

EVALUATION STUDY SERIES NO. 22

**DUGWELL IRRIGATION IN
PALGHAT DISTRICT-KERALA**

**AN EX-POST
EVALUATION STUDY**



**NATIONAL BANK FOR
AGRICULTURE AND RURAL DEVELOPMENT
ECONOMIC ANALYSIS AND PUBLICATIONS DEPARTMENT
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The National Bank for Agriculture and Rural Development (NABARD) was established on July 12, 1982. The Agricultural Refinance & Development Corporation (ARDC) ceased to exist from that day and its functions were taken over by the NABARD. The subject-scheme was sanctioned by the erstwhile ARDC. For the sake of convenience, the report refers to ARDC although it does not exist any more.

FOREWORD

This is the twenty-second in the series of evaluation reports brought out by the National Bank, and the first one in respect of the state of Kerala. The subject-matter of the evaluation was a minor irrigation scheme sanctioned to the Kerala Cooperative Central Land Mortgage Bank for implementation in Palghat district of the state. In Kerala, Palghat district has the highest percentage of irrigated area at 36% as compared to 12% for the state as a whole.

The results of scheme have been found to be quite favourable, with financial rate of return on new wells with pumpsets and renovation of wells with pumpsets ranging between 35% and 40%. No instance of infructuous well had been reported during this study. The study shows that the subject-scheme enabled an additional production of 35,930 tonnes of sugarcane in the scheme area, which provided the much needed raw material for the local cooperative sugar factory. This forward linkage also benefited the borrowers in the form of better prices for sugarcane. Another finding that merits attention is that fixing the due dates for repayment of loan instalments to coincide with the peak marketing season of the major crop grown in the area could enable the banks to have a better recovery performance. The repayment performance of the sample beneficiaries was found to be quite satisfactory, with recovery forming 84% of the demand. The repayment period prescribed by the bank was consistent with the repayment capacity of the scheme beneficiaries.

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BASIC DATA SHEET

I)	Reference year of study	:	July 1980 - June 1981.		
II)	Total number of scheme beneficiaries	:	643		
				New*	
				well	
					New well
					with
					pumpset
					Renova-
					tion of
					old well
					with
					pumpset
					Renova-
					tion of
					old well
					without
					pumpset
III)	Number of units financed	:	208	310	182
IV)	Size of sample	:	20	30	20
V)	Average cost of investment (Rs. per unit) in historical prices	:	6,345	10,595	6,875
VI)	Average loan disbursed (Rs.):	:	6,018	8,628	5,489
VII)	Average size of holding (acres)	:	-	8.30	9.25
VIII)	Average benefited area (acres)	:	-	3.18	2.08
IX)	Intensity of cropping (%)				
	(a) With project condition	:	-	257	265
	(b) Without project conditions	:	-	124	129
X)	Net income (Rs.)				
	(a) Per unit	:	-	8,665	5,360
	(b) Per acre	:	-	2,725	2,577

		New* well	New well with pumpset	Renova- tion of old well with pumpset	Renova- tion of old well without pumpset
XI)	Incremental income per unit (Rs.)	: -	7,444	4,310	3,000
XII)	Financial rate of return (%) :	-	35	40	Above 50
XIII)	Total scheme impact				
	(a) Addition to irrigated area (acres)	: 1,652			
	(b) Gross value of addi- tional agricultural production (Rs. lakhs)	: 71.74			
	(c) Contribution to GDP (Rs. lakhs)	: 40.73			
	(d) Non-recurring addi- tional employment (lakh man-days)	: 6.34			
	(e) Recurring additional employment (lakh man-days)	:			
	1. Hired	: 1.47			
	2. Family	: 0.45			

* At the time of field survey, the borrowers of loans for new wells had also installed pumpsets, the financing of which was from other sources. As such no separate estimates for benefit from new wells were attempted in the study.

SUMMARY AND CONCLUSIONS

1. The minor irrigation scheme taken up for evaluation was sanctioned to Kerala Co-operative Central Land Mortgage Bank (KCCLMB) in 1969 for the construction of 500 new wells, renovation of 700 old wells and installation of 550 pumpsets in Chittor and Palghat taluks of Palghat district, Kerala. The total credit assistance approved under the scheme was Rs. 75.35 lakhs with refinance assistance at Rs. 67.81 lakhs. The scheme was sanctioned for implementation over a period of three years commencing from 1969-70. It was rephased on three occasions and the last rephasing was effected in December 1972, with physical achievements, as of 30 June 1972, at 518 new wells, renovation of 251 old wells and installation of 492 pumpsets. The corresponding financial achievements at the time of final rephasing of the scheme stood in terms of credit assistance at Rs. 50.89 lakhs and of refinance at Rs. 45.98 lakhs. The scheme was thus closed with an achievement of about 68% of the financial target.
2. The PLMB had disbursed 769 loans to 643 farmers, thus indicating that some of the scheme beneficiaries had availed of loans for more than one item of investment. Under the scheme, 310 cases were financed for new wells with pumpsets, 182 for renovation of old wells with pumpsets, 69 for renovation of old wells without pumpsets and 208 for new wells without pumpsets. The beneficiaries financed under this scheme were mostly medium and large farmers.
3. The evaluation study was taken up in January 1982 and the field data were collected with reference to agricultural year 1980-81. The sample drawn for the study comprised 82 borrowers, of whom 30 were financed for new wells with pumpsets, 20 for new wells without pumpsets, another 20 for renovation old well with pumpsets and 12 for renovation of old wells alone. The sample beneficiaries were selected from those financed in 6 villages (out of 31 villages covered under the scheme), which accounted for 94% of loans disbursed under the scheme.

4. The study revealed that in the first year of scheme implementation the progress was not satisfactory. The two important factors which contributed to initial slow progress of the scheme were, (a) the inability of the farmers to produce documents to establish their ownership right over the lands held by them as a large number of them in the scheme area were tenants and (b) the non-availability of electricity in some of the villages in the scheme area.
5. Considering the average actual cost incurred by the scheme beneficiaries, the unit costs approved under the scheme for different items for investment were generally inadequate. The average amount of loans disbursed to sample borrowers for different categories of investment was even less than the approved unit costs. The main reason for sanction of lower average amount of loan was the restrictive policy followed by the PLMB in the valuation of land by considering the market value of unirrigated land rather than its presumptive value after development.
6. There was considerable delay in the sanction and disbursement of loans. The average time-lag between the date of application and the date of sanction was a little over 3 months in the case of sample beneficiaries. The average time-lag between sanction and disbursement of the loan was about 2 months. The average time lag between date of application and date of disbursement was a little over 4 months. The delay in sanction of the loan cases was generally on account of the time taken in obtaining the revenue records and encumbrance certificates.
7. It was envisaged under the scheme that the dugwells to be financed will be constructed upto a depth of 35 ft. In the case of renovation of pre-existing wells, they were to be deepened upto the same depth. It was anticipated that each well would irrigate, on an average, 4 acres of sugarcane. The study, however, revealed that in the case of new wells, only 8 of the 50 sample beneficiaries had dug their wells to the required depth; in the other cases, the depth varied from 25 ft.

to less than 35 ft. The depth of 35 ft. was reached in 9 out of 32 sample cases for renovation of wells whereas in the remaining cases it ranged from 25 ft. to 30 ft. Non-adherence to the prescribed depth had adversely affected the discharge from wells and had resulted in a reduced command of wells at a little over 3 acres as against the anticipated 4 acres.

8. On an average, the sample beneficiaries gave 25 waterings to sugarcane, as against the recommended 36. In the case of paddy, the sample beneficiaries gave 6 irrigations during the Kharif season and 12 during the Rabi season. The annual average cost of lifting an acre-inch of water worked out to Rs. 3.80 during the reference year.
9. The important crops cultivated under irrigated conditions were sugarcane and paddy. The per-acre costs of cultivation were estimated at Rs.2,130 for sugarcane and at Rs. 857 for paddy. The average yield of sugarcane realised by the sample beneficiaries at about 30 tonnes per acre was very close to that assumed by the scheme appraisal. The yield of paddy averaged about 10 quintals per acre.
10. The investments in minor irrigation works financed under the scheme resulted in improvements in crop pattern, cropping intensity productivity, income and onfarm employment. The total area benefited by scheme investments came to 2,390 acres. Since a portion of the area irrigated by renovated wells was already receiving irrigation during pre-project period, the incremental area brought under irrigation was estimated to be about 1,652 acres. The annual output of the main irrigated crops, as a result of the scheme investments, is estimated at 35,930 tonnes of sugarcane and 476 tonnes of paddy. As a result of switchover from rainfed to irrigated cultivation, the annual loss in the production of rainfed cotton and groundnut was of the order of 130 tonnes and 75 tonnes respectively. The gross value of incremental output due to the project works out at Rs. 71.74 lakhs in 1980-81 prices. The implementation of scheme also ensured the supply of much

needed cane to the sugar factory located in the scheme area, which had earlier been operating at much below its capacity for want of adequate cane supply. The scheme resulted in a net contribution to GDP of Rs. 40.73 lakhs.

11. The construction of new wells, renovation of old wells and installation of pumpsets under the scheme are estimated to have generated non-recurring employment of the order of 6.34 lakh man-days. In addition, the scheme investments had created additional recurring employment of 1.92 lakh mandays per annum, of which the share of hired agricultural labour was estimated at 1.47 lakh mandays.
12. The sample beneficiaries had cultivated sugarcane in 68% to 95% of the benefited area because they realised better income from sugarcane as compared to the other important crop, viz., paddy. Incremental income of Rs. 7,444, Rs. 4,310 and Rs. 3,000 per unit was realised by the beneficiaries of investments in new well with pumpset, renovation of well with pumpset and renovation of well without pumpset respectively.
13. The financial rates of return on investments under the scheme were estimated at 35%, 40% and above 50% for new wells and pumpsets, renovation of wells and pumpsets, and renovation of wells without pumpsets respectively.
14. The loan repayment period under the scheme was uniformly fixed at 12 years, including an initial grace period of one year, for all categories of investment. Repayment performance of the sample beneficiaries was not satisfactory during the initial years, but later on it improved significantly. During the first 4 years, the overdues ranged between 27% and 41% of the demand but had come down in the subsequent years. During the reference year, the overdues formed only 16% of the demand for the sample beneficiaries. Higher level of overdues during the initial years was mainly due to the delay in switching over to high value crops by the scheme beneficiaries.

15. The study underlines the need for so fixing the due dates for repayment of loan instalments as to coincide with the peak marketing season of sugarcane, the important commercial crop grown in the area. The sample beneficiaries whose due dates fell during peak marketing season of sugarcane were found to have been more punctual in repayment relative to the performance of others whose due dates fell outside the sugarcane marketing season.

**THE SCHEME AND ITS
IMPLEMENTATION**

CHAPTER I

THE SCHEME AND ITS IMPLEMENTATION

- 1.1 This is a report on the ex-post evaluation of a minor irrigation scheme sanctioned by ARDC in 1969 and completed in June 1972 after three rephasements. The scheme was sanctioned for implementation in favour of the Kerala Co-operative Central Land Mortgage Bank Ltd. (KCCLMB) for financing the construction of new wells, renovation of old wells and installation of pumpsets in Chittur and Palghat Taluks of Palghat district in Kerala. The evaluation study was undertaken during early 1982 with the period July 1980 to June 1981 as the reference year.
- 1.2 The Palghat district extends over an area of 4.38 lakh ha., of which 2.13 lakh ha. (nearly 49%) is under cultivation. Of the net cultivated area, 1.24 lakh ha. (58%) is sown more than once and the gross cropped area in the district was 3.37 lakh ha. during 1980-81. Nearly 20% of the total cropped area in the district was irrigated during 1980-81. The major sources of irrigation are canals, wells and tanks. Area irrigated by different sources is given in Annexure I.
- 1.3 The foodgrain crops accounted for 59% of the gross cropped area in the district during 1980-81, of which paddy alone occupied nearly 92% of the area. Other important field crops were sugarcane, vegetables, groundnut, cotton, etc. Among plantation and horticultural crops, fruit crops, coconut, condiments and spices, rubber, etc. were the important ones. The area sown under different crops during 1980-81 in the district is given in Annexure 2.
- 1.4 The scheme district experiences a typical tropical monsoon climate. The normal annual rainfall of the district based on IMD data for 50

The responsibility for the facts presented and views in this report vests entirely with the authors.

years is 2115 mm. The rainfall data in respect of the scheme area from 1971 to 1981 are given in Annexure 3. Normal rainfall was received during 4 of the 11 years. The scheme area had experienced a mild drought during 2 years and moderate drought in one year. During remaining 4 years excess rainfall had been received in the area. The South west monsoon is most predominant, contributing 65% of total annual rainfall. The north-east and pre-monsoon rains contribute 20% and 15% of the annual rainfall respectively. Large regional variations in rainfall are observed in the district. The eastern part of the district, which forms the area of operation of the scheme, receives relatively less rainfall than the western part of the district. The average annual rainfall varies from 1800 mm in the east to about 3500 mm in the west.

- 1.5** Ground water is tapped in the district in the main by means of dugwells and to a lesser extent by dug-cum-bore wells. In the scheme area, (Chittur and Palghat taluks) large diameter wells are used for irrigation. The taluk-wise data on draft and development potential in Palghat district for 1979, given in Annexure 4, indicate that there were 3641 energised irrigation wells in operation in the district. Of this about 2439 wells (67%) were in Chittur and Palghat taluks. The total draft through energised wells in the whole district was less than 10% of the annual recharge though in the scheme area (Chittur and Palghat taluks) it was slightly higher at about 18% of recharge.
- 1.6** As stated earlier, only 20% of the cropped area in the district is irrigated and, as such, there is good scope for large scale ground water exploitation in the district in general and the scheme area in particular in view of the relatively low rainfall in the area. The studies carried out by Swedish International Development Agency assisted ground water project on optimisation of ground water exploitation structures revealed that dug wells, dug-cum-bore wells with vertical bores at the bottom of the wells and horizontal bores on the sides are suitable for the major part of the scheme area.

- 1.7 Upto 30 June 1980, ARDC had sanctioned three minor irrigation schemes for implementation in the scheme area for construction of 818 new wells installation of 742 pumpsets and renovation of 326 old wells. The total credit assistance and refinance commitment approved under the scheme were Rs. 82.27 lakhs and Rs. 74.03 lakhs respectively.

The Scheme

- 1.8 In May 1968, the KCCLMB submitted a scheme to ARDC for providing credit assistance for construction of 500 new wells, renovation of 700 old wells and installation of 550 pumpsets in Chittur taluk and a few villages of Palghat taluk of Palghat district. The scheme area had experienced frequent failures of monsoons and as such there was demand from the cultivators for institutional credit to enable them to create own source of irrigation. The scheme was, therefore, formulated with a view to enabling the borrowers to cultivate high value irrigated crops like sugarcane. The scheme also aimed at augmenting the supply of sugarcane to the local co-operative sugar factory which was working at nearly half of its capacity for want of adequate cane supply. Even for working at 50% capacity, the factory had to depend on sugarcane supply from neighbouring districts of Tamil Nadu.
- 1.9 The scheme was sanctioned by ARDC in December 1969 with a total financial outlay of Rs. 75.350 lakhs and refinance commitment of Rs. 67.815 lakhs. Subsequently, the KCCLMB approached ARDC on three occasions to rephase the scheme. Accordingly ARDC rephased the scheme reducing the physical and financial targets of renovation of wells and pumpsets. The physical and financial targets as per the original sanction and as revised under subsequent rephasements are given in Annexure 5. The scheme was treated as closed as at the end December 1972 at the level of achievements as on June 1972, which stood at 518 new wells, renovation of 251 old wells and installation of 492 pumpsets with a total credit assistance of Rs. 50.887 lakhs and refinance assistance to the tune of Rs. 45.798 lakhs.

- 1.10** The financial outlay under the scheme was determined on the basis of the unit cost of Rs. 6,500 for new well and Rs. 3,000 each for renovation of old well and for installation of pumpset of 5 hp. The cost of investment in full was to be advanced by Primary Land Mortgage Bank (PLMB) by way of loans, since no down payment by farmers towards the investment cost other than the customary share capital contribution had been stipulated. The financial outlay and the credit assistance under the rephased scheme was therefore equal at Rs.50.887 lakhs.
- 1.11** The cultivators availing the credit assistance under the scheme were to be charged interest rate at 8.5% per annum and the repayment period was fixed at 12 years uniformly for all the three categories of investment covered under the scheme.
- 1.12** The loan eligibility under the scheme was fixed at one half of the market value of land. For this purpose the PLMB had fixed different rates of market value for different types of lands which ranged from Rs. 500 to Rs. 1,500 per acre. It had also been stipulated that in deserving cases the State Government would guarantee any shortfall in security. The loan amount for the construction of new wells as also for renovation of old wells were to be disbursed in 2 or 3 equal instalments. The loan for pumpsets was to be disbursed to the supplier in one instalment.

The Scheme Implementation

- 1.13** Though the scheme was sanctioned in December 1969 the implementing PLMB had started disbursing the loans from August 1969 in anticipation of sanction. The scheme was to be implemented over a period of three years i.e. 1969-70 to 1971-72. During first year of implementation, the progress of the scheme was rather tardy. Important factors which contributed to the slow progress of the scheme were :

- i) the inability of the farmers to produce documents to establish their ownership right over the land, as a large number of farmers in the scheme area were tenants, and
- ii) non-availability of electricity in some of the villages in the scheme area.

1.14 After 1970, all tenants acquired the status of owners of the land as a result of passage of the Land Reforms Amendment Act of 1970. During the same period, the State Government launched a massive rural electrification programme by floating rural debentures. The above factors helped the PLMB in accelerating the progress under the scheme. The scheme was finally rephased and closed with achievements upto June 30, 1972 as indicated in Table 1.1.

Table 1.1

Programme Achievements

(Rs. in lakhs)

Sr. No.	Category of investment	Achievements upto 30.6.72	
		Number of units	Bank credit disbursed
1	2	3	4
1.	New wells	518	29.9325
2.	Renovation of old wells	251	7.0210
3.	Pumpsets	492	13.9335
			50.8870

Size of Loan

1.15 The unit cost of different items of investment under the scheme was arrived at on the basis of costs prevailing at the time of submission

of the scheme. The unit cost assumed in the scheme and the average amount of loan disbursed by the PLMB for different items of investment are given in Table 1.2.

Table 1.2

The Unit Cost and Loan Amount

Sr. No.	Category of investment	Unit cost approved under the scheme (Rs.)	Average amount of loan disbursed (Rs.)
1	2	3	4
1.	New wells	6,500	6,018
2.	Renovation of old wells	3,000	2,825
3.	Pumpsets	3,000	2,664

1.16 The average amount of loan disbursed for construction of new wells was 8% less than the unit cost approved under the scheme. In the case of renovation of old wells and pumpsets the average amount of loan disbursed was less by 6% and 11% respectively than the unit cost approved under the scheme for these items of investment. As would be seen later, average amount of loan disbursed did not compare well with the actual cost incurred by the beneficiaries. The main reason for sanctioning and disbursing loans lower than the approved unit cost was the conservative land valuation policy adopted by the PLMB and the failure on the part of the PLMB in invoking the State Government guarantee in the event of shortfall in the security offered by borrowers.

1.17 The success of minor irrigation scheme can be judged from both the quantity and quality of irrigation water available from the irrigation structures, which in turn, depend upon the suitability of site of wells and their dimensions. As such, effective technical supervision and guidance are essential during the period of implementation. Though

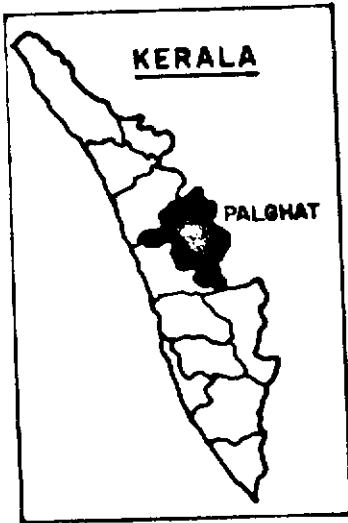
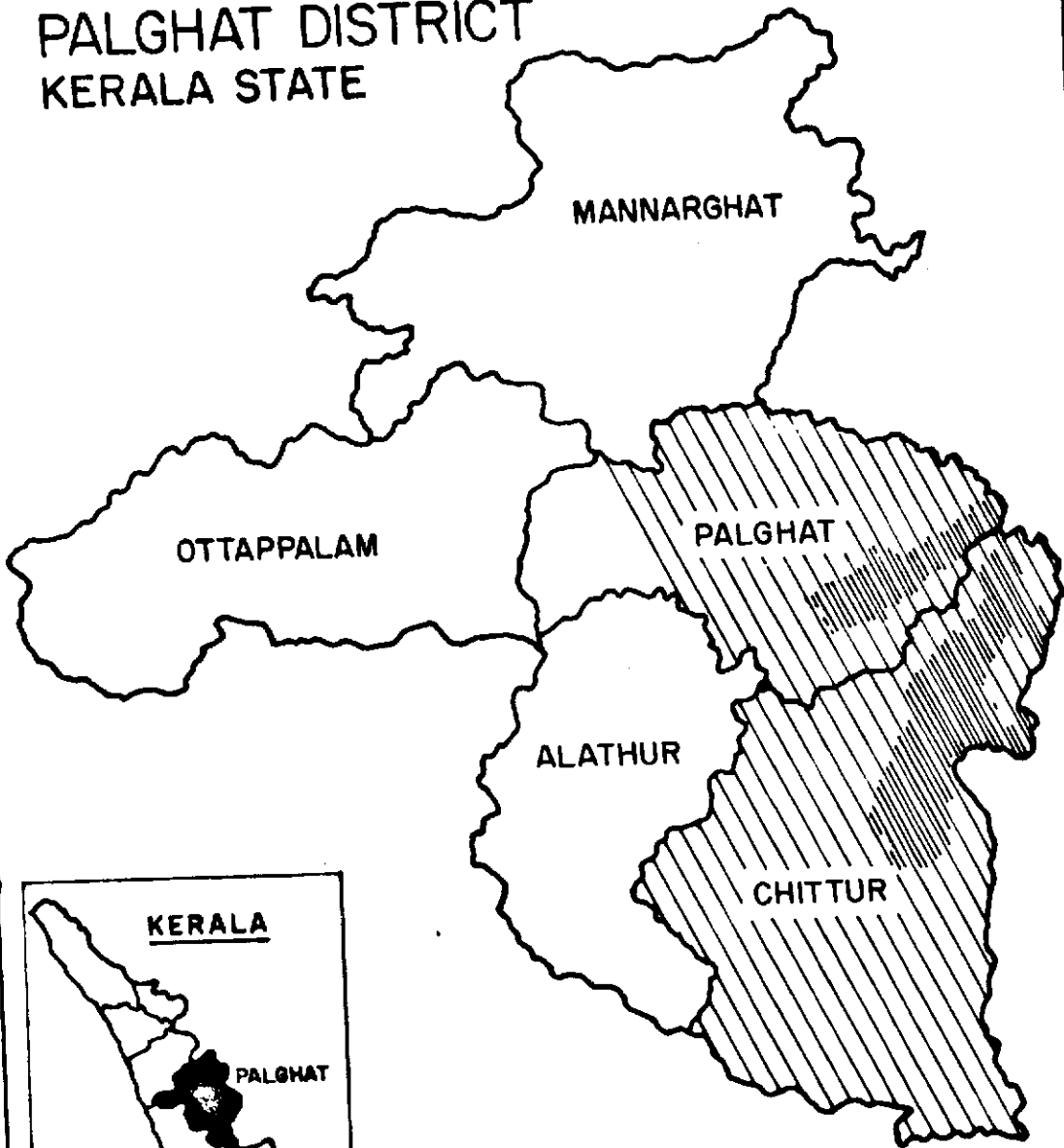
the State Ground Water Department (SGWD) was supposed to provide the necessary technical guidance, it did not fulfil this responsibility. None of the sample borrowers reported having received any technical guidance in the matter of selection of sites, dimensions of wells, or choice of pumpsets.

1.18 The new wells under the scheme were required to be constructed upto a depth of 35 ft. In the case of renovation of wells, the wells were to be deepened by 5 ft. so that a depth of 35 ft. was achieved. Field data, however, revealed that the average depth of wells (new and renovated) constructed by the sample beneficiaries was only 30 ft. Of the 50 sample beneficiaries who had taken loans for construction of new wells, 8 had dug the wells to the depth of 35 ft. or more, 20 upto only 30 ft. and the remaining 22 between 25 and 30 ft. depth. Nine out of 32 sample borrowers who had taken loans for renovation of old wells, had deepened wells upto a depth of more than 35 ft. In the case of 15 of the sample borrowers, the depth of the wells after deepening was 30 ft. and in the remaining 8 cases it ranged between 25 to 30 ft.

1.19 Wide variation in the depth of the wells resulted in variation in the yield of irrigation water, which in turn resulted in the variation of command of the well. The survey data indicated that of the sample beneficiaries who had constructed new wells, only 22% had command area of the well equal to 4 acres or more, 50% had command area of 3 to 4 acres, while the remaining 28% had command area of less than 3 acres. In the case of renovated wells, command area of 4 acres or more could be achieved by 14% of the sample beneficiaries while command area of 3.25 acres and less than 3 acres could be achieved by 30% and 56% of them respectively. However, no case of failure of investment was reported.

1.20 In the case of the sample beneficiaries the information on time taken between date of application, date of sanction and date of disbursement of first instalment was collected and the time lag analysis is given in Table 1.3.

PALGHAT DISTRICT KERALA STATE



SCHEME AREA

AREA SELECTED FOR STUDY

**THE STUDY - ITS OBJECTIVES,
SAMPLE DESIGN AND METHODOLOGY**

CHAPTER II

THE STUDY - ITS OBJECTIVES, SAMPLE DESIGN AND METHODOLOGY

Main Objectives

- 2.1 A field study was undertaken during January 1982 to evaluate the actual benefits from the scheme in the form of incremental output income and employment, both at the micro and macro levels. The reference period of the survey was July 1980 to June 1981.

Sample Frame

- 2.2 The scheme was implemented in 31 villages disbursing 769 loans and covering 643 cultivators. It may be noted here that the difference between the number of loans and number of beneficiaries is due to the fact that a few beneficiaries had taken more than one loan. Since all the scheme villages have uniform agro-climatic conditions and crop pattern no need was felt to stratify the villages on the basis of these attributes. For the purpose of drawing sample for the study 6 of the 15 villages having 10 or more beneficiaries each and together accounting for 94 per cent of the loans disbursed under the scheme were selected. These 6 villages were selected in such a way as to represent 2 villages from the first 4 villages with maximum number of beneficiaries and 4 sample villages from the remaining 11 villages having relatively less number of beneficiaries.
- 2.3 A list of beneficiaries of the scheme in these 6 sample villages was prepared and the beneficiaries were classified on the basis of type of investment for which loan was availed of under the scheme. Twenty per cent sample was randomly selected from each village and category of investment. The village-wise/category-wise sample beneficiaries selected for the study is given in Table 2.1.

Table 2.1

Sample Frame

Sr. No.	Name of village	Sample Size			
		New well with pumpset	New well without pumpset	Renovation of old well with pumpset	Renovation of old well without pumpset
1	2	3	4	5	6
1.	Pudušsery	12	7	5	2
2.	Vadakarapathy	5	4	4	2
3.	Valiya Vallampathy	4	3	5	2
4.	Kozhinjampara	4	2	2	2
5.	Kunnamkattupathy	3	2	2	2
6.	Eruthiampathy	2	2	2	2
Total		30	20	20	12

2.4 For the purpose of estimating the incremental income and benefits accruing to beneficiaries who had taken loan for new well with pumpset, 15 farmers were selected as control sample from the sample villages who were having almost the same size of land holding and were cultivating under rainfed conditions during the reference year.

2.5 As regards renovation of old well with pumpset, details about their pre-project crop pattern, cost of cultivation, net income etc., were collected from the sample beneficiaries themselves instead of selecting a separate control sample. In order to estimate the reference year's cost of investment of different items another set of 10 farmers who had undertaken similar types of investment during the reference year were selected and details about the cost of investment in 1980-81 prices were collected from them.

2.6 The financial viability of investment is assessed in terms of incremental income and the financial rate of return. For the purpose of estimating the incremental income from investment in new well with pumpset, two types of control, i.e. (i) rainfed portion of the sample beneficiaries' holdings and (ii) non-beneficiaries cultivating under rainfed conditions were used. In the case of beneficiaries who had taken loan for renovation of old well, with or without pumpset, the incremental income was estimated on the basis of pre-investment net income in 1980-81 prices estimated on the basis of data obtained from the sample beneficiaries themselves.

**COST OF INVESTMENT AND
ITS FINANCING**

CHAPTER III

COST OF INVESTMENT AND ITS FINANCING

- 3.1** The cost of investment for each of the items covered under the scheme, as approved by ARDC had been estimated on the basis of the 1968 PWD schedule of rates. The unit cost of a dugwell (30' x 25' x 35') was estimated at Rs. 6,500. For renovation of an old well and installation of pumpset the unit cost was estimated at Rs. 3,000 each. The major part of the programme under the scheme was, however, implemented between 1970-72. As such, during this period, the cost of a new well of the stipulated specifications would have gone up to around Rs. 7,000. A large number of wells constructed under the scheme were, however, not as per the specifications laid down under the scheme. As a result, the average cost actually incurred (at historical prices) on construction of the well amounted to Rs. 6,845, which was about 5% higher than the approved unit cost of Rs. 6,500. The actual cost of investment ranged between Rs. 4,250 and Rs. 9,500 among the selected beneficiaries. The higher cost in the case of a few beneficiaries was primarily due to a larger area covered in lining of the well. The labour component accounted for major part of the investment cost (65%) while the material costs came to only about 35%. The average actual cost incurred by the sample beneficiaries on renovation of old well worked out at Rs. 3,125. The average cost incurred by sample beneficiaries on pumpset and accessories was Rs. 3,750, which was 25% higher than the approved unit cost.
- 3.2** Though the construction of the distribution system was not provided for in the scheme, a few of the sample beneficiaries had invested from other sources in installation of the distribution system. The sample beneficiaries who had reported having constructed the distribution system had used either earthen or cement pipes for the purpose.

3.3 Though the scheme had assumed full financing of the cost of investments, the loan amount disbursed was considerably lower than the cost actually incurred. The average amount of loan disbursed for different categories of investment was less than the respective assumed unit cost. The average amount of loan disbursed for different categories of investment, as against the approved unit cost and average actual cost incurred by beneficiaries are given in Table 3.1 below.

Table 3.1

Unit Cost and Loan Disbursed

Sr. No.	Category of Investment	Approved unit cost Rs.	Average actual cost incurred Rs.	Average loan disbursed Rs.
1	2	3	4	5
1.	New wells	6,500	6,845	6,018
2.	Renovation of old wells	3,000	3,125	2,825
3.	Pumpsets	3,000	3,750	2,664

3.4 In the case of new wells, the average amount of loan disbursed by the financing bank accounted for only 93% of the approved unit cost and 88% of the average cost actually incurred by the beneficiaries. The average loan disbursed (Rs. 2,664) for installation of pumpsets accounted for only 89% of the unit cost and 71% of the actual cost incurred by the beneficiaries. In the case of renovation of old well the average amount of loan disbursed was to the extent of 94% of the unit cost and 90% of the actual cost incurred by the beneficiaries. The approved unit costs for new well, renovation of old well and installation of pumpset were lower than the respective average costs incurred by the sample beneficiaries by 4%, 4% and 25% respectively.

3.5 The under financing of investments under the scheme may be attributed mainly to the restrictive method of land valuation adopted by the bank. As a result, though no down payment other than the statutory share capital contribution had been assumed under the scheme the effective down payment inclusive of share capital contribution ranged between 14 and 34%. The difference between actual cost of investment and the loan amount was met out of private borrowings or own savings. While 62 per cent of the sample beneficiaries reported borrowings from private sources, 28% financed it out of their own savings and another 10% through borrowings from commercial banks by pledging gold.

3.6 The data on cost of investment presented above are in terms of historical prices and as such, lack comparability with the data on benefits from the investments, which are in terms of 1980-81 prices. In order to ensure proper comparison and assess the financial viability of the investment, the cost of investment has been estimated at 1980-81 prices by using the data collected from a separate sample. The estimated cost of investment in 1980-81 prices are given in Table 3.2.

Table 3.2

Cost of Investment in 1980-81 Prices

Sr. No.	Category of investment	Cost of investment in 1980-81 prices (Rs.)
1	2	3
1.	New well	10,750
2.	Renovation of old well	5,450
3.	Pumpset (5 hp)	6,600

3.7 Based on the above unit costs, the estimated cost of investment for different categories of investments under the scheme, in 1980-81 prices, would be as indicated in Table 3.3.

Table 3.3

**Cost of Investment for Different Categories of Investment
in 1980-81 Prices**

Sr. No.	Category of investment	Cost of investment (Rs.)
1	2	3
1.	New well with pumpset	17,350
2.	Renovation of old well with pumpset	12,050
3.	New well without pumpset	10,750
4.	Renovation of old well without pumpset	5,450

3.8 Thus if the beneficiaries were to make the investments in 1980-81, those going in for new well with pumpset would have to spend nearly 82% more and those for renovated well with pumpset 100% higher than what they had actually spent on these items. Borrowers with new well and renovation of old well without pumpset would have to spend 65% and 81% more than the historical prices respectively.

**FARM BUSINESS CHARACTERISTICS
OF SELECTED FARMERS**

CHAPTER IV

FARM BUSINESS CHARACTERISTICS OF SELECTED FARMERS

- 4.1 As stated earlier the loans under the scheme were restricted to those farmers who owned 4 acres or more of cultivated land. The size of holdings of sample beneficiaries ranged from 5 to 14 acres. The average size of holding for the sample beneficiaries as a whole was 8.56 acres. For those who had invested in new well with pumpset, the average size of holding was 8.30 acres, and for those who had taken loans for renovation of old well with pumpset it was 9.25 acres.

Benefited Area

- 4.2 While sanctioning the scheme, it was assumed that a new as well as a renovated well would provide irrigation, on an average, sufficient for growing 4 acres of sugarcane. However, the field study revealed that a well with pumpset could actually irrigate, on an average, 2 acres of sugarcane and about an acre of paddy in Kharif and Rabi seasons. It may be mentioned here that the entire area benefited from new well with pumpset was freshly brought under irrigation. In the case of investment in renovation of old dugwell with pumpset, 64% of the total irrigated area, during post development stage, represented the benefiting area on account of the investment. In respect of beneficiaries who had taken loan for renovation of old well without pumpset, 33% of the area irrigated by the well was due to renovation. It was observed during the field study that beneficiaries who had taken loan under the scheme for new well alone had subsequently installed pumpsets financed either out of their own funds or by borrowings from some other financing agency. In order to estimate the area benefited by well alone before installing pumpsets, a few farmers in the scheme area who were still using the traditional lift, viz., mhote were contacted. The data collected from them revealed that a well with mhote could irrigate only an acre of seasonal crops like paddy, vegetable, etc. during Kharif and Rabi seasons.

4.3 The average size of holding and the area benefited from different categories of investment are given in Table 4.1.

Table 4.1

Average Size of Holding and Area Benefited

				(Acres)
Sr. No.	Category of Investment	Benefited area	Rainfed area	Average size of holding
1	2	3	4	5
1.	New well with pumpset	3.18	5.12	8.30
2.	Renovation of old well with pumpset	2.08	7.17	9.25
3.	Renovation of old well without pumpset	1.18	7.02	8.20

4.4 Among the sample units the benefited area varied widely and it ranged from 1.50 acre to 7.00 acres in the case of new well and pumpset. The range of variation in benefited area in respect of renovation of well with pumpset was from 1.00 acre to 3.00 acres, while in the case of renovation of well alone, it was from 0.50 acre to 1.75 acre.

Crop Pattern

4.5 Important crops raised by the sample beneficiaries during the pre-project period under rainfed condition were, groundnut, cotton, paddy, etc. Under irrigated conditions the crop pattern was dominated by sugarcane and paddy. In the case of renovation of old well there was an increase in the area under sugarcane and paddy due to increase in irrigation availability. In the case of well with traditional lift (estimated on the basis of control sample) the crop pattern was dominated by paddy. The crop pattern followed by the sample beneficiaries in the case

of different categories of investment under without and with project conditions is given in Table 4.2.

Table 4.2

Crop Pattern (As percentage of gross cropped area)

Sr. No.	Category of Investment	Sugarcane	Paddy	Cotton	Groundnut	Others
1.	2	3	4	5	6	7
I. New Well with pumpset						
1.	Benefited area	68	32	-	-	-
2.	Rainfed area	-	-	40	60	-
II. Renovation of old well with pumpset						
1.	Benefited area	90	10	-	-	-
2.	Rainfed area	-	-	35	60	5.
III. Renovation of old well without pumpset						
1.	Benefited area	95	5	-	-	-
2.	Rainfed area	-	-	40	55	5
IV.	Control farms	-	-	35	60	5

4.6 It can be seen from the table that an altogether different crop pattern was followed by the beneficiaries on the rainfed and irrigated portions of the land holdings. The beneficiaries were growing sugarcane and paddy under irrigated conditions while under rainfed conditions cotton and groundnut were generally raised though on a small area some miscellaneous crops also were grown.

Cropping Intensity

4.7 As envisaged in the scheme, the sample beneficiaries were growing sugarcane and paddy in the benefited area and as between the two crops sugarcane was more predominant. For working out the cropping intensity a weight of 3 has been assigned to area under sugarcane as sugarcane crop remains in the field for 12 months. The cropping intensity worked out in the case of different categories of investment under without project and with project conditions is given in Table 4.3.

Table 4.3

Cropping Intensity

Sr. No.	Category of Investment	(Per cent)	
		With Project	Without Project
1	2	3	4
1.	New well with pumpset	257	124
2.	Renovation of old well with pumpset	265	129
3.	Renovation of well without pumpset	260	124
4.	Control sample	-	121

4.8 It is significant to note that the intensity of cropping on rainfed portion of the beneficiaries' holding is slightly higher than that on the holding of control sample indicating the favourable spill-over effect of the investment in irrigation structures which made it possible for the farmers to adopt improved agricultural practices even on rainfed portion of their holdings.

Intensity of Irrigation

4.9 As stated earlier, the actual area benefited by the investment was less than what was assumed in the scheme. The deviation was primarily due to two factors. Firstly, the appraisal estimate of the command of the well was not based on realistic estimates of yield of the well and the water requirements of crops in the scheme area. Secondly, the majority of the sample wells had not been constructed up to the desired depth. Since sugarcane crop grown by the sample beneficiaries is of 12 months duration, the extent of area that can be brought under this crop depends mainly on the availability of irrigation water during summer. The study results revealed that the average depth of water column in the sample wells during summer was 1.5 metre and the beneficiaries were able to pump, on an average, for about 2.5 hours/day and irrigate about 30 cents of sugarcane. The average time taken for recuperation was 24 hours. The frequency of irrigation during summer season is normally once in 7 days. The recommended quantum of irrigation for sugarcane in the scheme area is 85 inches. The field study revealed that the beneficiaries were giving, on an average, 25 irrigations, of 2.5 inches depth to the sugarcane crop, and the total irrigation water supplied was less than the recommended irrigation requirement. The paddy crop was raised by the sample beneficiaries either in Kharif or Rabi season. On an average, the beneficiaries were giving 6 irrigations to Kharif paddy and 12 irrigations for Rabi paddy, each of 2.5 inches depth.

4.10 All the sample beneficiaries were cultivating completely new crops under irrigated conditions. The sample beneficiaries obtained, on the average, an yield of 30.10 tonnes of sugarcane per acre, as against the scheme assumption of 30 tonnes per acre; while the yield of paddy averaged to 10.10 Quintals per acre. The variations in yield among sample farmers was explained mainly by the differences in quantity of fertiliser inputs and intensity of irrigation.

Table 4.4

Average Per Acre Yield of Important Crops
(Quintals)

Type of Area	Sugarcane	Paddy	Cotton	Groundnut
1	2	3	4	5
Benefited area	301.00	10.10	-	-
Rainfed area	-	-	2.00	8.00
Control sample	-	-	1.85	7.00

4.11 All the sample beneficiaries who had cultivated sugarcane during the reference year reported that they had sold their cane to the local sugar factory. The price paid by the factory during 1980-81 was Rs.200/tonne. The average farm gate price of paddy was Rs.150/quintal.

ECONOMICS OF INVESTMENT

CHAPTER V

ECONOMICS OF INVESTMENT

5.1 The cumulative effect of improvement in crop pattern, cropping intensity and productivity due to introduction of irrigation can be measured in terms of difference between the per acre gross incomes under 'with project' and 'without project' situations. The estimates of gross income per unit of investment and per acre of benefited area under 'with project' condition and corresponding per acre figures in respect of rainfed cultivation of sample beneficiaries and rainfed cultivation (control) of sample non-beneficiaries are given in Table 5.1.

Table 5.1

Average Gross Income

Sr. No.	Category of Investment	(Rupees)		
		With project		Without project (Rainfed)
		Per unit of Investment	Per acre	Per acre
1	2	3	4	5
1.	New well with pumpset	15,315	4,816	1,685
2.	Renovation of old well with pumpset	12,161	5,846	1,680
3.	Renovation of old well without pumpset	6,192	5,247	1,680
4.	Control sample	-	-	1,560

5.2 It may be observed that per acre gross income is relatively higher in the case of investment in renovation of old well with pumpset as well as renovation of old well without pumpset. The higher per acre gross income from renovated wells (with or without pumpset)

can be attributed to higher intensity of cropping, more intensive irrigation and larger proportion of area under sugarcane. Under rainfed conditions, the cultivators raised low value crops such as cotton, groundnut, pulses, etc. Since all the sample beneficiaries who had taken loan for new well alone were found to have installed pumpsets at the time of field study no attempt was made to estimate the gross income per acre for new well alone.

Costs of Cultivation

- 5.3 Changes in crop pattern and cropping intensity were associated with changes in composition and level of input use. Details in respect of average costs of cultivation per acre of important crops cultivated under with project conditions are given in Table 5.2.

Table 5.2

Average Per Acre Cost of Cultivation

(Rupees)

Sr. No.	Item	Sugarcane	Paddy
1	2	3	4
1.	Seed	125	70
2.	Manure	-	50
3.	Chemical fertilisers	520	172
4.	Pesticides	-	30
5.	Labour		
	i) Hired	1,120	400
	ii) Family	380	135
6.	Irrigation charges (electricity)	240	90
7.	Others including interest on ST loan	125	45
8.	Total costs including imputed value of family labour	2,510	992
9.	Total costs excluding imputed value of family labour	2,130	857

- 5.4** The total cost of cultivation of sugarcane, including imputed value of family labour averaged Rs. 2,510 and excluding imputed value of family labour it worked out to Rs. 2,130 per acre. The corresponding estimates for paddy were Rs. 992 per acre and Rs. 857 per acre respectively. The increase in per acre cost of cultivation consequent upon introduction of irrigation was found to be mainly on account of increased use of fertilisers, pesticides and labour.
- 5.5** As stated earlier, the average command of the well with pumpset was a little over 3 acres in the case of all the categories of beneficiaries, of which about two third was put under sugarcane and the balance under paddy. The average total quantity of water lifted per well for irrigation, worked out to about 150 arce-inches per year. The annual electricity charges worked out, on an average, to Rs. 420 and the annual maintenance charges for electric motor and pumpset to Rs. 150. Thus the cost of irrigation worked out to Rs. 3.80 per acre-inch. The pumpsets were used on an average for about 600 hours per year. None of the beneficiaries under the scheme had installed diesel pumpsets.

Net Income

- 5.6** The net effect of the interaction between increase in irrigated area, shift in crop pattern, increase in intensity of cropping, higher yields and associated higher costs of cultivation is reflected in the higher level of net farm income obtained from the benefited area. The estimates of net income based on two concepts of total costs, one including and the other excluding the imputed value of family labour under 'with project' and 'without project' situations are given below. In the case of renovation of old wells (whether with or without pumpsets), the net income under pre-development situation in 1980-81 prices represents the 'without project' net income.

Table 5.3

Net Income under 'With Project' and 'Without Project' Situations

(Rupees)

Sr. No.	Category of investment	With Project				Without Project			
		Per unit of investment		Per acre		Rainfed area		Pre-investment situation	
1	2	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
1.	New Well with Pumpset	8,665	9,623	2,725	3,026	710	810	-	-
2.	Renovation of old well with pumpset	5,360	5,984	2,577	2,877	-	-	705	805
3.	Renovation of old well without pumpset	3,598	3,949	3,050	3,347	-	-	705	805
4.	Control sample	-	-	-	-	600	685	-	-

(a) Based on total cost including imputed value of family labour.

(b) Based on total cost excluding imputed value of family labour.

5.7 Net income per acre from benefited area in respect of new well with pumpset was estimated at Rs. 3,026 when the imputed cost of family labour was ignored and Rs. 2725 when that cost was also considered. In the case of renovation of old well with pumpset, the corresponding net income estimates were slightly lower at Rs. 2,877 per acre and Rs. 2,577 per acre. Per acre of benefited area net income was highest in the case of renovation of old well without pumpset at Rs. 3,347 and Rs. 3,050 respectively which is attributable to the relatively higher proportion (95%) of area under sugarcane.

5.8 The average net income under 'without project' situation worked out to Rs. 685 per acre excluding imputed cost of family labour and Rs. 600

per acre allowing for imputed family labour cost in respect of rainfed lands of non-beneficiaries. If the rainfed portions of the beneficiaries' holdings were treated as control, the corresponding net incomes worked out to Rs. 810 per acre and Rs. 710 per acre respectively. This suggests that there has been a positive spill-over effect on non-benefiting portion of the sample beneficiaries' holding.

Incremental Income

5.9 The benefit attributable to the investment is measured on the basis of incremental income. In respect of investment in new well with pumpset two different estimates of incremental income (a) on the basis of income from non-benefiting rainfed area of the sample beneficiary, and (b) on the basis of income from rainfed area of control sample of non-beneficiary, have been attempted. In the case of renovation of wells, whether with or without pumpsets, the incremental income was worked out by taking the difference in net incomes of the sample beneficiaries between current and pre-investment situations at reference year's prices. The estimates of incremental income per unit of investment as worked out in the above manner are presented in Table 5.4.

5.10 The average incremental income per unit of investment in new well with pumpset varied from Rs. 6,408 to Rs. 6,757 depending upon the type of control used when imputed value of family labour was included in the total cost. The corresponding magnitudes of incremental income varied from Rs. 7,046 to Rs. 7,444 when the imputed value of family labour was excluded from total cost. The incremental income of sample beneficiaries based on total cost exclusive of imputed value of family labour varied from Rs. 4,560 to Rs. 17,241 when rainfed area of the beneficiaries' holding was treated as control. Taking the rainfed area of non-beneficiary holding as control, it was found that incremental income ranged from Rs. 4,748 to Rs. 18,108 not allowing for the imputed cost of family labour. In the case of renovation of well with

pumpset the incremental income was estimated at Rs. 3,873 considering total cost inclusive of imputed value of family labour and Rs. 4,310 taking into consideration total cost excluding imputed value of family labour. The corresponding incremental incomes were Rs. 2,767 and Rs. 3,000 in the case of renovation of well without pumpset, the range of variation in incremental income was found to be Rs. 875 to Rs. 5,475 among the sample beneficiaries based on total cost exclusive of imputed value of family labour.

Table 5.4

Incremental Income Per Unit of Investment

Sr. No.	Category of Investment	Incremental income based on the					
		Rainfed area of beneficiaries' holding		Rainfed area of control non-beneficiary sample		Pre-investment situation	
		(a)	(b)	(a)	(b)	(a)	(b)
1	2	3	4	5	6	7	8
1.	New well with pumpset	6,408	7,046	6,757	7,444	-	-
2.	Renovation of old well with pumpset	-	-	-	-	3,893	4,310
3.	Renovation of old well without pumpset	-	-	-	-	2,767	3,000

(a) Based on total cost including imputed value of family labour.

(b) Based on total cost excluding imputed value of family labour.

Financial Viability

5.11 The financial viability of investments undertaken under the scheme is assessed on the basis of financial rate of return (FRR). The FRR

based on cash flow for 20 years, in 1980-81 constant prices has been calculated on the basis of following assumptions :

1. The economic life of a new well is 40 years.
2. The life of a pumpset is 9 years.
3. There will be no shrinkage in the command area of the well.
4. There will be no change in the crop pattern over the years.
5. Full development benefits from new well with pumpset are realised only in the third year. Benefits start from the second year and 50% of full benefits will be realised in the second year.
6. Full benefits from renovation of well with pumpset are realised from the second year, and 50% of the full benefits will be realised in the first year.
7. Full benefits from renovation of well without pumpset will be realised from first year itself.
8. As the life of a new well is assumed as 40 years, its residual value at the end of 20 years has been taken at 50% of its initial cost.

5.12 The FRRs estimated for different types of investments are given in Table 5.5.

Table 5.5**Financial Rate of Return**

Sr. No.	Item	Financial rate of return %
1	2	3
1.	New well with pumpset	35
2.	Renovation of old well with pumpset	40
3.	Renovation of old well without pumpset	Above 50

5.13 The FRR in respect of new well with pumpset is relatively lower in comparison with those of renovation of old well with pumpset and renovation of well without pumpset. This is due largely to the relatively lower investment cost and higher proportion of area under high value, sugarcane, crop in the latter two categories.

**REPAYING CAPACITY AND
REPAYMENT PERFORMANCE**

CHAPTER VI

REPAYING CAPACITY AND REPAYMENT PERFORMANCE

6.1 Data obtained on demand, collection and balance during each year upto 1980-81 in respect of loans disbursed to sample beneficiaries are presented in Table 6.1.

Table 6.1

Demand Collection and Balance

(Rupees)

Year	Demand	Collection	Balance	Percentage of overdues
1	2	3	4	5
1971-72	53,025	35,005	18,020	34.0
1972-73	88,805	64,828	23,977	27.0
1973-74	94,762	55,874	38,888	41.1
1974-75	1,09,637	80,036	29,601	27.0
1975-76	1,00,386	77,298	23,088	23.0
1976-77	93,873	74,160	19,713	21.0
1977-78	90,498	66,064	24,434	27.0
1978-79	95,219	76,176	19,043	20.0
1979-80	89,828	73,659	16,169	18.0
1980-81	86,954	73,042	13,912	16.0

6.2 The data show that overdues were relatively higher in the initial years. The higher percentage of overdues in the beginning could have been due to the delay in switching over to high value crops and also due to delay in energisation of electric pumpsets.

6.3 The loan period under the scheme was fixed uniformly at 12 years for all categories of investment. The repayment of the loan was to

commence from the end of the second year thus providing for initial grace period of one year. While fixing the due dates of repayment, however, the financing bank had taken into account only the date of disbursement of the loan, and not the marketing seasons of the crops grown by the scheme beneficiaries. A number of beneficiaries had expressed difficulties in repaying the loan instalments on the dates fixed by the PLMB, as they were not coinciding with the peak marketing season of crops, especially sugarcane. The scrutiny of the bank records revealed that the due dates of repayment of loan instalments for sample beneficiaries were fixed in all months of the year. The percentage distribution of sample beneficiaries according to month in which due date was fixed is given in Table 6.2.

Table 6.2

Proportionate Distribution of Sample Beneficiaries according to month of repayment

Month	Percentage of beneficiaries
1	2
January	21
February	9
March	12
April	9
May	12
June	5
July	4
August	5
September	10
October	4
November	5
December	4
	100

- 6.4** The harvesting and sale of sugarcane in the scheme area commence from November and is completed by March. The Major part of the income from crops accrues to the beneficiaries during this period. It was also observed that the beneficiaries in whose cases the due dates of loan instalment coincided with the above period, had made prompt repayment. About 55% of such beneficiaries had repaid the loan instalments in time without defaulting in any year, about 21% had defaulted once and 24% had defaulted on more than two occasions, over the period between 1972 to 1981. Of the sample beneficiaries in whose cases due dates were fixed between April and October, 28% of them had repaid the loans in time and 39% had defaulted once and remaining 33% had defaulted for two or more times.
- 6.5** The amount of loan instalment was determined on the basis of the income stream expected to be generated from the investment. But, as already indicated, the average benefited areas of the investments financed under scheme was less than the anticipated. Assuming the present level of incremental income and investment cost the debt service liability of different categories of farmers are given in Table 6.3.

Table 6.3

Incremental Income and Debt Service Liability

Sr. No.	Category of Investment	Incremental income/year Rs.	Annual debt service liability Rs.
1	2	3	4
1.	New well with pumpset	7,444	1,189
2.	Renovation of old well with pumpset	4,310	752
3.	Renovation of old well without pumpset	3,000	387

6.6 In the case of all categories of investment, the debt service liability comes to less than 20% of the incremental income. Since all the sample farmers who had taken loan for new well alone had already installed pumpsets the repayment of loan would not be difficult for them. This shows that the original repayment schedules fixed for different categories of investment were rational.

**IMPACT OF SCHEME
INVESTMENTS - MACRO ESTIMATES**

CHAPTER VII

IMPACT OF SCHEME INVESTMENTS - MACRO ESTIMATES

7.1 The benefits from the investments financed under the scheme accrued to the beneficiaries by way of increase in irrigated area, increase in productivity, increase in income and increase in on farm employment. As already indicated 769 units were financed under the scheme. No case of misutilisation or failure was reported under the scheme. The total number of units financed and completed under each category are given below :

Table 7.1

Number of Units Financed and Completed

Sr. No.	Category of Investment	Number of units financed	Number of units completed
1	2	3	4
1.	New well with pumpset	518 *	581 *
2.	Renovation of old well with pumpset	182	182
3.	Renovation of old well without pumpset	69	69
	Total	769	769

* Includes 208 units of new wells alone on which the beneficiaries had installed pumpsets purchased with other sources of funds.

7.2 The total cost of investments supported under the scheme is estimated Rs. 61.74 lakhs at historical prices and Rs. 101.83 lakhs at 1980-81 prices. On the basis of sample data the macro level benefits have been estimated and presented in Table 7.2.

Incremental Irrigated Area

7.3 The total area irrigated by different categories of investment financed under the scheme came to 2,390 acres. Part of this area was irrigated by old wells requiring renovation or as a result of installation of pump-sets by the beneficiaries who had taken loan for new well alone. Thus, for the purpose of estimating the incremental irrigated area we have taken into account the new area brought under irrigation as a result of investment in new well and pumpset and in the case of renovation of old well, with or without pumpset. On this basis, the incremental area brought under irrigation is estimated at 1652 acres.

Table 7.2

Aggregate Impact of the Scheme

Sr. No.	Item	Unit	Incremental magnitude
1	2	3	4
1.	Irrigated area	Acres	1,652.00
2.	Agricultural production		
	a) Sugarcane	Tonnes	35,430.00
	b) Paddy	Tonnes	476.00
3.	Gross value of output at 1980-81 prices	Rs. lakhs	71.74
4.	Value added at 1980-81 prices	Rs. lakhs	40.73
5.	Employment		
	a) Non-recurring	Man years	2,536.00
	b) Recurring	Man years	768.00

Incremental Production

- 7.4** As stated earlier the important crops raised on the benefited area were paddy and sugarcane. Out of 1652 acres of incremental irrigated area, an area of about 1181 acres were under sugarcane and 471 acres were under paddy. The annual incremental output of sugarcane and paddy was estimated at 35430 tonnes and 476 tonnes respectively. As a result of switch-over from cotton and groundnut to paddy and sugarcane cultivation there was a reduction in annual production of cotton by about 130 tonnes and groundnut by 75 tonnes. The gross value of incremental output works out to Rs. 71.74 lakhs at 1980-81 prices.

Incremental Income

- 7.5** The incremental income per unit of investment financed under the scheme is estimated at Rs. 7,444 per new well with pumpset, Rs. 4,310 per renovated well with pumpset and Rs. 3,000 per renovation of well without pumpset. On this basis, the contribution of investments made under the scheme to Gross Domestic Product at 1980-81 prices is estimated at Rs. 40.73 lakhs.*

Employment

- 7.6** Besides increasing the income of beneficiary farmers, the investment activities financed under the scheme also created substantial additional employment opportunities. A part of the employment so created was non-recurring i.e. during construction of dugwells and installation of pumpsets, the balance was of recurring nature. The survey data revealed that it took 990 mandays to dig a new well, about 435 mandays to

* For the purpose of estimating the macro impact of the scheme the incremental income due to new well alone, for which sample estimate was not available, was assumed at 50% of that for new well with pumpset.

deepen a well and about 25 mandays for installation of a pumpset including the construction of pumphouse. On this basis, investment in new wells, renovation of old wells and installation of pumpsets are estimated to have provided non-recurring employment for roughly 6.34 lakhs mandays. All the sample beneficiaries had reported that in the construction/renovation of wells no family labour was employed. In addition to this, the investment in minor irrigation works under the Scheme has created additional recurring employment opportunities of 1.92 lakh mandays per year, of which 1.47 lakh mandays were for hired labour. The implementation of scheme has thus augmented the annual employment of owned labour of the beneficiary families to the extent of 0.45 lakh mandays.

Annexure - 1

Area Irrigated by Different Sources in Palghat District
during 1980-81.

Sr. No.	Source of Irrigation	Area irrigated (ha)
1	2	3
1.	Canals	52,565
2.	Wells and tanks	6,937
3.	Other Sources	5,945
	Total	65,447

Annexure 2

Area Under Different Crops in Palghat District in 1980-81

Sr. No.	Crop	Area (in ha.)
1	2	3
1.	Rice	183634
2.	Jowar	1839
3.	Ragi	968
4.	Other cereals and millets	2062
5.	Pulses	10730
6.	Sugarcane	2324
7.	Other sugar crops	8020
8.	Condiments and spices	11580
9.	Fruits	29868
10.	Vegetables	19655
11.	Groundnut	9309
12.	Coconut	22954
13.	Other oilseeds	1593
14.	Cotton	6223
15.	Drugs and narcotics	103
16.	Coffee	2264
17.	Rubber	11084
18.	Other plantations	1033
19.	Fodder crops	90
20.	Green manure crops	1383
21.	Other non food crops	10297
	Total	336957

Annexure 3

Annual Rainfall in the Scheme Area

(in mm)

Year	Palghat	Chittur
1	2	3
1971	1843.8	993.3
1972	2698.8	1399.6
1973	2482.7	1645.6
1974	2233.6	2008.1
1975	1918.8	1872.6
1976	2584.2	854.0
1977	1817.0	1541.5
1978	2111.8	1212.4
1979	1600.1	1412.5
1980	2065.4	1521.8
1981	2605.6	1794.1
Normal	2115.2	1794.1

Annexure 4

Taluk-wise Estimate of Groundwater Draft and Development Potential in Palghat District

Taluk	Groundwater recharge (in MCM)	Total Number of energised wells	Estimated draft due to wells (MCM)	Estimated draft for human population and livestock (in MCM)	Total annual draft (in MCM)	Groundwater balance for further development (in MCM)	Number of wells proposed	
							Dug wells	Bore wells
1	2	3	4	5	6	7	8	9
Ottappalam	106.72	286	3.43	0.51	3.94	102.78	3750	205
Mannarghat	80.56	251	0.30	0.04	0.34	80.22	2920	160
Palghat	94.09	152	1.82	0.27	2.09	92.00	3720	210
Chittoor	130.10	2439	29.01	4.33	33.34	96.76	3530	195
Alathur	79.37	513	6.16	0.91	7.07	72.30	1080	230
Total	490.84	3641	40.72	6.06	46.78	444.06	15000	1000

Annexure 5

A. Physical and Financial Programmes as Per the Original Sanction

Year	New wells		Old wells		Pumpsets		Supervision charges		Total outlay	Refinance
	Number	Amount	Number	Amount	Number	Amount				
1	2	3	4	5	6	7	8	9	10	
1969-70	100	6.5	230	6.9	110	3.30	1.78	18.48	16.632	
1970-71	200	13.00	235	7.05	220	6.60	1.78	28.43	25.587	
1971-72	200	18.00	235	7.05	220	6.60	1.78	28.44	25.596	
Total	500	32.50	700	21.00	550	16.50	5.35	75.35	67.815	

B. Year-wise Physical and Financial Programmes as Per the First Rephasement

Year	New well		Old well		Pumpset	Total outlay		Refinance
	Number	Amount	Number	Amount				
1	2	3	4	5	6			
1969-70	130		75		100	10.00	9.00	
1970-71	300		250		250	36.91	33.219	
1971-72	70		375		200	28.44	25.596	
Total	500		700		550	75.35	67.815	

Annexure 5 (Contd.)

C. Year-wise Physical and Financial Programmes as Per the Second Rephasing

Year	(Amount Rs. in lakhs)									
	New well		Old well		Pumpset		Supervision charges	Total financial outlay	Refinance	
	Number	Amount	Number	Amount	Number	Amount				
1	2	3	4	5	6	7	8	9	10	
1969-70	132	6.02	70	1.73	86	2.82	-	10.57	9.00	
1970-71	150	9.75	75	2.25	100	3.00	1.20	16.20	13.50	
1971-72	218	14.17	100	3.00	235	7.05	1.71	25.93	24.93	
Total	500	29.94	245	6.98	421	12.87	2.91	52.70	47.43	

D. Physical and Final Programmes as Per the Final Rephasement

Year	New well		Old well		Pumpset		Total outlay	Refinance
	Number	Amount	Number	Amount	Number	Amount		
	1	2	3	4	5	6	7	8
1969-70	132	6.022	70	1.7285	86	2.8280	10.00	9.00
1970-71	154	8.557	82	2.0805	159	3.8495	15.00	13.50
1971-72	232	15.3535	99	3.2120	247	7.2610	25.887	23.2983
Total	518	29.9325	251	7.0210	492	13.9335	50.887	45.7983

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