EVALUATION STUDY SERIES NO: MADRAS-2

DUGWELL IRRIGATION IN PUDUKKOTTAI AND NORTH ARCOT DISTRICTS-TAMILNADU

(AN EX-POST EVALUATION STUDY)

NATIONAL BANK FOR AGRICULTURE AND RURAL DEVELOPMENT

REGIONAL OFFICE : MADRAS-600 034.

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The National Bank for Agriculture and Rural Development (National Bank) 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 National Bank. The subject schemes were sanctioned by the erstwhile ARDC. For the sake of convenience, the report refers to ARDC although it does not exist anymore.

FOREWORD

This report brings out the results of an evaluation of two schemes for financing minor irrigation investments in Pudukottai and North Arcot districts of Tamil Nadu. The schemes covered by the study were implemented by the Tamil Nadu State Co-operative Land Development Bank and refinanced by the erstwhile ARDC.

The study revealed that the investments on minor irrigation structures viz., energised wells, non-energised wells and deepening of wells were found to be viable with the financial rates of return varying between 19 and 38% across different investments and districts. The repayment performance by sample beneficiaries was also found to be satisfactory with the overall recoveries being about 77% of the demand.

Notwithstanding the above good features, certain deficiencies were observed in the scheme implementation. An unrealistic estimation of unit costs, implementation of the sanctioned programme over an extended period and partial disbursements had resulted in severe underfinancing of the investments. Similarly, due to inadequate command area, the viability of the investments was in jeopardy in as many as 25% of the sample farms. Hence, the implementing banks would do well to realistically estimate the unit cost, implement the sanctioned programmes within the approved phasing and also strictly adhere to the technical norms relating to physical dimensions of the minor irrigation structure.

The study also revealed that the proportion of debt service liability to incremental income was disproportionately high in the case of wells in Pudukottai district which is drought prone. Hence, the policy makers should think of subsidising minor irrigation investments to all eligible beneficiaries in dry areas.

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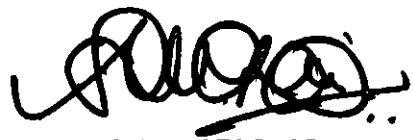

S.VENKATACHARI
DEPUTY GENERAL MANAGER

NATIONAL BANK FOR AGRICULTURE
AND RURAL DEVELOPMENT
MADRAS

10.8.89

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CREDIT LIST

Overall Direction

Shri C. Ramalingam, Chief General Manager
National Bank, Bombay

General Guidance

Shri S. Venkatachari, Deputy General Manager
National Bank, R.O. Madras

Shri N.M. Shenoy, Manager
National Bank, R.O. Madras

Analysis of Data and Drafting of the Report

Dr. V. Puhazhendhi, Deputy Manager
Shri V. Mohandoss, Deputy Manager

Tabulation of data

Shri V. Chelladurai, Development Officer
Smt. Mythili Balu, Development Officer

Field Work

Shri K.N.Balasubramanian, Development Officer
Shri K.Mohan, Development Officer
Shri K.Balasubramaniam, Development Officer
Shri S.I.Ramamoorthy, Asst. Development Officer

LIST OF ABBREVIATIONS USED

ARDC	-	Agricultural Refinance & Development Corporation
DOW	-	Deepening of wells
DOWPS	-	Dugwell with pumpset
DRDA	-	District Rural Development Agency
FRR	-	Financial Rate of Return
GCA	-	Gross Cropped Area
GDP	-	Gross Domestic Product
HYV	-	High Yielding Variety
IRDP	-	Integrated Rural Development Programme
MI	-	Minor Irrigation
NA	-	North Arcot
NW	-	New well
NWPS	-	New well with pumpset
PASMA	-	Programme of Assistance for Small and Marginal Farmers for Increesing Agricultural Production
PDU	-	Pudukottai
PLDB	-	Primary Land Development Bank
Pre	-	Predevelopment situation
Post	-	Post development situation
REC	-	Rural Electrification Corporation

TABLE OF CONTENTS

BASIC DATA SHEET

Districts	:	Pudukkottai and North Arcot
Agency	:	Tamil Nadu State Land Development Bank Ltd.
No.of schemes	:	2
Implementing PLDB'S	:	PLDB, Ponnamaravathi (Pudukkottai)
	:	PDDB, Cheyyar (North Arcot)
Date of sanction	:	July 1979 and February 1981
Date of closure	:	June 1986
Reference year	:	1986 - 87

	New wells	New wells with Pumpset		DOWPS	
	PDU	PDU	NA	PDU	NA
Size of the sample	16	28	18	10	28
Average size of holding(ac)	2.75	2.94	4.15	3.26	4.03
Average benefitted area(ac)	1.63	2.12	3.09	2.69	3.31
Of which addition to net irrigated acreage	1.31	1.03	2.33	0.68	0.97
Awerage cost of MI structures at historical prices(Rs.)	12481	16130	14166	4780	5015
Average financial assistance(Rs.) for MI structeres	7307	7133	10799	3204	3211
Average cropping intensity(%)					
Pre-development	104	112	115	142	155
Post-development	166	170	193	197	217
Farm business income(Rs.)					
Pre-development	2141	2735	3847	5406	8011
Post-development	5260	7895	10725	9388	14431
Net Incremental Income(Rs.)	3119	5160	6878	3982	6420
Financial Rate of Return(%)	20	20	28	28	38
Percentage of recoveries to demand(%)	44	73	94	62	77

SUMMARY AND CONCLUSIONS

1. This study presents the results of an Evaluation study of of 2 MI schemes implemented by Tamil Nadu Co-operative State Land Development Bank Ltd. and refinanced by the then ARDC in Pudukottai and North Arcot districts. The field work in this connection was undertaken during September/October 1987. It covered a total sample of 100 beneficiaries spread over 3 investments viz. new wells, new wells with pumpsets and deepening of well with pumpsets. The reference year for the study was 1986-87 which was a normal year.

2. Financing for MI in Tamilnadu has grown by substantial proportions during the last five years especially in view of limited potentials available for exploitation of surface irrigation sources. The National Bank/the then ARDC had disbursed a total sum of Rs.155 crores constituting 28% of the total disbursements in the State towards this investment. Keeping in view the importance of this sector in the National Bank's investments this ex-post evaluation study was undertaken with a view to compare primarily the sanctions relating to techo economic parameters with actual realizations in the field for drawing lessons for the future.

3. The selected schemes were implemented by the Ponnamaravathi PLDB in Pudukottai district and Cheyyar PLDB in North Arcot District. As against the total financial target of Rs.15.348 lakhs and Rs.32.020 lakhs respectively, the financial achievements were only Rs.10.47 lakhs and Rs.9.77 lakhs constituting 68% and 31% of the relative targets. The shortfall in financial achievements was due to lesser coverage of physical units, simultaneous financing of similar investments under IRDP, availing of subsidy benefits by the scheme beneficiaries and partial disbursements to beneficiaries who had not adhered to the sanctioned physical dimensions.

4. It was assumed under the sanctioned schemes that wells with a diameter of 7 metres and depth of 10 metres would be grounded in Pudukottai district while rectangular wells with dimensions of 7m x 6m x 9m were to be grounded in North Arcot district. In reality the actual physical dimensions were quite different. Almost all the beneficiaries had gone in for a lesser depth and larger diameter of the wells. However this was not found to have much impact on the benefitted area except in case of energised wells in Pudukottai district.

5. A comparison of the historical cost of investment with the sanctioned unit cost revealed that there was a cost overrun of about 41% for all sample beneficiaries put together. However, this cost overrun was substantially higher for the investments grounded in Pudukottai district. Lower sanctioned unit costs, delays in grounding the units and construction of large diameter wells were the major reasons for the high cost overun.

6. The proportion of financial assistance to the total cost of investment worked out to only 51% for all the sample beneficiaries indicating that the down payment constituted as much as half the cost of investment. The stipulated downpayment norms were 5, 10 and 15% for small, medium and other farmers. The reasons of fixation of lower unit cost and delays in implementation of the schemes were the major reasons for under-financing the investments. The under-financing did not however result in incompleteness of the investments as the beneficiaries had completed the units by involving their own resources or by borrowing from outside sources.

7. The average benefitted area worked out to 1.63 acres for new wells, 2.50 acres for new wells with pumpsets and 3.14 acres for DOWPS. In comparison with the scheme assumptions, the actual benefitted area was in favourable comparison with the scheme assumptions except in case of energised wells in non-ayacut areas of Pudukottai district.

8. The cropping pattern did not undergo any major changes following the investments on the MI structures. The additional area brought under cultivation due to additional irrigation potential created was devoted mostly to groundnut and paddy. In both the pre-development and post-development situations, these two were the major crops grown by the beneficiaries.

9. The cropping intensity of the benefited areas of the farms averaged around 200% which was as per the scheme assumptions.

10. The average incremental income per unit was found to be Rs.3119 in case of new wells, Rs.5832, for wells with pumpsets and Rs.5778 for DOWPS. The financial analysis of the investment based on the discounted cash flow techniques revealed that these investments were viable as they had an average internal rate of return of more than 15%. However, comparison of the minimum benefitted area required to make the investments viable, with the actual benefitted area in individual farms revealed that in as many as 25% of the farms, the investment on wells was proved to be non-viable. Hence additional financial assistance will have to be provided wherever necessary to further deepen the ex;sting wells and increase the command area thereby resulting in viability.

11. An analysis of the repayment performance of the sample beneficiaries revealed that the repayment of loan instalments were better in the case of energised wells and DOWPS beneficiaries as compared to beneficiaries for non-energised wells. The proportion of defaulters in the total sample was 35% in the case of DOWPS, 57% in the case of NWPS and 100% for NW. Across the districts the repayment performance was better in North Arcot as compared to Pudukottai district. The higher productivity of crops in North Arcot district was one of the major factors determining the higher repayment performance in the district.

12. A comparison of the annual debt service liability with the incremental income (both measured at reference year prices) revealed that the proportion of debt service liability was more than 70% in the case of wells in Pudukottai district which is mostly dry. This would have naturally affected the overall recovery performance. Hence it would be desirable to provide adequate capital subsidy for all eligible beneficiaries in the district with a view to reducing the repayment burden.

13. As a consequence of the scheme investments, an additional area of about 270 acres was brought under irrigation. This resulted in increase in production of all crops to the tune of Rs.16 lakhs. The value added to gross domestic product was Rs.11 lakhs.

14. The study revealed that there was severe underfinancing of the investments largely due to lower assumed unit costs and implementation of the sanctioned programme over an extended period without commensurate increase in the unit costs. Hence the participating banks would have to carefully assess the unit costs at the time of scheme formulation and implement the sanctioned programme within the stipulated period.

15. The study also revealed that in a number of farms the investment on wells was found to be non viable due to inadequate command area. Hence the participating banks should ensure that all the stipulated technical norms were adhered to by the beneficiaries for realising minimum viable returns from the investment.

CHAPTER - I

INTRODUCTION

1.01 Instability in rainfall and absence of any perennial river irrigation systems characterise the present status of agricultural development in Tamil Nadu. The poor distribution of rainfall, both spatially and temporally, has diminished the reliability of surface irrigation sources like canals and tanks for improving the crop production in the State.

1.02 The State is being served by 46 major reservoirs and over 39000 tanks with a storage capacity of about 1.10 ha.m. The benefited command area through these surface irrigation sources amounted to about 16.72 lakh ha. It is notable that the surface irrigation systems together account for two thirds of the irrigated acreage in the State. It is an established fact that the State has almost utilised the available surface water potentials and there is hardly any scope for fresh river valley projects except for diversion of west flowing rivers of Kerala to dry areas in Tirunelveli, Ramanathapuram, Madurai, Coimbatore and Periyar districts. In view of the above limitations, development of minor irrigation structures to exploit ground water resources assumes importance.

1.03 According to the latest estimates made by the State Groundwater Directorate, there exists good scope for grounding minor irrigation structures as evidenced below:

Total groundwater potential	-	3.33 million ha.m.
Utilisable groundwater	-	2.83 million ha.m.
Net draft	-	1.23 million ha.m.
Balance availabile for further exploitation	-	1.60 million ha.m.
Percentage of unexploited potential	-	57%

1.04 The present net draft is acounted by 17 lakh wells, which together irrigate an area of 10 lakh ha. In the State, MI schemes consist primarily of works relating to construction of dug wells and tube wells, renovation of existing wells and their energisation. As a result of the continued importance given for groundwater exploitation, the area under well irrigation in the State has registered an increase of over 20% between 1971 and 1986, while the area under surface irrigation systems remained more or less static.

1.05 An important motivating factor to the above increasing trend seems to be the liberal lending policy adopted by the financial institutions in the State. Between the years 1982-83 and 1987-88, the quantum of bank finance for minor irrigation structures had increased five folds from Rs.6.07 crores to Rs.30.98 crores.

1.06 As a refinancing agency, the then ARDC/National Bank have disbursed a cumulative amount of Rs.155 crores for minor irrigation (including REC programmes) till June' 88 which accounted for 28% of the total refinance disbursements in the State. The flow of refinance for MI schemes (excluding REC) under regular schematic lending as well as PASMA during the last five years in Tamil Nadu is given below:

TABLE 1.1

REFINANCE DISBURSED FOR MI IN TAMILNADU

(Rs.in lakhs)

Year (July - June)	Schematic lending	PASMA	Total
1983 - 84	113		
1984 - 85	114	894	1008
1985 - 86	160	1396	1556
1986 - 87	219	1043	1262
1987 - 88	188	884	1072
1988 - 89 (till March)			

1.07 Considering the substantial disbursements for MI, it was decided to undertake an Ex-post Evaluation Study on Minor Irrigation schemes implemented in the Tamil Nadu State.

CHAPTER II

METHODOLOGY OF THE STUDY

2.01 The ex-post evaluation study of minor irrigation schemes in North Arcot and Pudukottai districts was undertaken during September-October 1987 with the following specific objectives:

i. To analyse the technical and economic paramaters of the schemes relating to their sanction and implementation.

ii. To compare ex-post realisations with ex-ante assumptions, with particular reference to techno-enonomic parameters.

iii. To study the impact of the investment on production, productivity and income levels.

iv. To estimate the aggregate project benefits in terms of additional production, incremental income, etc., and

v. To analyse the repayment performance of the scheme beneficiaries vis-a-vis the level of incremental income generated by different items of investment.

Selection of Schemes

2.02 The minor irrigation schemes were implemented in all the districts of the state. However, for the purpose of this study, North Arcot and Pudukottai districts were specifically selected to represent districts with maximum and minimum quantum of refinance committed/disbursed in the State. The schemes implemented by the LDBs, the major constituent of minor irrigation investments in Tamil Nadu, in these two districts were selected. One major scheme closed prior to June 1986 was selected from each district with a view to have sufficient

samples as well as units which would experience stabilised benefits as on the date of field visit. Accordingly one scheme implemented in Ponnamaravathy block of Pudukottai district and another scheme in Anakkavur block in North Arcot district were selected for the present study.

Selection of Investments

2.03 The selected schemes were implemented by the Ponnamaravathy PLDB and Cheyyar PLDB in Pudukottai and North Arcot districts respectively. A total of 171 and 115 beneficiaries were financed by the two PLDBs respectively. The investment-wise distribution is as follows:-

(No.of beneficiaries)

Name of the PLDB	New Wells (NW)	New wells with Pumpsets (NWPS)	Deepening of wells (DOW)	Deepening of wells with pumpsets (DOWPS)	Pumpsets (PS)	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ponnamaravathy	87	19	10	13	42	171
Cheyyar	-	43	13	36	3	115
	87	62	43	49	45	286

For the purpose of the study, investments on NW, NWPS and deepening of wells with or without pumpsets were considered. The total sample size for the study was determined at 100 and it was distributed among the selected items of investment wvth a probability proportionate to

the total population. The 100 sample units were selected randomly from the total number of units under each item of investment after removing the units for which only one instalment was disbursed.

2.04 During the course of field visit it was observed that many of the beneficiaries who had availed the assistace for new wells only, had also invested on pumpsets with their own resources; similarly DOW was in relation to energised wells only. Hence a post stratification of the selected sample was done and the final distribution of the sample units over different items of investment is as under:

Category of investment	Pudukottai	North Arcot	Total
New wells (NW)	16	-	16
New wells with pumpsets(NWPS)	28	18	46
Deepening of wells with pumpsets (DOWPS)	10	28	38
Total	54	46	100

2.05 The pre-development situation of the new well beneficiaries (with or without pumpsets) was characterised mostly by rainfed farming as also tank irrigated farming while the post development situation was mostly irrigated farming through new wells.

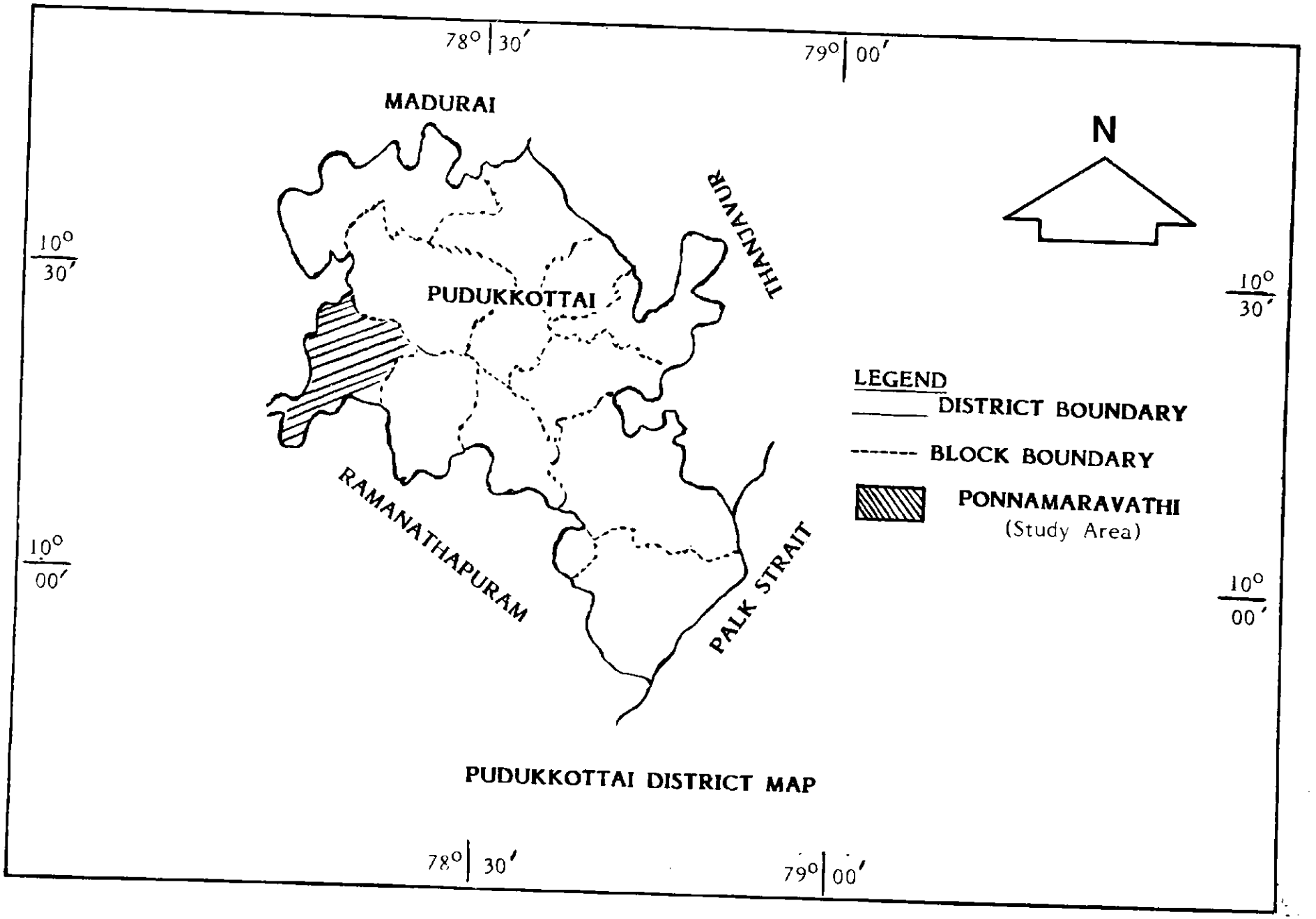
2.06 In case of deepening of walls, the pre-development situation was represented by both irrigated and rainfed farming in different proportions. After renovation, not only the intensity of irrigation on the already irrigated plots increased but also some additional area was brought under well irrigation. For all the investments, the pre-development situation of the sample beneficiaries itself was taken as the control and due care was taken to reduce memory bias.

Analysis of Data

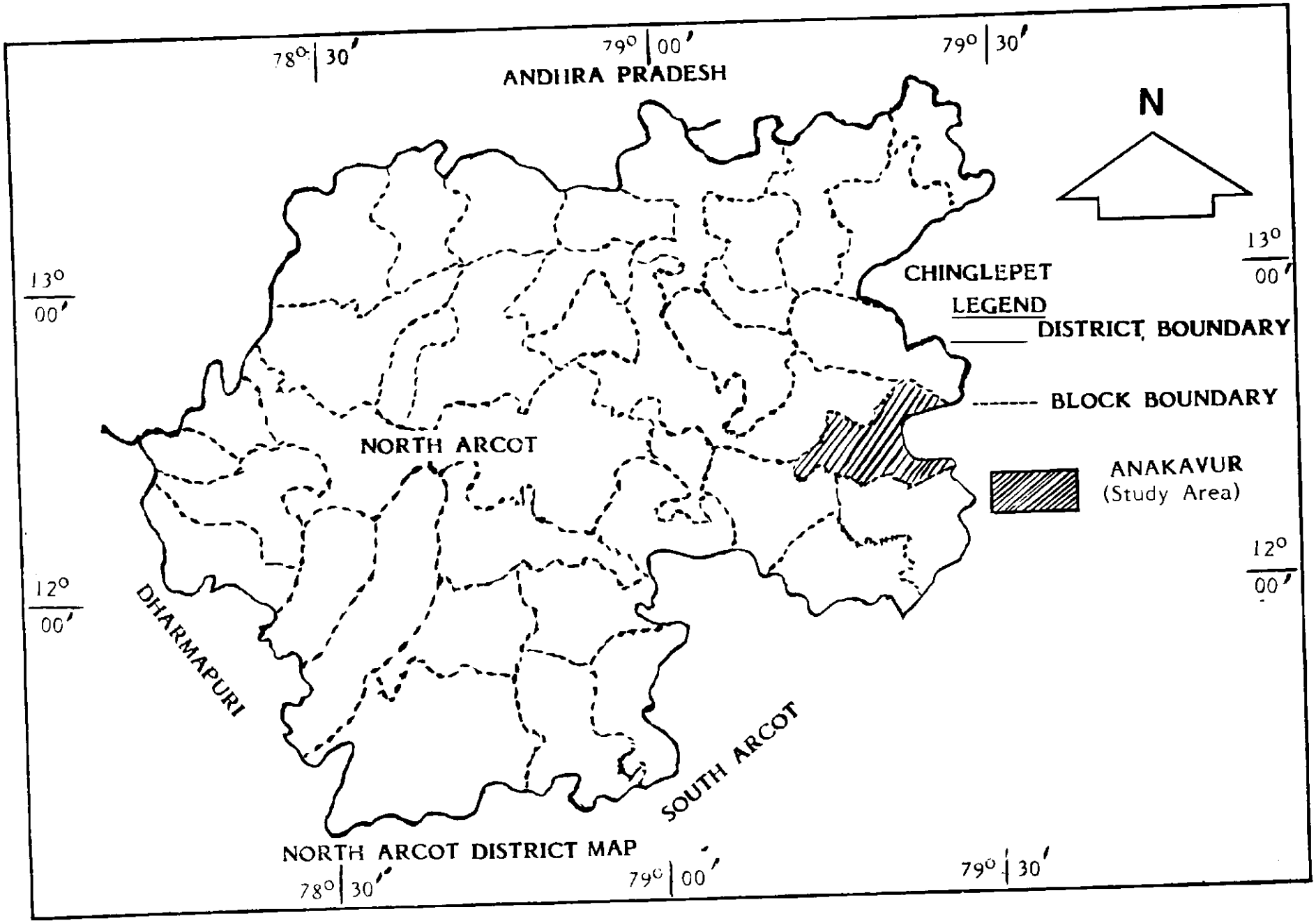
2.07 Though both the selected districts are basically hard rock areas, the technical aspects like size of wells, recuperation, re-charge of water and economic parameters like cropping pattern, income levels, etc. vary widely between the two districts. Further with a view to bring out the impact of investment if any, in conjunction with suface irrigation sources, the sample units were post stratified into units of ayacut area and non-ayacut area. Hence the analysis of the sample units were done separately for each districts as well as areas.

2.08 Apart from the regular tools of analysis like tabulation and percentages, the annual discounting technique was utilised to examine the viability of the investment.

2.09 Gross value of output was defined as the value of the main product plus by-products of the crops. Farm business income was worked out by deducting the out of pocket expenses on seeds, manures, fertilisers, hired human labour and bullock labour, maintenance cost of pumset, land revenue and other incidental expenses from the value of gross produce. The valuation of inputs and outputs was done at 1986-87 constant prices.



PUDUKKOTTAI DISTRICT MAP


78° 30′
79° 00′
79° 30′
ANDHRA PRADESH
N
13° 00′
CHINGLEPET
LEGEND
DISTRICT BOUNDARY
BLOCK BOUNDARY
ANAKAVUR
(Study Area)
NORTH ARCOT
12° 00′
DHARMAPURI
SOUTH ARCOT
NORTH ARCOT DISTRICT MAP

CHAPTER III

AGRICULTURAL ECONOMY OF THE STUDY AREA

3.01 As stated earlier, the study covered two districts viz Pudukottai and North Arcot. These two districts represent different agroclimatic zones in Tamil Nadu with Pudukottai falling in Zone IV and North Arcot in Zone III. Ponnamaravathi block in Pudukottai district and Anakavur block in North Arcot district constitute the study area for this evaluation. The agricultural economy of these two blocks is described below.

Location

3.02 Ponnamaravathy block in Pudukottai district is situated between 10^{o} 11' and 10 26' latitude and between 78^{o} 26' and 78^{o} 40' longitude with a total geographical area of 328 sq.kms. Anakavur block in North Arcot district lies between 12^{o} 35' and 12^{o} 40' latitude and between 79^{o} 30' and 79^{o} 30' longitude with a total geographical area of 384 sq.kms.

Climate and Rainfall

3.03 Both the selected blocks enjoy a trophical climate with the minimum and maximum termperatures being 16^{o}C and 37^{o}C. The Annakavur block enjoys a higher precipitation with the normal rainfall being 1105mm as compared to the Ponnamaravathi block (953 mm). Both the blocks receive a mojor portion of the precipitation through South-West and North-East monsoons. An analysis of the precipitation in these two blocks during the last five years (Annexure I) revealed that Anakavur block had consistently received a higher quantum of rainfall than the normal one. However, the Ponnamaravathi block received

less than normal rainfall in all the years with the deficit being pronounced during 1982-83 and 1984-85. Thus, the rainfall availability for Ponnamaravathi block is found to be unstable as compared to the Anakavur block.

Demographic Characteristics

3.04 The total population (1981 census) in Ponnamaravathi block was 83,500 and in Anakavur block 96,500. Workers constituted 27% and 29% of the population in the respective blocks. Among the total workers, the agricultural workers constituted 83% in Ponnamaravathi block and 65% in Anakavur block, thereby indicating a higher concentration of agricultural work force in the former block.

Land Use Pattern

2.05 The details of land utilised during the year 1984-85 in the two selected blocks are presented in Annexure II. It would be seen therefrom that the net shown area constituted 47% of geographical area in Ponnamaravathi block and 52% in Anakavur block. The cropping intensity was found to be 134% and 147% respectively. The higher cropping intensity in Anakavur block was due to higher coverage of net sown area under irrigation (55% of the sown area) as compared to Ponnamaravathi block (36%). Tank irrigation was the major source of irrigation in both the blocks and about 3/4 th of the irrigated area was covered by this source.

Operational Holdings

3.06 There were 21,675 operational holdings in Ponnamaravathi block and 29,515 holdings in Anakavur block with the average size of holding being 1.15 ha and 1.46 ha respectively. The distribution of operational holdings was skewed in both the blocks in as much as more than 80% of the holdings were in the size group of less than 2 ha.

Cropping Pattern and Productivity

3.07 Paddy and groundnut were the two major crops grown in both the blocks. However, while the percentage of area under paddy was more in Ponnamaravathi block (65% of the gross sown area) than in Anakavur block (54%),the area under groundnut was more in Anakavur block (30%) as compared to Ponnamaravathy block (25%). Similarly, the areas under sugarcane and pulses were higher in Anakavur block (12%) as compared to Ponnamaravathi block (2%). Thus the proportion of commercial crops in the total cropped area was found to be higher in Anakavur block. Further, it was also found that the levels of productivity of the two major crops was found to be higher in Anakavur block as evidenced below:

(Kgs/acre)

Block	Paddy	Groundnut
Anakavur	1260	675
Ponnamaravathi	1135	465

The higher level of productivity in Anakavur can be attributed to more irrigation coverage and higher precipitation with a consequent higher input usage.

Potentials for Groundwater Exploitation

3.08 As at present the available ground water resources are exploited through open wells and tubewells and an extent of 906 ha and 1636 ha are irrigated through these structures in Anakavur and Ponnamaravathi blocks respectively. The estimates of groundwater potentials available in these two blocks are given below:

(in ha.m.)

Block	Gross recharge	Utilisable recharge	Net draft	Ground water balance	Stage of development (%)
Ponnamaravathi	8922	7584	2864	4720	38
Anakavur	11534	9804	2869	6935	29

Both the blocks fall under the "white category" as the stage of development is less than 60% and it has been estimated that an additional 4520 and 6764 wells are feasible in Ponnamaravathi and Anakavur blocks respectively.

CHAPTER IV

THE SCHEMES AND THEIR IMPLEMENTATION

The Scheme Sanctions

4.01 As already indicated, one scheme each implemented by the Primary Land Development Banks (PLDBs) in Pudukkottai and North Arcot Districts were selected for the purpose of this evaluation study. The details of sanctions of the two selected schemes are given below:

Particulars	Pudukkottai	North Arcot
1. Date of sanction	19.7.1979	10.2.1981
2. Phasing of the scheme	1979 - 80 to 1981 - 81	1980 - 81 to 1981 - 82
3. Physical targets		
NW	66	-
NWPS	33	75
DCW	21	120
DOWPS	15	120
PS	93	100
4. Financial targets (Rs.lakhs)		
Financial assistance	15.348	32.020
Refinance commitment	13.813	28.820
5. Name of the implementing PLDB	Ponnamaravathy	Cheyyar

The above schemes were sanctioned under ARDC Credit Projects II &

The above schemes were sanctioned under ARDC Credit Projects II & III.

Progress in Implementation of Schemes

1. Pudukkottai District

4.02 The scheme for implementation in the above district was sanctioned with the following cumulative bank loan phasing:

Year ended 30th June	Amount (Rs.lakhs)
1980	5.116
1981	10.232
1982	15.348

The implementing PLDB started grounding the units earnestly during 1979-80. However, because of the ineligibility to draw refinance during 1980-81, it could not ground any units during that year. As a result, the bank could disburse till June 1981, a total of Rs.4.15 lakhs against a cumulative target of Rs.10.232 lakhs which consituted only 40% of the targets. Hence, a rephasement of the scheme was sought to cover the entire financial programme by June 1983. However, again as on that revised date, the cumulative disbursement (Rs.7.35 lakhs) accounted for only 48% of the sanctioned targets. After three more rephasements, the scheme was closed with a total financial assistance of Rs.10.47 lakhs as on 30th June 1986.

2. North Arcot district

4.03 As was the case above, the scheme for implementation in North Arcot district also did not progress smoothly. The implementing PLDB viz. The Cheyyar PLDB of the district could not disburse any amount under this scheme during 1980-81 because of ineligibility. By end June 1982, it had disbursed a total amount of only Rs.1.00 lakhs as against a

total target of Rs.32.02 lakhs, with the achievements constituting only 2% of the targets. Here again, the implementing bank sought rephasement of the scheme thrice, first during May 1984, second during May 1985 and the last during April 1986. Even after continuous rephasements, the bank could finally disburse only an amount of Rs.9.77 lakhs as against the original sanctioned target of Rs.32.020 lakhs.

Final Achievements

4.04 The physical and financial achievements under the selected schemes as at their closure in given below:

Particulars	Pudukkottai	North Arcot
Physical Achievments		
NW	87 (132)	-
NWPS	19 (58)	43 (57)
DOW	10 (48)	33 (28)
DOWPS	13 (87)	36 (30)
PS	42 (45)	3 (3)
Financial Achievements (Rs.in lakhs)		
Bank loan	10.470	9.770
Refinance drawn	9.745	9.280
Percentage of financial achievements to targets	68%	31%

(Figures in parantheses indicate per cent achievement to targets)

4.05 It is evident from the above that the overall financial achievements under the selected schemes fell short by 32% in Pudukkottai district and a very high 69% in North Arcot district. Availment of subsidy from DRDA for many of the small and marginal farmers and partial disbursements of the financial assistance were the major reasons ior the shorfall in financial achievements in Pudukkottai district. Apart from the above reasons, in North Arcot district the coverage of physical targets itself was low due to financing for similar activity under SFDA programmes with the attendent subsidy advantage; hence a heavy short fall in the achievement in this district.

Adherence to Various Terms and Conditions

1. Unit cost

4.06 The approved unit cost for various items of development under the two selected schemes at the time of their sanction is given below:

Item of Investment	Pudukkottai	North Arcot
NW	7700	-
NWPS	12700	15200
DOW	3200	5000
DOWPS	8200	8500

The above sanctioned unit costs were revised in June 1984 under both the schemes after such revisions were sought by the implementing PLDBs. By that time, the participating bank had already grounded around 4/5ths of the total units. Hence, the revisions effected in the unit cost did not affect much the overall financial achievements under the schemes.

4.07 The selected PLDBs had adhered to the above unit cost norms at the time of the appraisal of the loan applications.

2. Margin money

4.08 The banks were required to ensure that the minimum down payment to be collected from small farmers was restricted to 5%, medium farmers - 10% and other farmers - 15%. While the margin money norms were adhered to by the banks, in actual practice, due to higher cost of investment, the actual down payment incurred by the beneficiaries worked out at an average of 49% of the investment cost.

3. Spacing norms

4.09 The minimum spacing required to be maintained between two wells was 110 m in ayacut areas and 150-190 m in non-ayacut areas. The above minimum spacing stipulations were adhered to by the PLDBs.

4. Disbursement of loans

4.10 As per the procedure then extant, the PLDBs were to disburse the loan amount for dugwells as well as deepening of wells in three instalments in the ratio of 30:40:30 and the second and final instalments were to be disbursed after the verification of the utilisation of the earlier instalments. Such verifications were done by the field supervisors of the implementing banks. However, the analysis of the disbursement pirticulars of all the beneficiaries assisted under the selected schemes revealed that partial disbursements were effected in as many as 41% of the cases in North Arcot district. The investmentwise, districtwise and instalmentwise proportion of partially disbursed units in both the districts is presented below:

District	Instalments	Percentage to total Wells	DOW	Total
North Arcot	Only one instalment released	5	25	17
	Two instalments released	21	26	24
	Sub total	26 (43)	51 (69)	41 (112)
Pudukottai	Only one instalment released	9	22	12
	Two instalments released	9	17	11
	Sub total	18 (106)	39 (63)	23 (129)

(Figures in bracket indicate the total No.of beneficiaries assisted)

4.11 It is evident from the above that the proportion of partially disbursed units was substantially high in respect of DOW investments. The main reason attributed by the PLDB for partial disbursement was the fact that the beneficiaries did not deepen the well upto the stipulated depths after the release of the first and/or second instalments. Similar was the reason attributed for partial disbursements in case of new wells. Further it was observed that all the beneficiaries who availed two instalments had completed the investments with their own resources. Thus the extent of incomplete units was restricted to 17% and 12% of the total beneficiaries who had availed only one instalment.

Time lag in disbursements

4.11 It was stipulated that the loan applications were to be disposed of within a period of 3 months from the date of receipt of applications. The time lag analysis of the sample beneficiaries revealed that in as many as 80% of the cases, the loans were sanctioned within a period of 3 months (Annexure II). The delay of more than 3 months in the case of the remaining beneficiaries was reportedly due to delay in furnishing the necessary documents for mortgaging land and their valuation certificate by the beneficiaries. Once the loan was sanctioned, the disbursement of the first instalment was completed within 2 months in most of the loan accounts (92%). Only in respect of 25% of the beneficiaries, there was delay of more than 3 months in disbursaing the second instalment. It could also be seen from the table that the last instalment had not been disbursed for 12 beneficiaries for reasons already stated.

Coverage of small farmers

4.12 As per National Bank difinition of small farmers, 72% of the sample beneficiaries assisted under the schemes were "small" while 20% were medium farmers and remaining were big farmers. Most of the small farmers were eligible to get subsidy from the DRDA to an extent of 25% or 33 1/3% of the unit cost. However, it was found that only 36% of the eligible beneficiaries could avail the subsidy benefits in view of the restriction in allocating the subsidy in the selected blocks during the implementation period. In cases where the subsidy was not received, the implementing banks had disbursed the entire unit cost as bank loan after ensuring minimum down payment.

Fixation of Repayment Period and Rate of Interest

4.13 The implementing banks had fixed a repayment period for new wells as 15 years for small farmers and 9 years for other farmers. For deepening of wells, the maturity period was fixed at 7 and 5 years respectively. These were as per the stipulations of the National Bank and no deviations were observed. The implementing PLDBs had charged a rate of interest of 9.5% or 10.25% as per the prevailing interest rate.

Security and Land Valuation

4.14 While implementing the above two schemes, the PLDBs were required to issue loans against mortgage of land. The mortgaged land was to be valued at 8 times the post development net income and the maximum loan eligibility stood restricted to 50% of the value of the land. It was also stipulated that all the farm investments need to be evaluated in terms of incremental return from the investment and the banks should ensure that appraisal of agricultural loan was in conformity with the agreed lending criteria. The participating PLDBs had adhered to the above stipulations.

CHAPTER V

COST OF INVESTMENT AND ITS FINANCING

5.01 In this chapter, an attempt has been made to present the historical cost of investment on different items of minor irrigation structures and relate them to physical dimesions of the structures. Further, the extent of financial assistance in the histrocial cost was also estimated and reported.

Physical Dimensions of the Wells

5.02 At the time of sanction of the schemes, the then ARDC had specified a circular well with dimensions of 7 meters dia. and 10 meters depth in Pudukkottai district and rectangular wells with dimensions of 7 mts. x 6 mts. x 9 mts. in North Arcot district. On the basis of the sanctioned physical dimensions and the then prevailing contract rates, the unit costs werre fixed at Rs.7,700 in Pudukkottai district and Rs.11,700 in North Arcot district. It is obvious that the unit cost in Pudukkottai district was substantially lower in comparison with the other district although the physical dimensions especially depth were higher in the former district and the geological formation (hard rock) were the same in both the districts. This had inevitably resulted in under financing of the investments as would be revealed later.

5.03 While implementing the schemes, the participating PLDBs had deviated both in respect of shape as well as size of the wells depending upon the site characteristics of the farmers' land holding. Thus, the average sanctioned depth varied between 8.09 meters to 9.40 meters across the investments and areas in Pudukkottai district as against the sanctioned norm of 10 meters. Similarly, in North Arcot district, the average depth sanctioned was 9.70 meters as against the stipulation of 9 meters. Similar was the case in respect of the diameter also.

5.04 While actually grounding the units, the sample beneficiaries had gone in for lesser depth and larger diameter of the wells with a view to have more storage capacity. The investment-wise/ districtwise sanctioned as well as actual physical dimensions of new wells are presented Table 5.1.

TABLE 5.1

PHYSICAL DIMENSIONS OF NEW WELLS

(In meters)

Item of Investment	District	Area	Depth		Diameter	
			Sanctioned	Actual	Sanctioned	Actual
1. New Wells(NW)	Pudukkottai	Ayacut	8.09	6.86	6.53	7.55
		Non-ayacut	9.10	8.50	6.85	8.35
2. New Wells with pumpsets (NEPS)	Pudukkottai	Ayacut	8.50	7.66	6.74	7.79
		Non-ayacut	9.40	9.30	6.17	7.43
	North Arcot	Non-ayacut	9.70	8.33	8.69	9.91

5.05 It is evident from the above that the farmers preferred to have large sized wells in place of deeper wells. The extent of increase in diameter varied between 14 to 22% of the sanctioned size; with the result, the cost of investment also went up as would be revealed later. In general, it can be concluded that the depth of wells in ayacut area was less than the depth in non-ayacut area for obvious reasons. Further, the depth of the energised wells (NWPS) were more than the non-energised wells (NW).

Deepening of Wells (DOW)

5.06 The participating banks were required to sanction further deepening of wells to a depth of 4 meters. At the time of sanctioning the loan applications, the PLDBs had sanctioned for deepening of 3 meters keeping in view the local requirements. As against this, the actual deepening was done only to the extent of 2.61 meters in ayacut areas of Pudukkottai district and 1.59 meters and 1.99 meters in the non-ayacut areas of Pudukkottai and North Arcot districts respectively. Further, only 50% of the sample beneficiaries had deepened the wells to the sanctioned depth of 3 meters.

Historical Cost fo Investment

5.07 The cost incurred on new wells by the sample beneficiaries varied between Rs.11,529 to Rs.14,900 across the districts and areas. As regards deepening of wells, the average cost of investment ranged between Rs.4,667 to Rs.5,015 across the districts. The item-wise/area-wise cost of investment and the relative sanctioned unit costs are presented below:

TABLE 5.2

HISTORICAL COST OF INVESTMENT[1]

(In Rupees)

Item of investment	District	Area	Cost of investment	Unit cost	Cost over run
NW	Pudukkottai	Ayacut	11,529	7,700	50%
		Non-Ayacut	13,222	7,700	72%
	Investment average		12,481	7,700	62%

(Contd...)

Item of investment	District	Area	Cost of investment	Unit cost	Cost over run
NWPS	Pudukkottai	Ayacut	12,675	7,700	65%
		Non-Ayacut	14,900	7,700	94%
	District average		13,470	7,700	75%
	North Arcot	Non-ayacut	14,166	11,700	21%
	Investment average		13,742	9265	48%
DOWPS	Pudukkottai	Ayacut	4,667	3,200	46%
		Non-ayacut	4,950	3,200	55%
	District average		4,700	3,200	49%
	North Arcot	Non-ayacut	5,015	5,000	Negligible
	Investment averge		4,932	4,526	9%

(1)Excludes pumpset cost

5.08 The following conclusions can be drawn from the above table.

i. The cost of investment on dug wells was more in non-ayacut areas than in ayacut areas in view of the greater depth of the wells in the former areas.

ii. The cost of construction of energised wells (with pumpsets) were higher than the non-energised wells again because of more depth.

iii. There was not much variation in the cost of deepening of wells either across the districts or across the areas.

5.09 More significant is the fact that there was a heavy cost over run under all the items of investments especially in Pudukkottai district. The extent of cost over run ranged between 46% to 94% in case of wells and 46 to 55% in case of deepening of wells in Pudukkottai district. In North Arcot district, however, the extent of cost over run was negligible for deepening and only 21% for energised new wells. The heavy cost over run in Pudukkottai district had occurred mainly because of the fact that the unit cost itself was lower as discussed earlier. Further, the unit cost for various items of investments were fixed at the time of sanction at 1979-80 prices while the actual grounding of the units was spread over a period of 5 years with the inevitable cost escalations. Besides, construction of large sized wells had influenced the cost over run. Hence, it is iimperative that the participating banks make a realistic assessment of the quantum of financial assistance needed for completing the investments and they should also endeavour to complete the sanctioned programme within the stipulated phasings. In case the implementation is sought to be extended beyond 2 or 3 years, a revision in unit cost should also accompany. The beneficiaries should also be advised about the economic benefits of adhering to optimum dimensions.

5.10 The average cost incurred by the sample beneficiaries for deepening of wells worked out to Rs.4,667 and Rs.4,950 in ayacut and non-ayacut areas of Pudukkottai district and Rs.5,015 in North Arcot district. Here again, there was a cost over run in Pudukkottai district as compared to Noth Arcot district be cause of the fixation of lower unit cost. However, it may be mentioned that since the diameter and depth of the already existing wells widely varied from the sanctioned parameters, the comparison of the unit cost with the actual cost of deepening cannot be realistic. Further, the cost of deepening is

influenced by the dimensions of the existing wells as well as the depth at which the renovaton is done.

Extent of Financial Assistance

5.11 The financial assistance (including subsidy) provided by the participating banks accounted for only 49% to 76% of the actual cost of investment as evidenced below.

TABLE 5.3

AVERAGE FINANCIAL ASSISTANCE (1)

(Rupees)

Item of investment	Disrict	Area	Financial Assistance			Percetage of Financial Asstance to	
			Bank	Subsidy	Total	Unit Cost	Cost of investment
1. NW	Pudukkottai	Ayacut	6036	1107	7143	93	62
		Non-ayacut	5965	1469	7434	97	56
	Investment average		5996	1311	7307	95	59
NWPS	Pududdottai	Ayacut	5538	1494	7032	91	55
		Non-ayacut	5758	1557	7315	95	49
	District average		5617	1516	7133	93	44
	North Arcot	Non-ayacut	8836	1963	10799	92	76
	Investment average		6876	1691	8567	92	64
3. DOWPS	Pudukkottai	Ayacut	2307	863	3170	99	68
		Non-ayacut	2465	791	3256	102	66
	District average		2370	834	3204	100	67

(Contd...)

Item of investment	Disrict	Area	Financial Assistance Bank	Subsidy	Total	Percetage of Financial Asstance to Unit Cost	Cost of investment
	North Arcot	Non-ayacut	2075	1136	3211	64	64
	Investment average		2153	1057	3210	71	65
	Overall Average		4057	1193	5250	73	51

(1)Excludes pumpsets assistance.

5.12 It is evident from the above that the extent of financial assistance provided constituted only 49% to 62% of the actual cost of investment for new wells in Pudukkottai district and 76% in Noth Arcot district. For DOWS, this proportion was around two-thirds. The overall average was found to be 51% implying thereby that down payment by beneficiaries constituted as much as half the cost of investment. While in relation to the unit cost, the financial assistance provided was quite adequate, in comparison with the actual investment cost, the financial assistance was found to be substantially inadequate especially in Pudukkottai district. The reasons of fixation of lower unit costs and also delays in implementation of the schemes as discussed earlier were the major reasons for the under financing of the investments. Further, in respect of DOW units, a number of farmers in North Arcot district were unable to draw the third unstalment of the loan amount in view of the beneficiaries going in for lesser depths than that stipulated. Fortunately, the under financing did not result in incompleteness of the investments as the beneficiaries had completed the units by involving their own resources or by borrowing from outside sources.

CHAPTER VI

IMPACT OF INVESTMENTS ON CROP ENTERPRISES

Size of Holding

6.01 The average size of holding of sample beneficiaries was found to be 2.93 ac. in Pudukkottai district and 4.08 ac. in North Arcot district. There were no differences in the size of the holding between the pre and post development situations. The averge size of holdings across different sample beneficiaries is presented below:

TABLE 6.1

LAND HOLDING PATTERN

(Acres.)

	Pudukkottai		North Arcot	
Investment	Ayacut	Non-ayacut	All	Non-ayacut
NW	**2.40**	3.03	2.75	-
NWPS	**2.92**	2.98	2.94	4.15
DOWPS	**2.74**	4.04	3.26	4.03
Average	2.77	3.18	2.93	4.08

As per the National Bank norms, about 72% of all the sample beneficiaries were small farmers, 20% were medium farmers and the remaining were big farmers.

Extent of Irrigation

6.02 In both the districts a portion of the land holding was irrigeted by seasonal tanks especially in ayacut areas and hence several of the dugwell beneficiaries were enjoying irrigation even in predevelopment situation. The extent of irrigated land in the pre and post development situation for different categories of farmers is given below:

TABLE 6.2

EXTENT OF IRRIGATION IN SAMPLE BENEFICIARIES FARMS

Item of investment	District	Ayacut		Non-ayacut	
		Pre	Post	Pre	Post
NW	Pudukottai	0.74 (31)	1.62 (68)	- -	1.65 (54)
NWPS	Pudukottai	1.95 (67)	2.49 (85)	- -	1.91 (65)
	North Arcot	-	-	0.76 (18)	3.09 (74)
DOW	Pudukottai	1.67 (61)	2.62 (96)	2.89 (72)	3.17 (78)
	North Arcot	-	-	2.34 (58)	3.31 (82)

(Figures in brackets indicate the proportion to average size of holding).

Thus in the post development situation the proportion of irrigated area was found to range between 65% and 96% of the land holding.

Extent of Benefitted Area

6.03 The land area benefitted by the investment consists of (i) additions to net irrigated acreage through conversion of rainfed land to irrigated land and (ii) providing supplementary irrigation to already irrigated lands. Both these components have been worked out for different investments and are presented in Table 6.3.

TABLE 6.3

BENEFITTED AREA

(Acres)

Items of investment	District	Area	Addition to net irrigated area	Area under supplementary irrigation	Total benefitted area
1. NW	Pudukottai	Ayacut	0.88	0.74	1.62
		Non-ayacut	1.65	-	1.65
	Investment average		1.31	0.32	1.63
2. NWPS	Pudukottai	Ayacut	0.54	1.69	2.23
		Non-ayacut	1.91	-	1.91
	District average		1.03	1.09	2.12
	North Arcot	Non-ayacut	2.33	0.76	3.09
	Investment average		1.54	0.96	2.50
3. DOW PS	Pudukottai	Ayacut	0.95	1.42	2.37
		Non-ayacut	0.28	2.89	3.17
	District average		0.68	2.01	2.69

(Contd...)

Items of investment	District	Area	Addition to net irrigated area	Area under supplementary irrigation	Total benefitted area
	North Arcot	Non-ayacut	0.97	2.34	3.31
	Investment average		0.89	2.25	3.14

Understandably, the proportion of area benefitted through supplementary irrigation was higher in ayacut areas and in case of DOWPS.

6.04 In the scheme sanctioned it was assumed that non energised wells could benefit 1.50 acres of dryland, the energised wells, 2.50 ac and the deepening of well would result in a net addition of 1.0 ac. to the irrigated acreage and provide supplementary irrigation to 1.50 ac. It is evident from table that the actual total benefitted area was in favourable comparison with the scheme assumptions in respect of all investments except NWPS in Pudukottai district.

Cropping Pattern

6.05 The extent of acreage under different crops in different farm situations are presented in Annexure IV. It can be seen there from that paddy and groundnut were the two most important crops under all farm situations and their combined share in the gross cropped area varied between 62% to as high as 96%, with the proportion being 90% or more under many situations. It could also be inferred from the statement that additional area brought under cultivation due to the investments have largely been allocated to these two crops only by the farmers. The proportion of additional area brought under these crops to additional gross cropped area under various situations is given below:

Items of investment	District	Area	Proportion of additional area to additional GCA	
			Paddy	G nut
NW	Pudukottai	Ayacut	38%	92%
		Non-ayacut	8%	81%
NWPS	Pudukottai	Ayacut	33%	42%
		Non-ayacut	38%	73%
	North Arcot	Non-ayacut	63%	25%
DOW PS	Pudukottai	Ayacut	40%	16%
		Non-ayacut	15%	42%
	North Arcot	Non-ayacut	77%	24%

6.06 It can also be found that there was a strong preference for paddy in North Arcot district while the preference was for groundnut in Pudukottai district.

Cropping Intensity

6.07 The schemes envisaged that with the introduction of wells, the entire benefited area will be brought under double cropping and as a result the cropping intensity would increase from 100% in the pre development situation (dry area) to 200% in the post development situation. Under DOW also, the cropping intensity was expected to increase from 100% to 200% . As against this, the actual cropping intensity under different farm situations is as under:

TABLE 6.4

CROPPING INTENSITY

(Percentages)

Items of investment	District	Area	Pre investment	Benefitted area	Non benefitted area	Total
NW	Pudukottai	Ayacut	103	190	100	161
		Non-ayacut	105	210	100	169
			104	201	100	166
NWPS	Pudukottai	Ayacut	110	201	110	179
		Non-ayacut	115	186	100	155
	District average		112	196	106	170
	North Arcot	Non-ayacut	115	225	100	193
DOWPS	Pudukottai	Ayacut	149	227	100	210
		Non-ayacut	131	199	100	178
	District average		142	216	100	197
	North Arcot	Non-ayacut	155	241	107	217

Thus on the benefitted area the cropping intensity was around 200% under most of the farm situations. For the farm as a whole, the cropping intensity was however lower, in view of the fact that in the non-benefitted area not covered under the command of irrigation structures, the cropping intensity was only 100%. Further it was found that the entire area under paddy and groundnut were covered with high yielding varieties and on the whole, more than 65% of the gross cropped area was covered under HYV's in the sample farms.

Crop Yields

6.07 The availability of irrigation facilities, use of high yielding variety seeds and adoption of improved practices had helped in increasing the productivity of crops in the benefited area of the farmers. In general, the productivity was more in ayacut areas than in non-ayacut areas in Pudukottai district. Between the districts, the yield was higher in North Arcot. The yield of important crops in irrigated and dry areas in the sample farms are given below:

TABLE 6.5

YIELDS OF IMPORTANT CROPS

(Quintal/acre)

District	Particulars	Paddy	Grams	Ragi	Cholam	Cumbu	Chillies
Pudukottai	Ayacut						
	Irrigated	13.13	8.06	3.16	3.45	5.56	12.15
	Rainfed	7.36	4.95	1.56	1.35	2.95	8.10
	Non-ayacut						
	Irrigated	11.46	7.65	2.76	3.13	4.73	11.63
	Rainfed	6.12	4.63	1.33	1.04	2.63	8.50
North Arcot	Non-ayacut						
	Irrigated	14.15	8.76	3.65	3.50	5.15	13.15
	Rainfed	7.32	4.76	1.76	1.70	2.56	8.90

Gross Value of Produce

6.08 The estimated average gross value of produce per farm and per acre under various farm situations is presented below:

TABLE 6.6

VALUE OF PRODUCE

(in Rupees)

Investment	District	Area	Per farm Pre	Per farm Post	Per acre Pre	Per acre Post
NW	Pudukottai	Ayacut	3698	8594	1541	3581
		Non-ayacut	3627	9051	1197	3292
	Investment average		3658	8851	1328	3402
NWPS	Pudukottai	Ayacut	5314	12582	1820	4309
		Non-ayacut	3078	11248	1033	3775
	District average		4515	12106	1537	4120
	North Arcot	Non-ayacut	6657	17530	1604	4224
	Investment average		5353	14228	1568	4167
DOWPS	Pudukottai	Ayacut	8179	14026	2985	5119
		Non-ayacut	10067	15982	2492	3956
	District average		8934	14808	2739	4539
	North Arcot	Non-ayacut	12682	21903	3147	5435
	Investment average		11696	20036	3057	5237

6.09 It could be seen from the above table that the per acre gross income in pre development situation varied between Rs.1033 to Rs.1820 for wells and between Rs.2492 and Rs.3147 for DOWPS. Obviously the predevelopment income for the latter were higher as a large proportion of the land was under irrigation from the existing wells. It could also been that the per acre pre development gross incomes were

higher (i) in ayacut areas viz-a-viz non ayacut areas in Pudukottai district and (ii) in non ayacut areas of North Arcot viz-a-viz Pudukottai district for reasons of higher irrigation coverage and good precipitation respectively, coupled with higher productivity.

6.10 Due to investments, there were substantial increase in gross income per acre with the values ranging between Rs.3292 and Rs.4309 in respect of wells and Rs.3956 and Rs.5435 in respect of DOW. For reasons already mentioned, the per acre post development gross incomes were higher in ayacut areas of Pudukottai district and higher incomes were realised in North Arcot as among the two districts.

Cost of Cultivation

6.11 The total cost of cultivation (excluding family labour) per farm and per acre of net sown area for different farm situations are presented in Table 6.7.

TABLE 6.7

COST OF CULTIVATION

(in Rupees)

Investment	District	Area	Per farm		Per acre	
			Pre	Post	Pre	Post
NW	Pudukottai	Ayacut	1562	3595	651	1298
		Non-ayacut	1482	3588	489	1184
			1517	3591	551	1227
NWPS	Pudukottai	Ayacut	2070	4249	709	1455
		Non-ayacut	1258	4142	422	1390
	District average		1780	4211	607	1431

(Contd...)

Investment	District	Area	Per farm Pre	Per farm Post	Per acre Pre	Per acre Post
	North Arcot	Non-ayacut	2810	6805	677	1640
	Investment average		2183	5226	639	1531
DOWPS	Pudukottai	Ayacut	3241	5231	1183	1909
		Non-ayacut	3959	5704	980	1412
	District average		3528	5420	1082	1661
	North Arcot	Non-ayacut	4671	7472	1159	1854
	Investment average		4370	6932	1142	1812

6.12 The per acre cost of cultivation in pre development situation varied from Rs.422 to Rs.709 in case of wells and it was higher between Rs.980 to Rs.1183 in case of deepening of wells. In the post development situation the range was between Rs.1184 to Rs.1640 in case of wells and between Rs.1412 to Rs.1908 in case of DOWPS. The increase in the cost of cultivation in the post development situation as compared to the pre development situation was due to additional area brought under irrigiation, increase in cropping intensity and switch over to high yielding varieties which eventually resulted in higher usage of all inputs.

Farm Business Income

6.13 The per acre and per farm net income realised by the sample units under different situation is presented below:

TABLE 6.7

FARM BUSINESS INCOME

(Rupees)

Investment	District	Area	Per farm Pre	Per farm Post	Per acre Pre	Per acre Post	Percent increase
NW	Pudukottai	Ayacut	2136	4999	890	2283	156%
		Non-ayacut	2145	5463	708	2108	200%
	Investment average		2141	5260	777	2175	182%
NWPS	Pudukottai	Ayacut	3244	8333	1111	2854	156%
		Non-ayacut	1820	7106	611	2385	290%
	District average		2735	7895	930	2689	188%
	North Arcot	Non-ayacut	3847	10723	927	2584	178%
	Investment average		3170	9002	929	2636	183%
DOW	Pudukottai	Ayacut	4938	8795	1802	3210	178%
		Non-ayacut	6108	10278	1512	2544	65%
	District average		5406	9388	1657	2878	73%
	North Arcot	Non-ayacut	8011	14431	1988	3581	85%
	Investment average		7326	13104	1915	3425	79%

The net income per acre of net sown area in post development situations varied within a range of Rs.2108 per acre to 2854 in case of wells and Rs.2544 to Rs.3681 in case of DOWPS. The extent of increase in net income was lower at 79% in case of DOW while it was higher at 182% and 183% for non energised and energised wells respectively. Further in all the situations there was improvement in

the input output ratio and the overall averages were 2.58 and 2.77 in the pre and post development situation respectively.

Net Incremental Income

6.14 The estimated net incremantal incomes for different situations are presented below:

TABLE 6.9

NET INCREMENTAL INCOME

(in Rupees)

Investment	District	Area	Per farm	Per acre
NW	Pudukottai	Ayacut	2863	1393
		Non-ayacut	3318	1400
	Investment average		3119	1398
NWPS	Pudukottai	Ayacut	5089	1743
		Non-ayacut	5286	1774
	District average		5160	1754
	North Arcot	Non-ayacut	6878	1657
	Investment average		5832	1707
DOWPS	Pudukottai	Ayacut	3857	1408
		Non-ayacut	4170	1032
	District average		3982	1222
	North Arcot	Non-ayacut	6420	1593
	Investment average		5778	1510

6.15 It can be seen from the above that the per farm incremental income averaged at Rs.3119 for non energised wells, Rs.5832 for energised wells and Rs.5778 for DOWPS. Between the districts the incremental incomes were higher in North Arcot than Pudukottai across compabable investments.

Macro Economic Impact

6.16 A total of 87 wells, 62 wells with pumpsets, 82 DOW/DOWPS and 45 pumpsets were financed under both the schemes. However, for as many as 12 wells and 22 DOW's, only one instalment was disbursed and they were treated as incomplete. Excluding the incomplete investments and adjusting for "pumpsets alone" investment, the macro-impact of the completed investments under the selected schemes on different parameters are estimated based on sample averages and presented below:

TABLE 6.10

MACRO ECONOMIC IMPACT

Total benefitted area	543.5 ac.
Net additions to irrigated acreage	269.80 ac.
Additions to gross cropped area	508.72 ac.
Total value of additional production(Rs.)	16.49 lakhs
Value added to GDP(Rs.)	11.31 lakhs

The estimated cost of investment on completed units worked out to Rs.41.55 lakhs at reference year prices; thus the incremental capital output ratio was 1:3.37 for all MI units as whole.

CHAPTER VII

FINANCIAL VIABILITY OF THE INVESTMENTS

7.01 The financial viability of the investments were examined by computing the Financial Rate of Returns (FRR) on the basis of the estimates of incremental income and updated investment costs at reference year prices. The estimated cost of investment at 1986-87 prices are given below:

TABLE 7.1
COST OF INVESTMENT AT REFERENCE YEAR PRICES
(in Rupees)

Item of investment	District	Area	MI Structure	Pumpset	Total
NW	Pudukkottai	Ayacut	14275	--	14275
		Non-ayacut	17156	--	17156
	Investment average		15896	--	15896
NWPS	Pudukkottai	Ayacut	15934	6370	22104
		Non-ayacut	20160	7134	27294
	Districts average		17443	6643	24086
	North Arcot	Non-ayacut	19675	6965	26640
	Investment average		18316	6768	25084
DOWPS	Pudukkottai	Ayacut	7200	6576	13776
		Non-ayacut	7963	6965	14928
	District average		7505	6732	14237
	North Arcot	Non-ayacut	7310	6965	14275
	Investment average		7361	6903	14264

7.02 Although the life of a well is expected to be around 40 years, the cash flow has been prepared for a period of 20 years for the sake of simplicity. The following assumptions were made while computing the cash flows.

i. The economic life of a new well is 40 years.

ii. The life of a pumpset is 9 years.

iii. There will be no shrinkage in the command area of the well.

iv. There will be no change in the cropping pattern over the years.

v. Full development benefits from new wells would accrue only from the third year onwards. The benfits during first and second years would be 50% and 75% of the stabilized incomes.

vi. Full benefits from DOWPS would accrue from the second year onwards. The first year benefits will be 50% of the stabilized incomes.

vii. 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 the initial cost; so also for DOWPS.

viii. The pumpset will be replaced during 10th and 19th years and the residual value of the replaced pumpset in the 20th year was taken at 90% of the investment cost.

7.03 The cash flow statements for various investments across the districts/areas are presented in Annexure V to XI. The calculated FRR for various situations are given as under:

TABLE 7.2

ESTIMATED FINANCIAL RATES OF RETURN

(%)

Item of investment	District	Ayacut	Non-ayacut	All
NW	Pudukkottai	21	20	20
NWPS	Pudukkottai	20	19	20
	North Arcot	-	26	26
	Average	20	24	22
DOWPS	Pudukkottai	26	30	28
	North Arcot	-	38	38
	Average	26	37	35

7.04 The following conclusions can be drawn from the above table.

i. The FRR for deepening of wells was higher than the FRR for new wells indicative of the fact that the incremental incomes generated by wells was not in comparable proportions with the investment cost as in the case of DOWPS.

ii. The estimated FRRs were slightly higher in ayacut areas than the non-ayacut areas of Pudukkottai district for investment on wells.

iii. Between the two districts, the FRR in North Arcot district was higher than the FRR in Pudukkottai district.

The variations in the generated FRRs can be attributed to the differences in the incremental income generated from the investments in different situations. However, as the FRR was found to be greater than 15% in all situations, it can be concluded that all the investments were financiably viable in different areas.

Minimum Benefited Area for Investment

7.05 The minimum farm size for the investment on NW, NWPS and DOWPS can be estimated on the basis of minimum incremental income required to make the investment viable. The minimum incremental income required can be measured by equating the cost of investment with the discounted flow of benefits. With the assumption that a beneficiary should get atleast 17% rate of return on the investment, the minimum incremental incomes and the corresponding benefited area were worked out and presented below:

TABLE 7.3

MINIMUM BENEFITED AREA

Investment	District	Area	Minimum viable		Percent of farms not having minimum benefitted area
			Incremental income	Benefitted area (acres)	
NW	Pudukkottai	Ayacut	2433	1.38	43%
		Non-ayacut	2924	1.45	22%
NWPS	Pudukkottai	Ayacut	3985	1.75	22%
		Non-ayacut	4884	1.76	30%
	North Arcot	Non-ayacut	4767	2.14	22%

(Contd...)

Investment	District	Area	Minimum viable Incremental income	Benefitted area (acres)	Percent of farms not having minimum benefitted area
DOWPS	Pudukkottai	Ayacut	2519	1.55	17%
		Non-ayacut	2717	2.07	-
	North Arcot	Non-ayacut	2612	1.35	-

It had been assumed in the scheme sanctions that the benefitted area would be 1.50 acres for non-energised well, 2.50 acres for energised wells/DOWPS. That the actual minimum benefited area required were lower than the scheme assumptions indicate the soundness of the investments. However it was found that the investment in about 25% of the farms were found to be nonviable because of lesser command under the well. Additional assistance would have to be provided in such cases for further deepening so as to increase the command area and ultimately make the investment viable.

CHAPTER VIII

REPAYMENT PERFORMANCE

8.1 The scheme sanctions stipulated that the farmers were to repay the loans for a new well investment in 15 years and the other farmers in 9 years inclusive of a grace period of one year. In the case of deepening of wells, the repayment period was 7 years both for small and other farmers without any grace period. The selected PLDBs had adhered to the stipulated norms.

8.02 An analysis of repayment performance of the sample beneficiaries revealed that repayment of loan instalments were better in North Arcot district (the repayment being 95% of demand) as compared to Pudukottai district (62%). The estimated percentage of recovery of different groups and sample beneficiaries are presented in table 8.1.

TABLE 8.1

REPAYMENT PERFORMANCE OF SAMPLE BENEFICIARIES

(% of recovery to demand)

Item of investment	District	Ayacut area	Non-ayacut area	All Farms
NW	Pudukkottai	42.85	45.45	44.32
NWPS	Pudukkottai	65.40	86.00	72.76
	North Arcot	-	94.28	94.26
		65.40	91.32	81.17

(Contd...)

Item of investment	District	Ayacut area	Non-ayacut area	All forms
DOWPS	Pudukkottai	50.17	79.75	62.01
	North Arcot	-	95.36	95.36
		50.17	93.41	86.58
ALL BENEFICIARIES		57.36	85.50	76.78

8.03 The following conclusions can be drawn from the above table:

i. The overall persontage of recovery was quite good at 77% of the demand for all sample beneficiaries.

ii. Across the investments, the recoveries were better in case of DOWPS as compared to wells. And among the wells, the peerformance was better in case of NWPS beneficiaries.

iii. The recovery percentage was higher in North Arcot distric as compared to Pudukottai district.

iv. The repayment performance by the beneficiaries in ayacut area was lower as compared to non-ayacut areas in Pudukkottai district.

8.04 A disaggregated analysis of sample units based on the percentage of overdue showed that out of 100 sample beneficiaries, 45 of them had paid the instalments in full and the remaining 55 beneficiaries had partially paid the instalments (Table 8.2)

TABLE 8.2

SAMPLE BENEFICIARIES CLASSIFIED ACCORDING TO THE PERCENTAGE OF OVERDUES

(Percent to no.of beneficiaries)

Item of investment	District/Area	No.of beneficiaries	0	1-25	26-50	51-75	75-100
NW	Pudukkottai						
	Ayacut	7	-	29	14	29	28
	Non-ayacut	9	-	44	-	22	34
	Investment average	16	-	38	6	25	31
NWPS	Pudukkottai						
	Ayacut	18	17	44	6	11	22
	Non-ayacut	10	40	50	10	-	-
	District average	28	25	46	7	7	15
NWPS	North Arcot						
	Ayacut	18	72	22	6	-	-
	Investment average	46	43	37	7	4	9
DOWPS	Pudukkottai						
	Ayacut	6	17	17	17	17	32
	Non-ayacut	4	50	-	50	-	-
	District average	10	30	10	30	10	20
	North Arcot						
	Non-ayacut	28	78	14	-	4	4
	Investment average	38	66	13	8	5	8
ALL BENEFICIARIES		100	45	28	7	8	12

8.06 Among different types of investments, all the beneficiaries were defaulters in the case of new wells and about 57% of them had to pay more than 50% of the amount due. In the case of New wells with pumpsets about 57% of the sample beneficiaries were defaulters and only 13% of them had overdues of more than 50% . As regards the deepening of wells, the percentage of beneficiaries without any overdue was about 65% and only 13% of them had to pay more than 50% of the instlaments due. The disaggregated analysis confirm the earlier observations in regard to the repayment performance across the districts and item of investments.

8.07 To examine the current norms of the repayment periods, a comparison of the annual incremental income with debt service liability (both measured at reference year prices) was done and the results are presented in Table 8.3.

TABLE 8.3

INCREMENTAL INCOME AND DEBT SERVICE LIABILITY

(in Rupees)

Item of investment	District	Area	Incremental inome	Annual debt service liability	% of col.5 to 4.
(1)	(2)	(3)	(4)	(5)	(6)
NW	Pudukottai	Ayacut	2863	2088	73
		Non-ayacut	3318	2509	76
NWPS	Pudukottai	Ayacut	5089	3418	67
		Non-ayacut	5286	4199	79
	North Arcot	Non-ayacut	6878	4099	60
DOWPS	Pudukottai	Ayacut	3857	2577	67
		Non-ayacut	4170	2712	65
	North Arcot	Non-ayacut	6420	2569	40

3.08 As could be seen from the above, the amount of annual debt service liability as a proportion of the annual incremental income varied between 40% and 79% across the investments/districts/areas. It is also found that the proportion was relatively higher for investment on new wells (with and without pumpset) in Pudukottai district. It is evident from the above analysis that the debt service burden was higher for small farmers in dry areas like Pudukottai district. Hence, the loan instalments need to be reduced for improving the overall recovery performance. Provision of adequate capital subsidy for all the eligible beneficiaries would help in reducing the debt burden.

ANNEXURE I

RAINFALL DISTRIBUTION IN THE SELECTED BLOCKS

Months	Ponnamaravathy block						Anakavur block					
	Normal rainfall	Actual rain fall 1982-83	83-84	84-85	85-86	86-87	Normal rainfall	Acutual rainfall 1982-83	83-84	84-85	85-86	86-87
Southwest monsoon												
June	58	69	63	46	117	132	78	64	73	15	72	138
July	65	54	45	48	42	35	94	146	111	473	153	148
August	122	146	181	-	88	185	143	196	237	45	208	229
September	149	95	82	72	67	137	150	193	303	177	197	46
Total :	394	364	371	166	314	489	543	599	724	710	630	699
North East monsoon												
October	167	86	91	113	132	128	182	186	181	188	127	146
November	134	26	13	44	111	61	173	146	45	155	266	196
December	68	190	280	131	100	33	67	93	250	63	42	115
Total :	369	302	384	288	333	222	422	425	476	406	435	457
Winter Period												
January	32	43	40	54	117	52	28	86	13	64	43	35
February	15	-	15	-	12	90	11	21	-	-	-	15
Total	47	43	55	54	129	142	39	107	13	64	43	50
Hot weather period												
March	16	-	30	-	32	75	13	64	128	-	20	26
April	56	2	42	16	35	20	23	30	18	24	2	-
May	71	80	-	-	32	-	55	65	-	11	17	40
Total	143	82	72	16	99	95	101	159	146	35	39	66
Annual Rainfall	953	791	882	524	875	948	1105	1290	1359	1215	1147	1272

ANNEXURE II

LAND USE PATTERN

(In hectare)

Sl. No.	Particulars	Ponnamaravathy block	Anakavur block
1.	Forest	1317	236
2.	Barren and uncltivable land	475	443
3.	Land put to non-agricultural uses	5760	7098
4.	Cultivable waste	546	762
5.	Permanent pastures and Grazing lands	263	254
6.	Land under miscellaneous uses	214	176
7.	Current fallows	2430	3081
8.	Other fallow lands	830	469
9.	Net area sown	10410	13524
	Total geographical area	22245	26043
10	Area sown more than once	3716	7453
11.	Gross cropped area	13950	19867
12.	Cropping Intensity (%)	134	147

ANNEXURE III

TIME LAG ANALYSIS

(No. of beneficiaries)

Time lag (in months)	Between dates of			
	Application & Sanction	Sanction & disbursement of I Instalment	I and II Installment	II and III Instalment
Less than 1	40	80	26	23
1 - 2	23	12	32	21
2 - 3	16	5	18	23
3 - 4	11	2	7	8
4 - 5	3	-	9	3
5 and above	7	1	8	10
	100	100	100	88

ANNEXURE IV

CROPPING PATTERN IN SAMPLE FARMS

(Acres)

Crop	NW				NWPS						DOWPS					
	Pudukkottai				Pukukkottai				North Arcot		Pudukottai				North Arcot	
	Ayacut		Non-ayacut		Ayacut		Non-ayacut		Non-ayacut		Ayacut		Non-ayacut		Non-ayacut	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Paddy	0.98	1.53	1.43	1.56	2.81	3.48	1.37	1.75	1.29	3.94	2.23	2.89	2.81	3.09	3.09	5.15
Ragi	0.29	0.14	-	0.20	0.10	0.17	0.45	0.40	0.18	0.54	0.17	0.42	0.11	0.36	0.13	0.09
Cholam	-	-	0.15	-	0.03	0.19	-	-	0.19	0.25	-	-	-	-	-	-
Cumbu	0.14	0.14	0.06	0.06	-	0.10	-	0.07	-	-	-	-	-	0.32	-	-
Pulses	0.14	-	-	0.11	-	-	0.38	0.05	-	0.06	-	-	-	-	-	-
Groundnut	0.50	1.83	1.54	2.90	0.22	1.08	1.11	1.83	3.06	4.13	1.12	1.38	2.12	2.91	2.59	3.24
Chillies	0.29	0.21	-	0.02	-	0.04	-	0.10	-	0.03	0.23	0.37	-	-	-	0.01
Others	0.07	-	-	-	0.05	0.18	0.12	0.22	-	-	0.33	0.69	0.25	0.50	0.25	0.28
Total	2.41	3.85	3.18	4.85	3.21	5.24	3.43	4.42	4.72	8.95	4.08	5.75	5.29	7.18	6.05	8.73
Proportion of Paddy	41%	40%	45%	32%	88%	66%	40%	40%	27%	44%	55%	50%	53%	43%	51%	59%
Groundnut	21%	48%	48%	60%	7%	21%	32%	41%	65%	46%	27%	24%	40%	41%	41%	37%
Total	62%	88%	93%	92%	95%	87%	72%	81%	92%	90%	82%	74%	93%	84%	84%	96%

ANNEXURE V

CASH FLOW STATEMENT : NEW WELLS - PUDUKOTTAI

Particulars	Years:	Ayacut Area 1	2	3-19	20	Non-ayacut area 1	2	3-19	20
I. Out flow		14275				17156			
Cost of new well									
II. Inflow									
Incremental Income		1431	2147	2863	2863	1659	2489	3318	3318
Residual value of wells					7138				8578
Total Inflow		1431	2147	2863	10001	1659	2489	3318	11896
III. Net Cash flow		(12844)	2147	2863	10001	(15497)	2489	3318	11896

ANNEXURE VI

CASH FLOW STATEMENT : NWPS - AYACUT AREA - PUDUKOTTAI

Sl. No.	Particulars	YEARS						
		1	2	3to9	10	11to18	19	20
I	Outflow							
	Cost of new well	15934						
	Cost of pumpset	6370			6370		6370	
	Total outflow	22104			6370		6370	
II	Inflow							
	Incremental farm income	2544	3817	5089	5089	5089	5089	5089
	Residual value of (i) Well							7867
	(ii) Pumpset							5733
	Total Inflow	2544	3817	5089	5089	5089	5089	18689
III	Net Cashflow	(19560)	3817	5089	(1281)	5089	(1281)	18689

ANNEXURE VII

CASH FLOW STATEMENT : NWPS - NON-AYACUT AREA - PUDUKOTTAI

Sl. No.	Particulars	YEARS						
		1	2	3to9	10	11to18	19	20
I.	Outflow							
	Cost of New Well	20160						
	Cost of Pumpset	7134			7134		7134	
	Total outflow	27294			7134		7134	
II.	Inflow							
	Incremental farm income	2643	3965	5286	5286	5286	5286	5286
	Residual valve of (i) Well							10080
	(ii) Pumpset							6421
	Total inflow	2643	3965	5286	5286	5286	5286	21787
III.	Net Cash flow	(24651)	3965	5286	(1848)	5286	(1848)	21787

ANNEXURE VIII

CASH FLOW STATEMENT - NWPS - NON-AYACUT AREA - NORTH ARCOT

Sl. No.	Particulars	YEARS						
		1	2	3to9	10	11to18	19	20
I.	Outflow							
	Cost of new well	19675						
	Cost of pumpset	6965			6965		6965	
	Total outflow	26640			6965		6965	
II.	Inflow							
	Incremental farm income	3439	5159	6878	6878	6878	6878	6878
	Residual value of (i) Well							9838
	(ii) Pumpset							6268
	Total Cashflow	3439	5159	6878	6878	6878	6878	22984
III.	Net Cashflow	(23201)	5159	6878	(87)	6878	(87)	22984

ANNEXURE IX

CASH FLOW STATEMENT : DOWPS - AYACUT AREA - PUDUKOTTAI

Sl. No.	Particulars	YEARS					
		1	2to9	10	11to18	19	20
I.	Outflow						
	Cost of deepening of well	7200					
	Cost of pumpset	6576		6576		6576	
	Total outflow	13776		6576		6576	
II.	Inflow						
	Incremental farm income	1928	3857	3857	3857	3857	3857
	Residual value of						
	(i) Deepening of well						3600
	(ii) Pumpset						5918
	Total inflow	1928	3857	3857	3857	3857	13375
III.	Net Cashflow	(11848)	3857	(2719)	3857	(2719)	13375

ANNEXURE X

CASH FLOW STATEMENT : DOWPS : NON-AYACUT AREA : PUDUKKOTTAI

Sl. No.	Particulars	YEARS					
		1	2to9	10	11to18	19	20
I.	Outflow						
	Cost of deepening of well	7963					
	Cost of pumpset	6965		6965		6965	
	Total outflow	14930		6965		6965	
II.	Inflow						
	Incremental farm income	2085	4170	4170	4170	4170	4170
	Residual value of						
	(i) Deepening of well						3982
	(ii) Pumpset						6268
	Total inflow	2085	4170	4170	4170	4170	14420
III.	Net Cashfolow	(12845)	4170	(2795)	4170	(2795)	14420

ANNEXURE XI

CASH FLOW STATEMENT : DOWPS : NON-AYACUT AREA : NORTH ARCOT

Sl. No.	Particulars	YEARS 1	2to9	10	11to18	19	20
I.	Outflow						
	Cost of deepening of well	7310					
	Cost of pumpset	6965		6965		6965	
	Total outflow	14275		6965		6965	
II.	Inflow						
	Incremental farm income	3210	6420	6420	6420	6420	6420
	Residual value of						
	(i) Deepening of well						3655
	(ii) Pumpset						6268
	Total inflow	3210	6420	6420	6420	6420	16343
III.	Net Cashflow	(11065)	6420	(545)	6420	(545)	16343