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GOVERNMENT OF KERALA

SOIL CONSERVATION
PROGRAMME
IN
KERALA

PATHANAMTHITTA DISTRICT
AN
EVALUATION STUDY
REPORT No. 4

DEPARTMENT OF ECONOMICS & STATISTICS
THIRUVANANTHAPURAM

1990

SOIL CONSERVATION PROGRAMME

IN KERALA

PATHANAMTHITTA DISTRICT

AN EVALUATION STUDY

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Statistics, Trivandrum,
Kerala.

DECEMBER 1989

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P R E F A C E

Soil Conservation Schemes have been launched of kerala in the various districts to protect and preserve the scarvest of the means of production, viz land.

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

The survey was conducted in the scheme Puliyurumba-Pottamala (loan scheme) of Pathanamthitta District.

This report was prepared by Smt.S.Nalini, Research Officer under the guidance of Sri.K.Mohamed Kutty, Deputy Director with the assistance of the staff in the Evaluation Division of this Department.

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

Trivandrum,
8-12-1989.

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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 objectives of soil conservation programmes have 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 patterns of optimisation of land use.

The list of objectives include (1) re-building the lost fertility of land (2) conservation of moisture in arid region (3) proper and efficient water management (4) promoting surface and sub-soil drainage in badly drained areas and (5) other managerial practices to optimise the benefits from investment on land. According to the working group set up by the planning commission. 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 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 a scheme area of Pathanamthitta district during 1986-87 to assess the impact of soil conservation measures in the district.

1.2. Objectives and Methodology of Survey

1.2.1. Objectives: The main objectives of the study will be (1) 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 analysis, 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 soil conservation programmes and the effects of extension works carried out by the concerned department in this direction.

1.2.2. Methodology: A sample size of 25 Nos. of beneficiaries are to be selected for the detailed survey covering all the four strata Viz. less than 1 Ha, 1 to 3 ha., 3 to 5 ha and 5 ha. and above. Since the no. of beneficiaries may vary and the extent of land covered also differ, one may not be able to fix a uniform procedure for the coverage of the survey. In Pathanamthitta 25 beneficiaries were selected at random for detailed survey and the extent of land covered by all these beneficiaries is less than 1 ha. Five central plots also have been selected for comparative study.

1.2.3. Schedule: Four types of schedules are used for this study. Schedule I is for the list of beneficiary cultivators, Schedule II for detailed enumeration of the selected beneficiaries, Schedule III is used for the list of central plots and Schedule IV for canvassing the details of central plots.

1.2.4. Field work and supervision of the survey:

One Investigator was posted for the conduct of the survey. He was given necessary training in the various aspects of the survey. The supervision was vested with the Deputy Director of the District Office of this Department and the officer-in-charge of the scheme at the head quarters.

1.2.5. Period of the Survey: The reference period of the survey was 1986-87 (agricultural year).

1.3. Problems of soil erosion:

1.3.1. 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. Top soil is the most vital part of the soil. The loss of top soil results in deterioration of land i.e. by way of soil erosion.

1.3.2. 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 produced. The soil erosion constitutes a land problem of enormous importance, not only for individual farmers but also for the entire society.

1.3.3. Causes of erosion

The destruction of the soil is mainly attributed to the catastrophic soil erosion which brings about the slow death of the soil. Water and wind are the active forces of erosion. Under the erosive forces of water and wind, the unprotected soil especially on slopes starts moving out.

1.3.4. Climate, topography, physical and chemical characteristics of soil and vegetation are the important factors which influence the extent of erosion. Agents which bring about erosion vary with climate. Wind is the principal cause of erosion and the extent of damage depends on its velocity in dry areas.

1.3.5. In wet areas, rain causes erosion through excessive runoff and the extent of damage upon the intensity, duration and frequency of rain fall.

1.3.6. The kind, quality and extent of the vegetation affect erodability of soil. The abundance of vegetation can provide an effective protective cover against erosion caused by both water and wind. Trees and grasses intercept the corrosive or beating action of falling rain drops. It can also check the flow of water down the slopes. The lands that are devoid of vegetation are thus more likely to be eroded than lands covered by vegetation.

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 in vogue are Agronomic, Agrostologic, Engineering and Forestry. The Agronomic agrostologic and forestry practices protect the fertility of the soil and the various engineering aspects supplement the effects of former measures. These are designed to reduce the flow of surface water, unbound water for a longer time and allow surplus run-off to flow. The various mechanical practices are contour bunding, contour cultivation, terracing, bench terracing etc.

1.3.10. Responsibility for prevention of erosion

Conservation of 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. The evils of erosion are very serious, these are not at all recognised promptly. Further, the benefits of antierosion works could be reaped only gradually. The individual farmers are interested in quick returns and hence may not show much interest in 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 co-operation of the farmers, any Government action in this regard is deemed to failure.

1.3.11. 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 fertilizers. This is because of wrong cropping pattern which also leads to the impoverishment of the soil.

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Extent of the problem in Pathanamthitta district:

1.3.12. The total geographical area of Pathanamthitta district is 268750 has. of which 1,64,204 has. form forests, uncultivable waste and land put to non-agricultural uses. The remaining area of 1,04,546 has. is under cultivation of permanent pastures, cultivable waste and miscellaneous tree crops. An area of 13,130 has. of land was brought under the cultivation of paddy which has a flat topography. A sizable portion of the remaining area viz. 91416 has. is made up of steep hills and low valleys. It is estimated that at least $\frac{1}{3}$ to $\frac{1}{2}$ of this 1,56,871 has. are highly vulnerable to soil erosion hazards which require effective conservation measures. About 40% of the area form steep hills to very steep hill ranges, 30% area is moderately to steeply slopping ridges and the rest of the land is gently to moderately slopping spurs.

Red loam, Riverine, Alluminium, Black soil, Forest foam and hydromorptive saline soil are different types of the soils found in Pathanamthitta district.

There is an annual rainfall of 500 cm rain wets about 1% of the land, 400 cm in 60%, and 200 cm of rain wets in the remaining area of Pathanamthitta district.

About 15% of the area in Pathanamthitta district is classified as wet evergreen, 15% semi evergreen 8% moist deciduans, 2% forest plantation, 5% dry deciduans, 4% other plantations and the rest is unclassified.

The rivers Pamba, Manimala, Achancoil are passing through this district.

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 recognized for long that soil was a wasting asset and that its depletion through natural agencies was accelerated by the indifference and ignorance of the farmer.

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1.4.2. The extent of the havoc may be gauged from an estimate that two percent of the valuable surface soil is lost every year through erosion. Knowledgeable 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 soil conservation measures undertaken in the District of Pathanamthitta.

CHAPTER II - Results of the Survey

2.1. Impact of soil conservation measures on
Land Use and crop pattern

2.1.1. The puliyurumba Pottamala Scheme has been taken for study in Pathanamthitta District. The scheme located in Kottangal village of Thiruvalla Taluk. It covers an area of 9.69 hectares and involves an estimated cost of Rs.80,200/-. Actual conservation work was commenced on 23-12-1980 and it was completed on 18-2-1981. The type of work is construction of contour Bunds.

2.1.2. According to 1981 census Kottangal Village comprises an area of 2308 hectares with a population of 16170 (8021 males and 8149 females). As many as 81% of the villages were literate. Out of 37 beneficiaries of the scheme, 25 persons were selected at random for detailed study.

2.1.3. An attempt has 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 prior to soil conservation measures and after the soil conservation treatment (ie. 1986-87). Details were also collected from control plots for comparison purposes.

2.1.4. Table I below gives the land use particulars of the selected holdings in the scheme area and control area prior to the introduction of the Soil Conservation Scheme and in 1986-87.

Table-I Land use particulars of selected beneficiaries

Sl. No.	Land use particulars	Before S.C. work		After S.C. work		Control plot	
		Area	%	Area	%	Area	%
1	2	3	4	5	6	7	8
1.	Area cultivated	2.54	75	2.78	82	1.95	80
2.	Current fallow	0.30	9	0.20	6	0.19	8
3.	Other use	0.20	6	0.20	6	0.10	4
4.	Area not cultivated	0.34	10	0.16	5	0.19	8
Total		3.38	100	3.38	100	2.43	100

2.1.6. A total of 25 beneficiaries were selected for detailed enquiry. All of them fall within the stratum of less than 1 hectre land holdings.

2.1.7. These beneficiaries were categorised as Agriculturists, Non-Agriculturists and Agricultural labourer or Non-Agricultural labourer.

2.1.8. Out of 25 beneficiaries selected ten are Agriculturists, three are Non-Agriculturists and the remaining form Agricultural/Non-Agricultural labourers.

2.1.9. Contour bunding is the main soil conservation work done in the area.

2.1.10. Compared with the control plots, the scheme area shows positive character in all categories. The area cultivated in the scheme area is 82% while in the control area it is 80%. The area under other use comes to 6%%in the scheme area while it is 4% in control area. Area not cultivated is 5% and 8% respectively in the scheme area and control area.

2.1.11. The Crop Pattern : Consequent on the implementation of soil conservation scheme, there are certain significant changes in the cropping pattern. There is an increasing trend in the cultivation of perennial crops. Since soil conservation measures are introduced, as evident from table 2.

Table-2. The crop pattern

Item	Scheme area				Control area	
	Before	%	After	%	1986-87	%
	S.C.Scheme		S.C. scheme			
1	2	3	4	5	6	7
Perennial Crops	0.70	78	2.75	85	1.26	81
Seasonal crops	0.20	22	0.50	15	0.30	19
Total	0.90	100	3.25	100	1.56	100

In the scheme area there is an increase of 7% in the area of Perennial Crops after the implementation of soil conservation works. From the above table, it can be seen that the farmers have acquired a tendency to cultivate perennial crops.

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The higher rate of increase in the cultivation of perennial crops in the scheme area is due to the improvement of soil and moisture conditions. It is desirable to cultivate 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.

The study on soil conservation programme reveals that the area under the perennial crops has increased in the scheme area.

2.1.12. The following table testifies to the above statements.

Table 3. Area under selected perennial crops

Sl. No.	Name of Perennial Crops	Scheme Area		% of increase
		Before S.C. work	After S.C. work	
1.	Coconut	0.31	1.00	223
2.	Arecanut	0.02	0.03	50
3.	Cashew	0.02	0.30	1400
4.	Pepper	0.01	0.29	2800
5.	Coffee	-	0.02	-
6.	Rubber	0.30	3.20	966
7.	Others	0.04	0.17	325
Total		0.70	4.99	613

2.1.13. From the above table we can see that there is an increase in the area brought under cultivation of selected perennial crops, Viz. Coconut, Arecanut, Cashew, Pepper and Rubber during the period under report.

2.1.15. Impact of Soil Conservation treatment on yield of crops

Information on yield and the value of crops were collected from the holdings of 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 all the crops have shown an increasing trend.

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Table 4. Crop-wise area, quantity and value of yield
(Perennial crops)

Sl. No.	Name of crop	Unit	Before S.C. work			After S.C. work		
			Area	Qty.	Value	Area	Qty.	value
1.	Cocoanut	Nos.	0.31	2220	3690	0.75	3855	10995
2.	Arecanut	"	0.02	1150	80	0.03	4700	470
3.	Cashew	Kg.	0.02	10	60	0.20	60	840
4.	Pepper	"	0.01	1	25	0.29	72	3048
5.	Coffee	Kg.	-	-	-	0.02	20	200
6.	Rubber	Kg.	0.30	-	-	1.26	489	7927
7.	Others	Kg.	0.05	30	6	0.20	1055	350
Total			0.71	3411	3861	2.75	10251	23830

2.1.17. The production of all the crops has increased after the implementation the soil conservation measures. In the case of rubber, the area is 0.30 hectares before the implementation of the programme and it has increased to 1.26 hectares after implementation.

2.1.18. In the case of cultivation of seasonal crops the area brought under the cultivation of Tapioca has been doubled and the area under plantain increased due to the adoption of soil conservation measures. The details are given below.

Table 5. Crop-wise area, quantity and value of yield
(Seasonal crops)

Sl. No.	Name of crop	Unit	Before S.C. Programme			After S.C. Programme		
			Area	Qty.	Value	Area	Qty.	Value
1.	Tapioca	Kg.	0.20	155	110	0.40	405	435
2.	Ginger	"	-	..	..	0.01	5	25
3.	Plantain	"	0.003	2	34	0.05	46	785
4.	Others	"	0.04	106	105
Total			0.203	157	144	0.50	562	1350

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2.2. Cost-Benefit Analysis of the Soil Conservation Programme

2.2.1. Attempts for protecting invaluable resources like soil the application of cost benefit analysis is unwarranted especially in 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 type.

2.2.2. An expenditure of Rs.79,700/- is incurred for the works on soil conservation programmes in Puliyurumba Pottanala Scheme of Patharanthitta district.

2.2.3. The table below shows the benefits obtained from the cultivation of land with various perennial and seasonal crops.

Table 6. Area, Quantity and value of perennial and seasonal crops

Sl. No.	Name of crop	Unit	Before S.C. Scheme			After S.C. Scheme		
			Area	Qty.	Value	Area	Qty.	Value
1.	Cocoanut	No.	0.31	2220	3690	0.75	3855	10995
2.	Arecanut	"	0.02	1150	80	0.03	4700	470
3.	Cashew	Kg.	0.02	10	60	0.20	60	840
4.	Pepper	"	0.01	1	25	0.29	72	3048
5.	Coffee	"	..	..	..	0.02	20	200
6.	Rubber	"	0.30	-	-	1.26	489	7927
7.	Tapioca	"	0.20	155	110	0.40	405	435
8.	Ginger	"	..	..	..	0.01	5	25
9.	Plantain	"	0.003	2	34	0.05	46	785
10.	Others	"	0.05	30	6	0.24	1161	455
Total			0.913	..	4005	3.25	..	25180

2.2.4. Value of the crops before the implementation of the soil conservation programme in the area of the beneficiaries comes to Rs.4005/- and the production value after the implementation of the scheme amounts to Rs.25180. This benefit has been obtained as a result of the increased production as well as the increase in area under cultivation. It is worthy to note that perennial crops have the major share in the production value. The area under cultivation of the selected beneficiaries before the soil conservation scheme was 0.913 while after the implementation of the Soil conservation scheme was 3.25 hectares. We can arrive at the pay back period by dividing the actual cost by the annual benefit. This is $\frac{79700}{21725} = 3.67$ ie. approximately 4 years.

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2.2.5. The total area of the selected beneficiaries has been estimated at 3.25 hectares of which 1.26 hectares comes under Rubber cultivation. Here 0.3 hectares was under rubber cultivation before the implementation of the soil conservation programme. The area under rubber cultivation has increased to 1.26 hectares and tapping was started with a production of 489 Kgms.

2.2.6 Here the performances of the holdings before and after the launching of the soil conservation programmes are compared. The concept of control plots has been used to isolate the external variables. Among the numerous direct benefits flowing from the conservation programme which are quantifiable, three categories of benefits may be picked up for special consideration. They are (1) extension of area under cultivation (2) diversification of the cropping pattern and (3) increase in productivity.

2.2.7(1) 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.

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 programmes indicates the sizable impact of conservation measures.

2.2.8. In control region 8% of area is not cultivated but in the scheme area it is 5%. 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.

2.2.9(2) Diversification of the cropping pattern

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.

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2.2.10. It is seen that the soil conservation staff had visited the scheme areas during the implementation of the scheme on 11 times. But they have failed to pay need to this extension work after the implementation of the schemes as a follow up.

2.2.11. In respect of extension of perennial crops, the scheme area has put up an encouraging performance. The area cultivated in the scheme area is greater than that in the control region. The increase in the area of perennial crop not only brings measurable benefits by way of higher out put but also substantial known measurable advantages.

2.2.12. 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.

2.2.13 (3) Increase in productivity

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 the following tables.

Table 7.A. Income, Expenditure and net income of beneficiary holdings

Name of Scheme	Income		Expenditure		Net income	
	Before SC work	After SC work 86-87	Before SC work	After SC work 86-87	Before SC work	After S.C. work 86-87
Puliyurumba Pottamala	440	31,284	200	9560	240	21724

Table 7-B. Income, Expenditure and Net income of Control plots (1986-87)

Name of Scheme	Income	Expenditure	Net income
Puliyurumba Pottamala	20,720	10,799	9921

2.2.14. The net income received from the beneficiary plot is Rs.21724/- and for the control plot is Rs.9921/-.

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2.2.15. 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.6428 is the net income per hectare from the scheme area and Rs.4082/- from the control area. The higher rate of net income from the scheme area is due the positive impact of the implementation of conservation programmes.

CHAPTER III - Summary & Findings

3.1 General Observations

3.1.1. On the basis of the operational holdings of the beneficiaries of the selected scheme, all of them come under marginal farmers i.e. operation of less than one hectare of land.

3.1.2. Instead of giving subsidy to the cultivators, arrangements have to be made to supply the improved seeds, manures etc. to cultivate and provide market for the produce. The current practice of giving subsidy of 25E to the cultivators may be substituted by the above policy, since most of them are hardly viable farmers. They continue to struggle for existence in the back drop of subsistence farming.

Out of the twenty five beneficiaries selected, on the opinion about the effectiveness of the contour bunding, only two were of the opinion that it was effectively controlled, 9 had reported that soil was controlled moderately and the rest had reported no effect.

3.2. Summary and Conclusion

3.2.1. This evaluation study of the soil conservation programme in Pathanamthitta 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 combination 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. In order to promote the capability of soil cultivators are to be supported by suitable farming practices such as crop rotation, contour cultivation, strip cropping, cover cropping, agronomic, agrostologic measures etc. There is a clear need for creating a machinery to take up the task of follow up action with link ages between soil conservation machinery and water management.

3.2.5. 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

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rotation, contour cultivation. Strip corpping, cover cropping and agronomic practices involving the use of reduced seed rate and adequate manuring.

3.2.6. In addition to the creation of an awareness of those practices among the target community, an agency has to be created for exclusive extension work and monitoring the proper implementation of suitable schemes.

3.2.7. It has been noted that significant increase in the cultivation of perennial crops in the scheme area yielding more profit to the cultivators.

3.2.8. The expenditure incurred for soil conservation scheme is found to be not only protective but also productive.

3.2.9. 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 this tempo was continued.

3.2.10. It is not easy to apply the cost benefit analysis to soil conservation programme, because of the intangible benefits of soil conservation schemes 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 after 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 forgoing chapter.

3.2.11. 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 rotation, contour cultivation, strip cropping, cover cropping etc. are adopted in conjunction with the construction of bunds, there engineering devices will not ensure full soil protection and promote maximum soil capability.

3.2.12. In the scheme areas, dearth of irrigation facilities and lack of proper management appear to impain the efficacy of conservation treatment.

3.2.13. Soil productivity and increased agricultural production will be possible only if we make earnest attempts to conserve soil and moisture. So, any amount spent on soil and water conservation will never go a waste.

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