and Adiyakalam Soil Conservation Schemes (Special Employment Schemes) are located in Vellarada Village of Neyyattinkal Taluk. They cover 12 hectares and 6 hectares with estimated cost of Rs. 59,205/- and Rs. 24,850/- respectively. The work of constructing of contour bunds at Pannimala commenced on 26-6-1980 and was completed by 5-9-1980. Construction of dry rubble bunds at Adiyakalam started on 7-10-1978 and was completed by 31-3-1979.

2.1.4 According to 1981 census Vellarada Village comprised an area of 5087 hectares with a population of 33957 (17091 males and 16866 females). As ⁿmay as 64% of the ~~villages~~ are literate.

2.1.5 There are 37 beneficiaries in Pannimala and 43 beneficiaries in Adiyakalam schemes. Out of these 19 and 22 were selected.

2.1.6 In this survey, attempts have been made to find out the extent of change in the land use and cropping pattern of the selected holdings of the cultivators in the scheme area as between the two periods of time, viz, prior to soil conservation measures and after the soil conservation treatment ie ^mafter 1986-87.

2.1.7 Table 2.1.7 gives below the land use particulars of the selected holdings and control areas.

Table 2.1.7 Land use particulars of selected holdings

Sl. No.	Land use pattern	Before Soil conservation work		After Soil conservation work		Control plot	
		Area	percentage	Area	percentage	Area	percentage
1.	Area cultivated	34.282	95.03	34.282	95.03	9.432	94.94
2.	Current fallow	-	-	-	-	-	-
3.	Other use	0.674	1.87	0.674	1.87	0.062	0.62
4.	Area not cultivated	1.120	3.10	1.120	3.10	0.441	4.44
Total		36.076	100.00	36.076	100.00	9.935	100.00

2.1.8 Since the beneficiaries are not interested in the annual maintenance of the soil conservation schemes, the land improvement position remains stagnant. In Manickal, out of the 24 selected beneficiaries, only two are attending to some sort of maintenance while the other 22 beneficiaries are not attending to any maintenance. This position remains almost the same with respect to Pannimala and Adiyakalam with respective numbers of 1 & 18 and 2 & 22. However, compared with the control plots, the scheme area shows positive characters in all the categories. Area cultivated in the scheme area is 95% while in the control area is 94%. In the scheme area, the area under other use comes to two percentage, while in control area this percentage is one only. Area not cultivated in the scheme area is 1% less than that in the control area.

2.1.9 The crop pattern:

Consequent to the introduction of soil conservation scheme, there are certain significant changes in the cropping pattern. This phenomenon shows an increasing trend towards cultivation of perennial crops.

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2.1.10 Table 2.1.10 clearly indicate the cropping pattern

Table 2.1.10 Crop pattern

Sl. No.	Item	Scheme area(in hectare)				Control area	
		Before soil conservation work	percen-tage	After soil conserva-tion work	percen-tage	Hactare	per-centage
1.	Perennial crops	24.912	72.67	30.564	79.32	7.282	61.50
2.	Seasonal crops	9.370	27.33	7.968	20.68	4.580	38.61
	Total	34.282	100.00	38.532	100.00	11.862	100.00

2.1.11 In the scheme area there is an increase of more than 7% in the area of perennial crops after the implementation of soil conservation works. In the control area, the extent of perennial crop is less than 18% that in the scheme area. The area of seasonal crops has decreased in the scheme area after the implementation of soil conservation programme. In the control area, the extent of seasonal crop is 18% higher than that in the scheme area.

2.1.12 From the above analysis, it is evident that soil conservation measures have induced the farmers to cultivate more of perennial crops. The higher rate of increase in the cultivation of perennial crop in the scheme area is due to the improvement of soil and moisture condition brought about by soil conservation treatment. The increase in the cultivation of perennial crops is a welcome sign as it is desirable to grow perennial crops in the slopy regions where soil conservation measures are carried out. The cultivation of seasonal crops in such regions is likely to conduce soil erosion.

2.1.13 The study reveals that the area under all the five selected perennial crops has increased in the scheme area.

Table 2.1.13 Area under selected perennial crops

Sl. No.	Name of perennial crop	Scheme area		percentage of increase
		Before soil conservation work	1986-87	
		Hect re		
1.	Coconut	6.454	6.705	3.89
2.	Arecanut	0.088	0.106	20.45
3.	Cashew	0.046	0.320	595.65
4.	Pepper	0.087	0.180	107.00
5.	Rubber	18.237	23.253	27.50
Total		24.912	30.564	23.00

2.1.14 Even though the area has increased in the case of rubber by 28% the production has gone down to 75%. This is due to new plantation of rubber seedlings where the tapping has not started. Though the increase in the area under coconut is only about 4% it has resulted in better production of coconuts. The high percentage shown against cashew is due to insignificant area taken for consideration.

2.1.15 Impact of Soil Conservation treatment on yield of crops

Information on yield and value of crops were collected from the holdings of the selected beneficiary cultivators in the scheme area. For this purpose, all the selected plots were contacted scientifically during the period under survey. The yields of the crops except rubber have showed an increasing trend. In the case of rubber, young seedlings have been planted anew in the scheme area, but tapping has not yet started. Hence production has shown a decreasing trend.

2.1.16 Table 2.1.16 testifies to this

Table 2.1.16 crop-wise distribution of quantity & value of yield in the scheme area.

Sl. No.	Name of crop	Unit	Quantity & value of yield				percentage increase
			Before soil conservation work		After soil conservation work		
			Qty	Value (Rs)	Qty	Value (Rs.)	
1.	Coconut	No	47895	136270	52511	146600	10
2.	Arecanut	No	5150	275	9080	633	75
3.	Cashew	kg.	30	147	31	162	3
4.	Pepper	kg	101	1648	145	2750	44
5.	Rubber	kg	7552	105151	1905	28135	- 75
6.	Tapioca	kg.	24200	12275	32000	16945	32

2.1.17 The percentage increase in the case of arecanut is high (75%). In the scheme area arecants were newly planted after the implementation of Soil Conservation measures. The yield of tapioca has shown an increase of 32%, while pepper has shown an increase of 44%.

2.1.18 This increase in the yield is mainly due to the improvement in the soil conditions consequent to soil conservation treatment.

2.2. Cost benefit analysis of the Soil Conservation Programme:

2.2.1. The application of cost - benefit analysis to programmes for protecting invaluable resources like soil is unwarranted especially in a state like Kerala, where this resource has to be preserved at any cost. However, on the basis of the present study we may attempt an analysis of this kind.

2.2.2. The actual cost incurred for the soil conservation work by the 65 selected beneficiaries in the three sample schemes, viz Manickal, Adiyakulam and Pannimala, amounts to Rs.1,28,000.

2.2.3. The benefits obtained can be assessed from the following tables:

Table 2.2.4 - Area, quantity and value of selected perennial and seasonal crops (excluding Rubber and other seasonal crops)

Sl. No.	Name of crop	Unit	Before Soil conservation scheme			After Soil Conservation scheme		
			Area Ha.	Qty.	Value	Area Ha.	Qty.	Value
	Coconut	No.	6.454	47895	136270	6.705	52511	146600
	Areca nut	No.	0.088	5150	275	0.106	9080	633
	Cashew	Kg.	0.046	30	147	0.320	31	162
	Pepper	Kg.	0.087	101	1648	0.180	145	2750
	Tapioca	Kg.	5.306	24200	12275	5.426	32000	16945
Total			11.981		150615	12.737		167090

2.2.5. Considering the benefits without taking into account the production value of Rubber and other seasonal crops the value of crops before the implementation of soil conservation programme in the area of beneficiaries comes to Rs.1,50,615 and the production value after the implementation of the scheme amounts to Rs.1,67,090. Thus the annual benefit is Rs.16,475. This benefit has been obtained as a result of the increase in production as well as increase in area under cultivation. The area under cultivation of the selected beneficiaries before the soil conservation scheme was 12 Hectares while after the implementation of the soil conservation scheme was 13 hectares exclusive of rubber and other seasonal crops. We can arrive at the pay-back period by dividing the actual cost by the annual benefit. This is $\frac{128000}{16475} = 7.75$ ie. approximately 8 years.

2.2.6. The total area owned by the beneficiaries has been estimated at 36 hectares excluding ^{other} after seasonal crops of 2.5 Hectares. Here 18 hectares were under rubber cultivation before the implementation of the soil conservation programme. The area under rubber cultivation has increased to more than 23 hectares. The production of rubber has gone down because of fresh transplantation of tender plants. This may yield after 7 years.

2.2.7 Taking proportionate yield from the new area under rubber plantation we can arrive at the data presented in the following table.

Table 2.2.8

Area, quantity and value of selected perennial and seasonal crops (Tapioca only) with projected value and yield of rubber

Sl. No.	Name of crop	Unit	Before Soil Conservation scheme			After Soil Conservation scheme		
			Area Ha	Qty.	Value	Area Ha.	Qty.	Value
1.	Coconut	No.	6.454	47895	136270	6.705	52511	146600
2.	Arecanut	No.	0.088	5150	275	0.106	9080	633
3.	Cashew	Kg.	0.046	30	147	0.320	31	162
4.	Pepper	Kg.	0.087	101	1648	0.180	145	2750
5.	Rubber	Kg.	18.237	7552	105151	23.253	9679	134760
6.	Tapioca	Kg.	5.306	24200	12275	5.426	32000	16945
Total			30.218	xxx	257766	35.990	xxx	301850

2.2.9. On the basis of proportionate yield estimation of rubber, we get Rs.3,01,880 as the total value of production after the implementation of soil conservation programme in the plots of 65 beneficiaries. This shows a benefit of Rs.44,084 per year. Hence in this case the pay back period will be $\frac{12800}{44084} = 2.90$ ie. the cost will be realised within a period of 3 years. However, in any way the amount spent for soil conservation programme will be realised within a period of five years.

2.2.10. Here the performances of the holdings before and after the launching of the soil conservation programme are compared. The concept of control plots has been used to isolate the external variables.

2.2.11 Among the numerous direct benefits flowing from the conservation programme which are quantifiable, three categories may be picked up for special consideration.

2.2.12 Extension of area under cultivation:

In Kerala, we have about a lakh and a quarter hectares of cultivable waste (including waste land other than current fallow left and more than ten lakhs hectares (about 40% of total arable land) are vulnerable to soil erosion. Therefore, it is obvious that there is immense scope for soil conservation measures in Kerala.

2.2.13 From a comparison of the plots in the scheme area and the control area, the higher percentage of area brought under cultivation after the implementation of soil conservation programme indicates the sizable impact of conservation measures.

2.2.14. In the control region 4.44% of area is not cultivated but in the scheme area it is 3.10%. This shows that more area *has* been brought under cultivation due to the impact of soil conservation programme. In the scheme area, an improvement has also been shown in the utilisation of land for other uses.

2. Diversification of the cropping pattern

2.2.15 One of the most important advantages of the conservation programme is that it increases the soil capability which facilitates the cultivation of more remunerative crops. This advantage can be reaped in full only if the conservation programme is followed promptly by Agricultural extension work that includes not only the dissemination of new know how but also the adequate provision of inputs and services which will promote the application of the newly acquired knowledge.

2.2.16. It is seen that the soil conservation staff had visited the scheme areas during the implementation of the scheme on 32 times, but it is worthy to note that they have conducted spot visits on 39 times after the implementation of the scheme as a follow up.

2.2.17. In respect of extension of perennial crops, the scheme area has put up an encouraging performance. The area in the scheme holdings is 18% higher than that in control region. The increase in the area of perennial crop not only brings measurable benefits by way of higher outputs but also substantial

known measurable advantages. It is found that the cultivation of seasonal crops, unless precautionary measures are taken will aggravate soil erosion, while the growing of perennial crops will accelerate conservation of soil more effectively.

3. Increase in productivity:

2.2.18. A comparison of the income, expenditure and net income from the holdings in the scheme area and control area will clearly indicate the benefits accrued due to the implementation of conservation programme. The above details are shown in Tables 2.2.19 and 2.2.20.

Table 2.2.19 Income, Expenditure and net income of Beneficiary holdings

Name of Scheme	Income		Expenditure		Net income	
	Before Soil conservation scheme	^{After} Before soil conservation work (1986-87)	Before soil conservation scheme	After soil conservation work (1986-87)	Before Soil Conservation Scheme	After soil conservation work (1986-87)
Manickal	152639	236988	35818	50820	116821	186168
Pannimala	7184	16140	420	1900	6764	14240
Adiyakulam	17827	21508	3420	4300	14407	17208
TOTAL	177650	274636	39658	57020	137992	217616

Table 2.2.20. Income, Expenditure and net income of control plots (1986-87)

Name of Scheme	Income	Expenditure	Net income
Manickal	67640	9300	58340
Pannimala *	..	3125	(-) 3125
Adiyakulam	2220	400	1820
TOTAL	69860	12825	57035

* Tapping not started

2.2.21. An attempt has been made to arrive at the net income per hectare from the plots in the control area and in the scheme area. An amount of Rs.6032/- is the net income per hectare from the scheme area and Rs.5741/- from the control area. The higher rate of net income from the scheme area is due to the positive impact of the implementation of conservation programmes.

CHAPTER III

3.1 General Observations:

3.1.1 The holdings of the beneficiaries of the selected Soil Conservation scheme surveyed area as follows: nearly 82% of the beneficiaries of Soil Conservation scheme cultivate holdings less than one hectare and 15% have comparatively large holding measuring less than 3 hectares. Only 3% of the beneficiaries are found to possess holdings measuring over three and less than five hectares.

3.1.2. Regarding the financing of the Soil Conservation schemes, 25% of the expenditure is being granted as subsidy to the beneficiaries, 75% of the expenditure has to be repaid in 20 equal instalments in ten years. The beneficiaries interviewed, expressed their grievances in respect of inability to repay the loans punctually. It may be stressed that soil conservation measures take a long time to produce their full impacts on land productivity and to enhance the capacity of the beneficiaries to meet financial obligation. The bulk of the beneficiaries of soil conservation scheme are hardly viable farmers. They continue the struggle for existence in the back drop of subsistence farming. Beneficiaries of commercial farming borrow funds for developing land and building capital assets. They will be able to discharge their liabilities promptly, while beneficiaries of subsistence farming can hardly discharge their liabilities in time.

3.1.3 Due to the economic weakness of these beneficiaries and poor returns from the scheme area, the enhancement of subsidy rate from 25% to 50% may be considered at appropriate levels of policy.

Table 3.1.4. Opinion of the beneficiaries with regard to Soil erosion measures.

Sample	Total number of beneficiaries	Effectiveness of contour bunding			Fertility of the soil			Moisture retention		
		a	b	c	a	b	c	a	b	c
Manickal	24	15	9	-	8	15	1	8	12	4
Pannimala	19	7	12	-	4	14	1	3	15	1
Adiyakalam	22	13	9	-	1	16	5	1	18	3
Total		35	30	-	13	45	7	12	45	8
Effective = a		Moderate = b			No effect = c					

contd.....

3.1.5 Soil conservation measures like contour bunding will become fully effective and promote maximum soil capability only if they are supported by suitable farming practices such as crop rotation, contour cultivation, strip cropping, cover cropping and agronomic practices involving the use of reduced seed rate and adequate manuring.

3.1.6 Out of the 65 beneficiaries contacted, 35 have acknowledged the effectiveness of contour bunding in the scheme area. The remaining 13 beneficiaries are of the opinion that contour bunding is moderately effective for controlling soil erosion. With respect to the fertility of the soil 13 cultivators are of the opinion that the contour bunding have effectively controlled the fertility of the soil 45 reported moderate nature of control while the remaining 7 beneficiaries reported the effectiveness of soil conservation scheme in the retention of fertility of the soil. The same line of thought has been revealed with respect to moisture retention.

3.1.7 In the scheme area the dearth of irrigation facilities and inadequate water management were found to impair the efficiency of soil conservation arrangements. There is a clear need for creating a machinery to take up the task of follow up action with linkages between soil conservation machinery and water management.

3.2 Summary and conclusion:

3.2.1 This evaluation study of the soil conservation programme in Trivandrum District seeks to probe into the cost benefit relations. The most distinct feature of the present study is the adoption of control plots which helps to isolate the external variables that influence land use pattern, crop combinations and income generation.

3.2.2 There is an increasing awareness of the importance of soil conservation programme among the people in the scheme area.

3.2.3 Table 3.2.3 shows that only five sample beneficiaries out of 65 have attended to the annual maintenance of the soil conservation work. The reason for non-maintenance is attributed to lack of funds in 37 cases and lack of interest in 27 cases.

Table 3.2.3 Maintenance of soil conservation work

Sample	Number of beneficiaries attended annual maintenance	Not attended annual maintenance due to		
		No interest	Lack of fund	Total
Manickal	2	21	1	22
Pannimala	1	-	18	18
Adiyakulam	2	6	14	20
Total	5	27	33	60

3.2.4 An effective conservation programme requires the adoption of sound land use principles and cultural practices by the target farming community. Ignorance, inability or inertia prevent the farmers from taking the right action at ^{write right} time at the right place to protect the soil. Therefore, soil conservation measures should be treated with utmost importance.

3.2.5 A tentative estimate of 10 lakh hectares of land need conservation measures in Kerala. To save this land, for acquiring benefits we do require an action plan for the time to come.

3.2.6 During the Third Plan period soil conservation programme gained considerable momentum in India when contour bunding and terracing activities covered four million hectares. The tempo was kept up in the subsequent plans. The scope was widened to include water management measures such as land shaping and levelling, lining of field channels, installation of under ground pipes for irrigation and agricultural drainage works.

3.2.7 In Kerala soil conservation programme was started towards the close of First Five Year Plan. However, since 1964-65 the movement picked up with considerable momentum and the tempo was continued.

3.2.8 It is not easy to apply the cost benefit analysis to soil conservation programme, because the intangible benefits of soil conservation measures are by no means negligible. As a matter of fact several instances of soil depletion and erosion need to be prevented at any cost. Further all tangible benefits are not quantifiable. Even quantifiable benefits are often difficult to impute the increase in income and productivity due to soil conservation works. However, an attempt has been made to conduct a cost-benefit analysis in the foregoing chapter.

3.2.9 There has been a significant increase in the cultivation of perennial crops in the scheme area. This will lead more profit to the cultivators.

3.2.10 The net income per hectare from the scheme area has been found to be higher than that from the control area (Rs. 6032/- from scheme area and Rs. 5741/- from control area)

3.2.11 The expenditure on soil conservation scheme is found to be not only protective but also productive.

3.2.12 On an estimation of the pay back period, it appears to be less than 10 years, after the completion of the scheme.

3.2.13 In Manickal (loan scheme) an amount of Rs. 71607/- has been disbursed as loan with a subsidy of Rs. 17100/-

The subsidy given to the beneficiaries amounts to 25%. Taking into account, the indigence of the bulk of the beneficiaries and the dominant system of subsistence farming as also the heavy overdues in respect of repayment of conservation loans the case for a more generous loan cum subsidy policy needs to be examined. Soil conservation should be looked upon as a social endeavour to protect and preserve the wasting assets. Therefore, it is in the interest of the state to induce every affected person to participate in this supremely important enterprise. Would it be feasible to revise the subsidy component from 25% to 50% in respect of small farms? In the alternative the grace period may be suitably raised, in respect of repayment of loan, because soil conservation measures take at least five years to produce the full impact on land productivity.

3.2.14 There seems to be no arrangement to watch the condition of the bunds after these are constructed. The extent of damages caused to beneficiary plots due to bunds broken in parts comes to 1518 square metres and seriously damaged amounts to 32 square metres. Beneficiaries have complained of breaks in bunds and a good many of these were still in various stages of disrepair.

Table 3.2.15. Extent of damage to the work
(square metres)

Sample	Partially damaged	Seriously damaged
Manickal	12	2
Pannimala	1098	30
Adiyakalam	408	-
Total	1518	32

3.2.16 It has already been seen that a few (5 out of 65) enlightened beneficiaries only have attended to maintenance of bunds.

3.2.17 Soil conservation activities in Kerala, for various reasons centre on engineering devices, primarily contour bunding. It is well known that unless appropriate agronomic practices such as crop protection, contour cultivation, strip cropping and cover cropping are adopted in conjunction with bund construction, these engineering devices will not ensure full soil protection and promote maximum soil capability. Presently this aspect appears to be totally neglected. Here, there is a clear need to strengthen the soil conservation machinery at district level in such a manner that trained persons with proper orientation will find enough time to keep themselves in touch with the concerned beneficiaries.

3.2.18 In the scheme areas, dearth of irrigation facilities and lack of proper water management, appear to impair the efficiency of conservation treatment. Since the concept of soil conservation is dynamic, immature and presently gathering new dimensions, to maintain the capability of the land as to improve its productivity, it is highly desirable to have a better link up of soil conservation with water resources management.

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