

**DUGWELL IRRIGATION IN CHITTOOR  
DIST.- ANDHRA PRADESH  
(AN EX-POST EVALUATION STUDY)**



**NATIONAL BANK FOR  
AGRICULTURE AND RURAL DEVELOPMENT**

REGIONAL OFFICE : HYDERABAD-500 020.

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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-schemes were sanctioned by the erstwhile ARDC. For the sake of convenience, the report refers to ARDC although it does not exist anymore.

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## FOREWORD

This is the 8th Evaluation Study Report brought out by the National Bank from Andhra Pradesh and 3rd published by the Hyderabad Regional Office. The subject matter of the evaluation study is minor irrigation (dugwells) schemes sanctioned to Andhra Pradesh State Central Cooperative Agriculture Development Bank (APCCADB) for implementation in Chittoor District.

The present study brings out the serious under-financing of the investments due to the restrictive land valuation policy adopted by the bank. The beneficiaries had further exacerbated this deficiency by putting up wells of larger dimensions than could be sustained with the loan amount, resulting in supplementary borrowing. Hence there was need to make realistic assumptions of the unit cost taking into account the actual requirements of local practices apart from ensuring technical guidance to the beneficiaries in the construction of dugwells.

Though the investment for different types of dugwells was found to be financially viable the repayment performance under the schemes has not been upto the levels expected due to lesser repayment periods assumed under the schemes on one hand and lesser incremental income realised owing to frequent droughts experienced in the district on the other. The percentage of overdues as well as defaulters was very high in the case of small farmers compared with others. The higher percentage of debt services liability was reflected in relatively higher percentage of overdues and with the increase in the incremental income there was progressive reduction in the level of overdues. Realising the need National Bank of late has rightly extended the repayment period upto 15 years.

The study also underlines the need to simplify the procedure of receipt and sanction of loan applications and to ensure early completion of the investments.



The coverage of small farmers under the schemes had been quite satisfactory as 80% of the total beneficiaries were small farmers against 60% assumed under the schemes.

**NABARD  
REGIONAL OFFICE  
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**9.8.1988**

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## ABBREVIATIONS

APCCADB	:	Andhra Pradesh Co-operative Central Agricultural Development Bank
APSIDC	:	Andhra Pradesh State Irrigation Development Corporation
ARDC	:	Agricultural Refinance and Development Corporation
ID Crops	:	Irrigated Dry Crops
IGPH	:	Imperial Gallon Per Hour
NABARD	:	National Bank for Agriculture and Rural Development
O & M Costs	:	Operation and Maintenance Costs
SC	:	Scheduled Caste
ST	:	Scheduled Tribe



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**BASIC DATA SHEET**

Type of Investment: Dug Wells  
 Scheme Area: Chittoor District  
 Financing Bank: Andhra Pradesh Co-operative Central  
 Agricultural Development Bank Ltd.

S. no	Particulars	Unit	Dugwells		
			Small farmers	Other farmers	Total
1.	Total population of the wells under the Scheme	Number	1,006	192	1,198
2.	Number of sample wells selected for the study	Number	72	18	90
	a) DEPs	"	25	12	37
	b) DDPs	"	32	6	38
	c) DMPs	"	15	-	15
3.	Cost of investment				
	a) At historical prices (1980-81)	Rupees			
	i) DEPs	"	16,348	19,350	17,322
	ii) DDPs	"	14,272	16,333	14,645
	iii) DMPs	"	7,866	-	7,866
	b) At 1985-86 prices	Rupees			
	i) DEPs	"	23,500	27,500	24,793
	ii) DDPs	"	20,000	24,000	20,632
	iii) DMPs	"	11,000	-	11,000
4.	Average size of cultivated holding	Acres			
	i) DEPs	"	6.56	17.14	10.00
	ii) DDPs	"	6.02	17.05	7.77
	iii) DMPs	"	4.47	-	4.47
5.	Average benefitted area				
	i) DEPs	"	3.23	3.54	3.33
	ii) DDPs	"	3.04	4.33	3.24
	iii) DMPs	"	1.68	-	1.68



BASIC DATA SHEET (CONTD../2/)

S. no.	Particulars	Unit	Dugwells		
			Small farmers	Other farmers	Total
6.	Intensity of cropping	%			
	1) DEPs	"	221	232	225
	ii) DDPs	"	164	169	165
	iii) DMPs	"	173	-	173
7.	Net farm incremental income per acre	Rupees			
	1) DEPs	"	2635 (2998)	2794 (3062)	2700 (3042)
	ii) DDPs	"	1619 (1800)	1982 (2118)	1718 (1948)
	iii) DMPs	"	1604 (1926)	-	1604 (1926)
8.	Net farm incremental income per unit	Rupees			
	1) DEPs	"	8511 (9684)	9891 (10839)	8991 (10130)
	ii) DDPs	"	4922 (5655)	8582 (9171)	5566 (6312)
	iii) DMPs	"	2695 (3236)	-	2695 (3236)
9.	Financial Rate of Return				
	1) DEPs		32 (35)	32 (34)	32 (35)
	ii) DDPs		22 (25)	31 (33)	24 (27)
	iii) DMPs		22 (25)	-	22 (25)

Contd...



BASIC DATA SHEET (CONTD../3/)

S. Particulars no.	Unit	Dugwells		
		Small farmers	Other farmers	Total
<b>10. Additional on farm employment per bene- fitted acre</b>				
	Man days			
i) DEPs	"	86	89	87
ii) DDPs	"	58	66	60
iii) DMPs	"	57	-	57
<b>11. Repayment performance</b>				
	%			
( % of overdues to demand )				
i) DEPs	"	42	2	31
ii) DDPs	"	34	32	33
iii) DMPs	"	63	-	63
<b>12. Total scheme impact</b>				
- Net addition to				
i) Irrigated area	Acre	-	-	2964
ii) Gross value of output at 1985-86 prices	Rs.lakhs	-	-	122.000
iii) Value added at 1985-86 prices	"	-	-	63.82 (72.39)
<b>13. Employment</b>				
a) Recurring	Lakh mandays	-	-	2.13
b) Non-recurring	"	-	-	9.13

NR: 1. Figures in brackets indicate the estimates based on the cost of cultivation excluding the imputed value of family labour.

2. DEPs : Dug wells with Electric pumpsets

DDPs : Dug wells with Diesel pumpsets

DMP's : Dug wells with Mhotes

: : :



## SUMMARY AND CONCLUSIONS

1. This report presents the results of an evaluation study of Minor Irrigation schemes in Chittoor District in Rayalaseema region of Andhra Pradesh.
2. The schemes taken up for evaluation study were sanctioned to Andhra Pradesh Cooperative Central Agricultural Development Bank (APCCADB) by the erstwhile Agricultural Refinance and Development Corporation (ARDC) for implementation in Chittoor District during the year 1980-81. These schemes were actually supplementary in nature and sanctioned yearly in continuation to ongoing schemes sanctioned earlier under Andhra Pradesh Agricultural Credit Project III.
3. The investments approved under the schemes included 1852 Dugwells, 3449 Development of wells and 676 pumpsets involving total financial assistance of Rs.214.87 lakhs. Against this programme the bank had disbursed Rs.198.35 lakhs for 1190 Dugwells, 3643 Development of wells and 889 pumpsets. Thus while only 65% of the Dugwells targeted were financed, the targets in respect of Development of wells and pumpsets were over achieved.
4. The evaluation study was restricted to dugwells and was conducted during August 1986 with the Agricultural year 1985-86 as reference period. The sample drawn for the study comprised 90 dugwell beneficiaries of whom 37 had installed electric pumpsets, 38 diesel pumpsets and 15 were lifting the water with Mhotes (Traditional water lifting device with bullocks). These sample beneficiaries were selected from 6 out of 9 Primary Agricultural Development Banks (PADBs) which had implemented the schemes.

5. The coverage of small farmers had been encouraging as 80% of the total beneficiaries under the schemes were small farmers as against 60% assumed in the schemes.
6. The rate of interest charged @ 10.25% and the repayment periods fixed at 12 years for small farmers and 9 years for other farmers with a gestation period of one year in respect of dugwells and 9 years for pumpsets were in conformity with the scheme assumptions.
7. Considerable delay was noticed in both sanction and disbursement of loans. After the receipt of loan applications for sanctioning the delay of 1-3 months for 51% of beneficiaries and more than 3 months for 26% of the beneficiaries was noticed while the loans were sanctioned within one month for the other 23%. After sanction, the loan amount was disbursed within one month for 66% of the beneficiaries whereas it took 1-3 months for 21% and more than 3 months for the other 13%. Delay in the disbursement of 2nd and subsequent instalments was also observed.
8. While the delay by the beneficiaries in completing the formalities such as submission of land records, non-encumbrance certificates etc. were the reasons reported for the time lag in sanctioning the loans, the delay in payment of share capital, non-availability of co-executors etc. were the reasons for the time lag in disbursing the loans. Delay in getting the work done by the beneficiaries on one hand and the delay in the verification of loan utilisation by the bank staff on the other were the main reasons noticed for the time lag in the disbursement of 2nd and subsequent instalments.
9. Thus there is acute need for the financing bank to simplify the procedure of receipt and sanction of loan applications



and ensure that the investments must be completed by the beneficiaries within the reasonable time by disbursing the loan amount early.

10. There were large variations in the dimensions of the wells constructed by the beneficiaries and they were far higher than the assumed dimensions which was the main reason for higher than the assumed cost of investment under the schemes.
11. Due to restrictive land valuation policy adopted by the financing banks, majority of the beneficiaries were under financed and the percentage of loan amount to the cost of investment worked out to only 42% in the case of wells operated by pumpsets, and 57% in the case of wells operated by Mhotes. Survey data also revealed that for 71% of the sample farmers the loan amount disbursed was less than 50% of the cost of investment. Underfinancing by the banks forced the farmers to resort to private borrowings and sale of assets in order to complete the investments apart from resulting in incomplete investments.
12. Hence the study underlines the need to make realistic estimates of unit costs taking into account the actual requirements and the local practices apart from ensuring technical guidance to the beneficiaries in the construction of wells. Also the financing banks should suitably revise the land valuation procedure so as to advance adequate loan amount to the beneficiaries.
13. As per the survey data the average benefitted area worked out to 3.29 acres under wells with pumpsets and 1.68 acres under wells without pumpsets as against the scheme assumptions of 3.50 acres and 2.50 acres respectively.

14. In the pre-investment situation the entire benefitted area was rainfed. With the introduction of irrigation, there was a shift in the cropping pattern from groundnut (dry), millets and pulses to groundnut (irrigated), paddy, vegetables, sugarcane etc. crops. Per acre yields of millets and groundnut crops realised under with project situation were about two times of their yields under without project situation. Further yields of crops raised under wells with pumpsets were slightly higher compared to respective yields of crops raised under wells with mholes. The cropping intensity was significantly higher at 195% and 173% under wells operated by pumpsets and mholes respectively compared to only 100% under without project situation.
15. The cumulative effect of improvement in the crop pattern, cropping intensity, application of irrigation and increase in input use reflected in the increase in the value of produce. At 1985-86 prices per acre incremental value of gross produce worked out to Rs.4812, Rs.3596 and Rs.3218 respectively under wells operated by electric pumpsets, diesel pumpsets and Mholes. Similarly there was conspicuous raise on all the components of cost of cultivation and per acre (including imputed value of family labour) incremental cost of cultivation worked out to Rs.2102, Rs.1878, and Rs.1614 resulting in per acre net incremental income of Rs.2700, Rs.1718 and Rs.1604 respectively in the case of wells operated by electric pumpsets, diesel pumpsets and Mholes.
16. On the basis of the above estimates, incremental income per unit of investment worked out to Rs.8961, Rs.5492 and Rs.2695 respectively in the case of wells operated

by electric pumpsets, diesel pumpsets and Mhotes, and the respective cost of investment was estimated at Rs. 24793, Rs.20632 and Rs.11000.

17. The Financial Rate of Return (FRR) worked out to 32, 24 and 22, when the imputed value of family labour was included in the cultivation costs and 35, 27 and 25 and when such cost was excluded in respect of wells operated by electric pumpsets, diesel pumpsets and Mhotes respectively, indicating that the investments under the schemes were financially viable.
18. Though the investment in different types of wells was found to be financially viable in the repayment performance under the schemes has not been encouraging. As at the end of June 1986, the percentage of overdue worked out to 37% and 60% of the sample beneficiaries had defaulted in the repayment of loans. The percentage of overdue as well as defaulters were very high in the case of small farmers compared to other farmers. Further the percentage of defaulters was highest in the case of wells with Mhotes (73%) followed by wells with diesel pumpsets (66%) and wells with electric pumpsets (49%).
19. Annual debt service liability as a percentage of incremental income was very high in the case of wells operated by diesel pumpsets (61%) and Mhotes (52%). The higher percentage of debt service liability has reflected in relatively higher percentage of overdue in different types of wells and farmers.
20. The disaggregated analysis also indicated that with the increase in the incremental income, there was progressive reduction in the level of overdue. Hence the lesser incre-

mental income realised by the beneficiaries owing to frequent droughts experienced in the district was the main reason for high overdues, though there were some instances of wilful defaulters constituting about 8% of the sample beneficiaries.

21. Realising the need NABARD of late has rightly extended the repayment period in the case of digwells from 12 to 15 years for small farmers and 9 to 12 years for other farmers. The gestation period was also extended from 12 to 23 months.
22. On the basis of the survey data, failed and incomplete wells constituted about 11% and 5% of the sample wells respectively while 3% of the beneficiaries had misutilised the loan amount. Non-striking of water even after constructing the wells upto the required depth, striking rock at the bottom and collapsing during/after construction were the reasons for failure of the wells. Inadequate loan amount was the main reason for incomplete wells while lack of proper supervision over the utilisation of loan amount by the bank staff led to misutilisation.
23. As a consequence of scheme investments as a whole the additional area brought under irrigation was estimated at 2964 acres which resulted in annual additional gross output of Rs.122.00 lakhs and the value added worked out to Rs.63.82 lakhs at 1985-86 constant prices.
24. Per acre incremental on-farm labour employment was estimated at 70 mandays by wells with pumpsets and 59 mandays by wells with Mhotes. On this basis, the scheme investments had generated an additional recurring employment of 2.13 lakh mandays per annum of which the share

of hired agricultural labour was 1.03 lakh mandays. In addition the construction of wells and installation of pump-sets under the schemes are estimated to have created non-recurring employment of 9.13 lakh mandays.

## CHAPTER I

### THE SCHEME AND THE SCHEME AREA

#### Scheme area

- 1.1 The scheme area is Chittoor district which is situated in the southern-most part of Andhra Pradesh and is bounded on the East by Nellore district of Andhra Pradesh and Chengalput district of Tamilnadu, on the West by Kolar District of Karnataka State, on the North by Cuddapah District of Andhra Pradesh and south by North Arcot and Dharmapuri districts of Tamilnadu.
- 1.2 As per 1981 census the population of the district was 27.47 lakhs of which the rural population was 83% (22.85 lakhs). The density of population in the district is 181 persons per sq.Km. as against the State average of 195. Scheduled caste and Scheduled Tribe population constituted about 20% of the total population. Agriculture is the principal occupation of about 70% of the work force in the district.
- 1.3 The district extends over an area of 36.56 lakh acres of which 33% (11.97 lakh acres) is the cultivated area. The gross cropped area is 13.59 lakh acres (84-85).
- 1.4 Chittoor district receives rainfall from both South-west and North-east monsoons. The annual normal rainfall of the district is 826 mm, with 44% received during South-west monsoon, 41% during north-east monsoon and the rest in the remaining period. The incidence of the rainfall is not uniform and the district is frequently prone to drought conditions. According to a study conducted by

the Central Water Commission, the district experienced drought for 12 years (40%) during a 30 year span between 1951 and 1980. Since 1981 the district experienced severe drought during 1981-82 mild drought during the year 1980-81 and 1984-85 while in the other three years in between there was more than normal rainfall.

- 1.5 About 56% of the soils in the districts are red-loomy and another 35% are red-sandy. The remaining 9% is covered by black clay, black sandy, black loamy and red clay. The soils of the district have been found suitable for cultivating Jowar, Bajra, Ragi, pulses, groundnut etc., under dry conditions and paddy, sugarcane, groundnut etc., under irrigated conditions.
- 1.6 About 30% of the land is under forest, uncultivable and land put to non-agricultural uses constitute about 20% of the geographical area. About 1/3rd of the cultivated area is under irrigation in the district. The average gross area irrigated over a period of ten years (1973-74 to 1983-84) was 4.85 lakh acres. The main source of irrigation is dugwells accounting for about 79% of the gross irrigated area (Annexure III).

While there was no significant change in the percentage of area irrigated by dugwells there was downward trend in the area irrigated more than once from 1.85 lakh acres in 1979-80 to 1.23 lakh acres in 1985-86 which can be attributed to the frequent droughts experienced by the district.

- 1.7 There are three main crop seasons in the district viz., Kharif - June to December, late Kharif-September to March and Rabi-December to April. Kharif is the most important season for both irrigated and rainfed crops. The preliminary preparation of soils for Kharif season takes place

in the months of June, July and August after the receipt of south-west monsoon and that of Rabi during December and January. Paddy - Paddy and Paddy - Sugarcane are the normal crop rotations practiced in the irrigated lands. In the drylands the cereals and millets were rotated with pulses, groundnut and gingelly. Under irrigated conditions the cropping pattern in the district (84-85) was dominated by Paddy (57%) followed by groundnut (18%) and sugarcane (11%).

- 1.8 Under unirrigated conditions the maximum area was under groundnut (70%), the other crops in order of importance being Bajra, Ragl, Jowar etc. It may be mentioned here, though it is a drought prone district the cultivators are used to grow paddy both in the Kharif and Rabi seasons thereby utilising the maximum quantity of available water.

#### **The schemes**

- 1.9 The schemes selected for the Study were sanctioned to Andhra Pradesh Cooperative Central Agricultural Development Bank (APCCADB) by the erstwhile Agricultural Refinance and Development Corporation (ARDC) for implementation by the Primary Agricultural Development Banks (PADBs) in Chittoor district of Andhra Pradesh during 1980-81. The schemes envisaged financing of 1852 dugwells, 3449 development of wells and 676 pumpsets involving financial assistance of Rs.214.87 lakhs. These schemes were supplementary in nature and were sanctioned in continuation to ongoing schemes sanctioned earlier under ARDC credit Project III. The evaluation study was conducted during 1986 with Fasil 85-86 as reference period.



- 1.10 The financial assistance under the schemes was determined on the basis of the unit cost of Rs.7500 for the construction of dugwell, Rs.2000 for development of a well and Rs.4500 for the installation of a pumpset. For small farmers the cost of investment in full was to be advanced by the PADBs by way of loans since no down payment towards the investment cost other than the customary share capital contribution had been stipulated. The other farmers were expected to contribute 6% of the unit cost in addition to the usual contribution towards share capital. It was also assumed that 60% of the total beneficiaries under the schemes would be small farmers and the remaining 40% other farmers. Taking into account the proportion of small and other farmers the average loan amount was assumed at 97.6% of the unit cost for computing the financial assistance under the schemes.
- 1.11 All the farmers availing loans under the schemes were to be charged interest at 10.25% p.a. In respect of dugwells the stipulated repayment period was 12 years for small farmers and 9 years for other farmers including one year gestation period during which the farmers were required to pay only interest. In respect of development of wells and pumpsets the repayment periods were fixed at 7. years and 9 years respectively for both the categories of farmers.
- 1.12 The loan eligibility for the farmers under the schemes was to be fixed at 50% of the post-development value of land offered as security. It was also stipulated that whenever security falls short of required value, but the borrower is otherwise eligible for loan assistance on the basis of incremental income accruing to him the

State Government shall stand guarantee for the deficit in security in each case.

- 1.13 The minimum area to be brought under irrigation was assumed at 2.50 acres by a dugwell, one acre by development of well and 3.5 acres by a dugwell with pumpset.
- 1.14 The Agriculture Department of the State was expected to make necessary arrangements for the supply of the inputs to the farmers in the scheme area. No problem in marketing the produce was envisaged as the scheme had adequate infrastructural facilities and well connected with all the places in the State. The short-term credit needs of the farmers were to be met by the PACS/commercial banks in the scheme areas. It was assumed that the PADBs have adequate staff for effective implementation of the schemes as well as to provide technical guidance to the farmers.





## CHAPTER II

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

#### Objectives

2.1 The field study was conducted during August 1986 keeping in view the following main objectives:

(i) to evaluate the actual benefits from the dugwell investment in the form of incremental output, income and employment at the micro as well as macro levels.

(ii) To study the implementation aspects of the scheme with reference to cost and time over run, adequacy of bank loan and adequacy and effectiveness of forward and backward linkages.

(iii) To study the repayment performance of the sample beneficiaries.

#### Selection of PADB's

2.2 Though under the schemes finance was provided for dugwells, development of wells and pumpsets, it was decided to restrict the scope of the study to dugwells only. The 1198 dugwells under the scheme were financed by 9 PADB's in the district (Statement No.1). On the basis of maximum number of units financed 6 PADB's were selected for the study. These 6 PADB's together had financed 1083 (90%) units.

#### Selection of sample beneficiaries

2.3 The sample size was fixed at 90 and the sample beneficiaries were selected from the 6 selected PADB's in proportion to the units financed by them as indicated in the Table 2.1.

**Table No. 2.1**

S. Name of the PADB no.	Total no. of Dugwells financed	Sample beneficiaries selected
1. Palamner	281	23
2. Madanapalli	246	20
3. Punganur	230	19
4. Srikalahasti	114	10
5. Satyavedu	107	9
6. Vayalpadu	105	9
	<u>1083</u>	<u>90</u>

- 2.4 PADB-wise lists of beneficiaries were prepared and the sample beneficiaries were selected randomly for canvassing the designed schedules. Failed, incomplete and misutilised units were suitably substituted. In the process 110 beneficiaries were contacted in order to arrive at 90 sample beneficiaries.
- 2.5 As discussed in Chapter III most of the dug well beneficiaries were not financed for the installation of pumpsets, but most of them had installed the pumpsets with the funds from other sources. The information regarding the motive power to lift the water from dugwells, such as electric pumpsets, diesel pumpsets, mhotas (traditional methods of lifting water from dugwells) was not available in the bank records. Therefore, on the basis of the survey data the 90 sample units were post stratified into wells with electric pumpsets, wells with diesel pumpsets

and wells with mholes for the purpose of comparative analysis. The sample beneficiaries were further classified into small and other farmers as given in the table No. 2.2.

**Table No. 2.2**

<b>S. No.</b>	<b>Type of dugwells</b>	<b>Small farmers</b>	<b>Other farmers</b>	<b>Total</b>
1.	Wells with electric pumpsets	25	12	37
2.	Wells with diesel pumpsets	32	6	38
3.	Wells with mholes	15	-	15
		<b>72</b>	<b>18</b>	<b>90</b>

### **2.6 Control sample**

No separate control sample was selected as the pre-investment situation of the benefitted area was found to be only rainfed and 80 out of 90 sample beneficiaries were having rainfed area ranging from 0.54 acres to 16.50 acres which was similar to that of the pre-investment situation of the benefitted area. Hence the rainfed area of the sample beneficiaries was considered as control to estimate the incremental income, output, employment etc.,

### **2.7 Analysis**

Economics of investment in dugwells with alternative sources of motive power viz., electric pumpsets, diesel pumpsets and Mholes and also among small farmers and other farmers were worked out for comparative purposes. The financial viability of the investment was estimated in terms of incremental income and Financial Rate of Return (FRR).

## CHAPTER III

### IMPLEMENTATION OF THE SCHEMES

#### 3.1 Progress

Investment-wise targets and achievements under the schemes are given in the table below:

Table No. 3.1

Sl. no.	Particulars	Targets	Achievements	% of achievement
1.	Dugwells (No)	1852	1198	65
2.	Development of wells (No)	3449	3643	106
3.	Pumpsets (No)	676	889	132
4.	Total financial assistance (Rs. in lakhs)	214.87	198.35	92

While the targets are over achieved in respect of development of wells and pumpsets only about 65% of the dugwells could be financed by the PADBs. There was heavy demand for development of wells and pumpsets as the water level in the district was going down year by year owing to the frequent droughts and hence the banks could achieve the targets for these purposes. Higher cost and uncertainty of striking water coupled with lower loan eligibility for the farmers were the reasons for not achieving the targets under dugwells.



### 3.2 Determination of loan eligibility

Under the scheme it was assumed that the loan eligibility for the farmers would be fixed at 50% of the post-development value of the land offered as security. However, the financing banks had decided the loan eligibility at 50% of the pre-development value of land arrived as per the average sales statistics of the respective areas. The valuation of land so arrived was very less and the average loan amount disbursed by the banks was far lower than the assumed loan amount as evident from table 3.2 below:

**Table No. 3.2**  
**Assumed loan amount and average loan amount disbursed**  
**by the Banks**

(Amount in Rupees)				
Sl. no.	Particulars	Assumed loan amount	Average loan amt. disbursed by banks	Loan amt. disbursed as percentage of assumed loan amount
<u>I Wells with pumpsets</u>				
a)	Small farmers	12000	6223	52
b)	Other farmers	11280	8067	72
<u>II Wells with Mhotes</u>				
a)	Small farmers	7500	4473	60

Thus the loan amount disbursed as percentage of assumed loan amount worked out to 52% for small farmers and 72% for other farmers in the case of wells with pumpsets and 60% for small farmers in the case of wells with mhotes.

Survey data also reveal that only 11% of the sample beneficiaries of wells with pumpsets could avail loan for pumpsets also.

### 3.3 Specification of dugwells

It was assumed that the beneficiaries under the schemes could construct the dugwells with a specification of 6 mts diameter and 10 metres depth. Survey data revealed that the beneficiaries had constructed rectangular, square and round wells and there was large variations in the actual surface area as well as depth of the dugwells as is evident from the table 3.3 below:

**Table 3.3**  
**Specifications of the dugwells constructed**  
**by the sample farmers**

S. Category of wells	Depth (mts)		Surface area (sq.mts)	
	Assu- med	Actual	Assu- med	Actual
1. Wells with Elec. pumpsets	10	10-67 (5-59-18-29)	28	64 (28-113)
2. Wells with diesel pumpsets	10	9.15 (5-50-12.80)	28	63 (23-144)
3. Wells with Mhotes	10	7.93 (7.30-9.15)	28	39 (18-55)
4. All wells	10	9.57 (5.50-18.29)	28	60 (18-144)

NB: Figures in brackets indicate the range

**3.4** While there was marginal variation in the average actual depth and assumed depth in the case of wells with electric pumpsets and wells with diesel pumpsets, the average actual depth of wells operated by Mhotes was substantially lower at 7.93 metres compared to the assumed depth of 10 metres. Further the actual depth ranged from as low as 5.50 metres to as high as 18.29 metres and 12.80 metres respectively in the case of wells operated by electric pumpsets and diesel pumpsets.

**3.5** The average surface area of the wells at 60 metres was more than two times the assumed area. Even in respect of wells operated by Mhotes though the average depth was 2.07 metres less than the assumed depth, surface area was higher by about one and half times. The sample farmers reported that to have higher storage capacity and also with the expectation of recharge from one direction or the other, they constructed higher diameter wells in tune with the existing practices in the study area. No technical guidance was made available to the farmers in the construction of wells. Higher dimensions of the wells have resulted in far higher than the assumed cost of investment as explained in chapter IV.

### **3.6 Coverage of small farmers**

As per the small farmer definition evolved by NABARD, a farmer having less than either 6.75 acres of irrigated area or 12.75 acres of rainfed area is a small farmer in the district and it was assumed that 60% of the total beneficiaries under the schemes would be small farmers. According to bank data out of 1198 dugewell beneficiaries under the schemes 1006 (84%) were small farmers. PADB-wise coverage of small farmers is presented in the

Statement No.2. The coverage of small farmers ranged from 75% in respect of PADB, Madanapalle to 96% in the case of PADB, Srikalahasti.

- 3.7 It was observed that the farmers were classified into small and others on the basis of the land indicated in the loan applications and some of the beneficiaries had not declared their landholding correctly. According to the survey data, out of 90 sample farmers 72 (80%) were small farmers whereas 82 (91%) of them were classified as small farmers by the financing banks. The percentage coverage of small farmers as classified by the banks and also on the basis of survey data are given in the following table, No 3.4

**Table 3.4**  
**Coverage of small farmers**

S. no.	Particulars	Small farmers	Other farmers	Total
1.	As per the classification of financing banks	82 (91%)	12 (9%)	90
2.	On the basis of the survey data	72 (80%)	18 (20%)	90

NB: Figures in brackets indicate percentage to total

- 3.8 The data revealed that the financing banks had classified 23 small farmers as other farmers and 8 other farmers as small farmers. Hence the actual coverage of small farmers was 11% less than the reported coverage.

### 3.9 Timelag

For dugwells the loan amount was disbursed to the beneficiaries in cash in 2 to 3 instalments. The timelag

in the sanction and disbursement of loan amount in respect of sample beneficiaries is presented in the statements 3 and 3A. As may be seen from these statements that while the loan applications were processed and sanctioned within a month for 23% of the beneficiaries, it took 1-3 months for 51% and more than 3 months for the other 26%. The delay in sanction of loans was reported to be on account of the beneficiaries not submitting the land records, non-encumbrance certificates and other necessary information on time or in full. After sanctioning the loan applications the first instalment was disbursed within a month for 66% of the beneficiaries, 1 to 3 months for 21% and more than 3 months for the other 13%. The delay in disbursement of loans after their sanction was attributed to non-compliance of the formalities like payment of share capital, availability of co-executors etc. by the beneficiaries. Considerable delay was also seen in the disbursement of 2nd and 3rd instalments which was attributed to the delay in getting the work done by the beneficiaries on one hand and delay in the verification of loan utilisations by the bank staff on the other.

### **3.10 Failed, incomplete and misutilised investments**

Out of 110 dugwells verified during the field visits 12 had failed, 5 were incomplete and the loan amount was misutilised in 3 cases. Number of failed wells and the reasons for failure are given in Table No. 3.5

**Table 3.5**  
**Reasons for failed wells**

S. Reason for failure no.	No. of wells failed	% to total
1. Water was not struck even after digging upto the required depth	6	50
2. Rock struck at the bottom	2	17
3. Well collapsed during/after construction	4	33
	12	100

**3.11** The depth of incomplete wells ranged from 2 mts to 5 mts. The loan amount disbursed ranged between Rs.4000 and Rs.5000. All the 5 beneficiaries reported that the loan amount was not sufficient to complete the wells and they could not mobilise funds from other sources, and hence the wells were left incomplete. The main reason for misutilisation of the loan amount may be attributed to lack of proper supervision over loan utilisation by the bank staff.

**3.12 Rate of interest and Repayment periods**

The rate of interest charged @ 10.25% and the repayment periods fixed at 12 years for small farmers and 9 years for other farmers including one year gestation period in respect of dugwells and 9 years for pumpsets in the case of both the categories of farmers were in conformity with the scheme assumptions.

## CHAPTER IV

### COST OF INVESTMENT AND ITS FINANCING

#### 4.1 Investment Cost at Historical prices

In the scheme the unit cost for constructing a dugwell of 6 metres diameter and 10 metres depth was estimated at Rs.7500 and the cost of a pumpset (Electric as well as Diesel) with all accessories was taken at Rs.4500. On the basis of the field data, the actual average cost at 1980-81 prices in constructing different types of wells by the small farmers as well as other farmers is given below:

**Table No. 4.1**  
**Average Cost of investment at 1980-81 prices**

S. Category of wells No.	(Rs)								
	Small farmers			Other farmers			All farmers		
	Dug well	Pump- set	Total	Dug well	Pump- set	Total	Dug well	Pump- set	Total
1. Well with Electric pumpset	11720	4628	16348	14642	4708	19350	12668	4654	17322
2. Well with Diesel pumpset	9844	4428	14272	12000	4633	16333	10184	4461	14645
3. Well with pumpset (Electric + Diesel)	10667	4515	15182	13761	4683	18444	11409	4556	15965
4. Well with Mhote	7866	-	7866	-	-	-	7866	-	7866

4.2 It can be seen from the above that the cost of construction of dugwells at historical prices was far higher than the assumed unit cost of Rs.7500; the actual cost

being 150% of the unit cost for wells with electric pumpsets (Rs.12668) and 144% for wells with diesel pumpsets (Rs.10184). Even in the case of wells with Mhotes where the average depth of wells was far less than the assumed depth, the average cost was slightly higher at Rs.7866 with a range of Rs.5000 to Rs.11000. Higher investment cost was mainly due to the higher dimensions of the wells constructed by the beneficiaries as explained in Chapter II.

### 4.3 Cost of Investment and Bank Loan

According to the survey data the bank loan constituted only 40-57% of the cost of investment as indicated in the following table:

**Table No. 4.2**  
**Average cost of investment and loan amount**  
(Rs)

S. Category of wells no.	Small farmers		Other farmers		All farmers	
	Cost	Loan	Cost	Loan	Cost	Loan
1. Wells with Electric pumpsets	16348	6444 (39)	19350	7792 (40)	17322	6882 (40)
2. Wells with Diesel pumpsets	14272	6050 (42)	16333	8617 (52)	14645	6445 (44)
3. Wells with pump-sets (Electric+Diesel)	15182	6223 (41)	18444	8067 (44)	15965	6665 (42)
4. Wells with Mhotes	7866	4473 (57)	-	-	7866	4473 (57)

NB: Figures in brackets indicate loan amount as a percentage to the cost of investment



**4.4** It is evident from the above that there was severe under-financing of the investments. This may be attributed to:

- (i) higher than the assumed dimensions of the wells constructed by the beneficiaries and
- (ii) restrictive land valuation procedure followed by the financing bank branches because of which not only the loan amount for dugwells was lower, but many beneficiaries were not eligible to avail loan for pumpsets as explained in Chapter III.

**4.5** The frequency distribution of the sample beneficiaries indicating the percentage of loan amount to the actual cost of investment is given in the table No. 4.3 below:

**Table No. 4.3**

**Frequency distribution of the sample farmers according to the loan amount as percentage of cost of investment**

S. no. of cost of investment	Wells with pumpsets			Wells with Mho-tes (SF)	All wells All sample farmers
	Small farm-ers	Other farm-ers	All far-mers		
1. Below 25	2	2	4	-	4
2. 25 to 49	43	11	54	4	58
3. 50 to 74	10	4	14	10	24
4. 75 to 90	1	1	2	1	3
5. More than 90	1	-	1	-	1
	57	18	75	15	90

**4.6** None of the small farmers were financed to the full extent of the cost of investment as assumed in the schemes. For the other farmers also the loan amount was not disbursed as assumed in the schemes. Further for about 71% of the sample beneficiaries the loan amount disbursed was less than 50% of the cost investment.

**4.7 Sources of finance**

The relative share of different sources of finance to complete the investments by the beneficiaries is presented in the table below:

**Table 4.4**  
**Different sources of Finance**

S. no. Sources of finance	Wells with pumpsets			Well with mhotes
	Small far- mers	Other far- mers	All far- mers	Small farmers
1. Bank loan	41	44	42	57
2. Own Savings	21	34	25	7
3. Private borrowings	29	19	26	29
4. Sale of assets	9	3	7	7
	100	100	100	100

**4.8** It is obvious that the percentage of down payment met out of own funds was higher in the case of other farmers compared to the corresponding figure in small farmers. Among the wells with pumpsets small farmers had to mobilise about 38% of the cost by private borrowings and

sale of assets while the corresponding share was 22% in respect of other farmers. In the case of wells with Mhotes, as stated earlier, all the beneficiaries were from the lower strata of small farmers and only 7% of the cost could be met out of own funds by them and the remaining 36% was to be met out of Private borrowings and sale of assets.

#### 4.9 Cost of investment at current prices

The data presented in table No. 3.2 regarding the cost of investment are in terms of historical prices and as such lack comparability with the date of benefits from the investments which are in terms of 1985-86 prices. Hence the investment costs at historical prices were updated using reference year prices and the updated cost of investment is presented below:

**Table 4.5**  
**Cost of investment at 85-86 prices (Rs)**

S. Category of well no.	Small farmers	Other farmers	All farmers
1. Well with Electric Pumpset	23500	27500	24793
2. Well with Diesel PS	20000	24000	20632
3. Well with Pumpset (Electric+Diesel)	21535	26334	22494
4. Well with Mhote	11000	-	11000

Thus, if the beneficiaries were to make investments in 1985-86, they would have to spend about 40% more than what they had actually spent during 1980-81.

**CHAPTER V**  
**FARM BUSINESS CHARACTERISTICS OF SELECTED FARMERS**

**5.1 Size of Land Holdings**

Pre-investment as well as post-investment position of the cultivated holding of the sample beneficiaries in the case of small farmers and other farmers are presented in the Statement No. 4. Prior to the construction of the wells the average cultivated holding of the sample beneficiaries of wells with pumpset was 8.48 acres and that of beneficiaries of wells with mhote was 4.47 acres. After the construction of the wells the beneficiaries of wells with pumpset had purchased some land and hence, there was marginal increase in the cultivated holding by 0.38 acres (4.48%). But there was no change in the cultivated holding of wells with mhote beneficiaries. Among the wells with pumpsets, the average size of cultivated holding worked out to 6.25 acres with a range of 2.00 acres and 12.00 acres in the case of small farmers and 17.12 acres with a range of 11.79 acres to 30.00 acres in the case of other farmers. In the pre-investment position, in respect of wells with pumpsets, out of the cultivated holding about 0.26 (4%) acres in the case of small farmers and 2.09 acres (13%) in the case of other farmers was irrigated while the entire cultivated holding of the beneficiaries of wells with Mhotes was unirrigated. It can also be observed from the Statement No. 4 that even after construction of the wells, on an average about 4.82 acres (54%) in the case of wells with pumpsets and about 2.79 acres (62%) in the case of wells with mhotes was left unirrigated. Of the 90 sample beneficiaries 80 were having the unirrigated area ranging from 0.54 acres to 16.50 acres which was considered as control for estimating the incremental income, output, employment etc.

## 5.2 Benefitted area

Under the scheme, it was assumed that a minimum area of 3.50 acres would be irrigated by a well with pumpset and 2.50 acres by a well without pumpset. As against this, the actual area irrigated worked out to 3.29 acres and 1.68 acres by a well with pumpset and well with mnote respectively. The assumed area and the average area benefitted under different types of wells is given in the table No. 5.1.

**Table No. 5.1**  
**Average benefitted area (Area in Acres)**

S.No.	Type of well	Assumed area	Actual benefitted area		
			Small far-mers	Other far-mers	All far-mers
1.	Wells with Electric Pumpsets	3.50	3.23	3.54	3.33
2.	Wells with Diesel PS	3.50	3.04	4.33	3.24
3.	Wells with PS (Electric+Diesel)	3.50	3.12	3.81	3.29
4.	Wells with Mhotes	2.50	1.68	-	1.68

5.3 In respect of wells with pumpsets the average benefitted area was slightly lower at 3.29 acres compared to the assumed area of 3.50 acres while the average benefitted area of wells without pumpsets was only about 2/3 of the assumed area. Among the wells with pumpsets, the average benefitted area was lesser than assumed area by 11% in the case of small farmers, whereas it was higher by 9% in the case of other farmers.

## 5.4 Crop pattern

The cropping pattern of sample beneficiaries under with and without project situations are presented in Statements 5 and 6 and a summary table is presented below:

**Table No. 5.2**  
**Cropping pattern (As a % of gross cropped area)**

S. no.	Particulars	Paddy	Millets	Ground- nut	Sugar cane	Vege- tables	Pulses	Others
<b>I. With Project (Irrigated)</b>								
1.	Wells with Elec. PS	31.84	12.66	18.44	15.83	17.32	-	3.91
2.	Wells with Diesel Pumpset	12.67	8.44	52.98	4.80	20.15	-	0.96
3.	Wells with Pump Sets (Elec. + Diesel)	21.77	11.29	38.10	11.09	15.13	-	2.62
4.	Wells with Mhotes	26.43	15.42	14.54	14.10	29.51	-	-
<b>II Without Project (Rainfed)</b>								
1.	Wells with Elec. PS	-	22.21	65.78	-	-	12.01	-
2.	Wells with Diesel PS	-	23.81	65.97	-	-	10.22	-
3.	Wells with Pump Sets (Electric + Diesel)	-	22.88	65.86	-	-	11.26	-
4.	Wells with Mhotes	-	35.84	48.16	-	-	16.00	-

**5.5** It is evident from the above that under rainfed conditions the cropping pattern was dominated by groundnut and millets, but after the construction of wells, there was a shift in the crop pattern from pulses, groundnut (dry) and millets to Paddy, Sugarcane, Groundnut (irrigated), vegetables etc. In respect of wells with electric pump-sets, the important crops raised were paddy, groundnut, vegetables and sugarcane, whereas under wells with diesel

pumpsets, the maximum area (52.98%) was under groundnut. Perhaps due to higher cost involved in lifting the water, these beneficiaries had raised the crops which needed relatively less water. Similarly, due to relatively less availability of water and also as it was difficult to lift the water with bullock power, wells with Mhotes beneficiaries had put the maximum area (29.51%) under short duration vegetable crops apart from cultivating paddy (26.43%) and millets (15.42%).

### 5.6 Cropping Intensity

The cropping intensity worked out in respect of different categories of wells under with project situations is presented in the table below:

**Table 5.3**  
**Cropping Intensity**

S.No.	Category of wells	Cropping intensity (%)		
		Small farmers	Other farmers	All farmers
1.	Wells with Electric PS	221	232	225
2.	Wells with Diesel Pump Sets	164	169	165
3.	Wells with Pumpsets (Electric & Diesel)	190	207	195
4.	Well with Mhotes	173	-	173

5.7 For working out cropping intensity a weight of 3 has been assigned to area under sugarcane, sericulture and flowers, as they remain in the field for 12 months. Under with project situation, the cropping intensity worked out to

225, 165 and 173 respectively. In the case of wells operated by electric pumpsets, diesel pumpsets and Mhotes as compared to only 100 in without project situation. Cropping intensity was higher in the case of wells operated with electric pumpsets as the relative percentage area under sugarcane, sericulture and flowers was higher compared to respective area under wells operated by diesel pumpsets and mhotes.

### 5.8 Yield of important crops

The average per acre yield of different crops raised by the sample farmers under different types of wells in with and without project conditions is given in the Statements 8 and 9. Per acre yields of crops in with project situation were substantially higher compared to the respective yields in the without project situation. The following table illustrates the per acre yields of important crops under different categories of wells.

**Table No. 5.4**  
**Yield of Important crops**  
(Quintals per acre)

S.No. Particulars	Paddy	Sugar cane (in tonnes)	Ground nut	Millets	Vege- tables
<b>I With Project (Irrigated)</b>					Rs.
1. Wells with Electric Pumpsets	13.59	34.54	7.40	5.62	4129
2. Wells with Diesel Pumpsets	12.74	33.05	6.97	5.84	3829
3. Wells with Pumpsets (Elec. & Diesel)	13.35	34.19	7.06	5.71	3971
4. Wells with Mhotes	11.04	31.79	6.80	4.86	3868
<b>II Without Project (Rainfed)</b>					
1. Wells with Elec. PS	-	-	3.14	2.85	-
2. Wells with Diesel PS	-	-	3.11	2.66	-
3. Wells with Pumpsets (Elec. & Diesel)	-	-	3.12	2.80	-
4. Wells with Mhotes	-	-	3.03	2.66	-



5.9 Per acre yields of groundnut and millets under with project conditions were more than two times compared to the respective yields under without project conditions. Under with project situation, the yields of all the crops were slightly higher in the case of wells with pumpsets compared to the respective yields in wells with mhotes. Similarly, the yields of all crops (except millets) under wells with electric pumpsets were slightly higher compared to the respective yields under wells with diesel pumpsets. It can also be inferred from the statement No. 8 that per acre yields of important crops were slightly lesser in the case of small farmers compared to the respective yields of other farmers. The difference in the crop yields may be attributed mainly to the difference in the application of inputs.

## CHAPTER VI

### ECONOMICS ON INVESTMENT

#### 6.1 Gross Income:

Per acre gross income under with and without project conditions is presented in Table 6.1 below:

**Table No. 6.1**  
**Gross Income per acre**

S.No.	Category of wells	With project			Without project		
		Small far-mers	Other far-mers	All far-mers	Small far-mers	Other far-mers	All far-mers
1.	Wells with Electric Pumpsets	5799	6023	5877	1041	1079	1065
2.	Wells with Diesel Pumpsets	4547	5117	4667	1084	1054	1071
3.	Wells with Pumpsets	5115	5679	5272	1063	1071	1067
4.	Wells with Mhotes	4082	-	4082	864	-	864

**6.2** Per acre gross income was more by Rs.1190 for wells with pumpsets than for wells with mhotes. The gross income per acre realised from wells with electric pumpsets was higher by Rs.1210 than the income of wells with diesel pumpsets. Among the wells with diesel pumpsets per acre gross income was higher by Rs.570 in respect of other farmers compared to the respective income of small farmers while, there was no significant

difference in per acre gross income between the small farmers and other farmers under wells with electric pumpsets.

**6.3** The difference in the gross income can be explained by the variations in the intensity of cropping, intensity of irrigation, cropping pattern and in the input use by the sample beneficiaries under different types of wells. Per acre gross value of produce under wells with pumpsets as well as pumpsets with mhotes was about 5 times that of the respective incomes under without project conditions.

#### **6.4 Cost of cultivation**

Changes in cropping pattern and cropping intensity were associated with changes in composition and level of input use. The per acre cost of cultivation in respect of different categories of wells in the with project and without project situations are given in Statements 12 and 13. The per acre cost of cultivation including imputed value of family labour worked out to Rs.2460 in the case of wells with pumpsets and Rs.1833 in the case of wells operated by mhotes. The figures stood reduced at Rs. 2051 and Rs. 1339 excluding the imputed value of family labour as shown in the Table No. 6.2 below:

**Table No. 6.2**  
**Per acre cost of cultivation under**  
**with project situations**

		(Amt. In Rs.)			
S.No.	Particulars	Wells with elec. PS	Wells with Diesel PS	Wells with pump sets	Wells with Mho- tes
1.	Seed & seedlings	274	343	309	254
2.	Chemical fertilisers	577	420	499	383
3.	Manure	217	185	201	297
4.	Pesticides	127	117	122	90
5.	Labour				
	(a) Hired labour	439	321	380	165
	(b) Family labaoour	466	369	417	494
6.	Operation and maintenance cost of pumpsets	193	393	326	-
8.	Bullock Maintenance	185	152	168	305
8.	Others including interest Short term Loans	199	137	168	43
9.	Total cost including imputed value of family labour	2677	2437	2590	2031
10.	Total cost excluding imputed value of family labour	2211	2068	2173	1537

**6.5** The difference in the cost of cultivation between different categories of wells was mainly due to the difference in the cropping pattern and the motive power used for lifting the water. As the farmers of wells with mhotes are from the lower strata of small farmers, the proportion of family labour in the cost of cultivation was very high accounting for 24% compared to the respective figure of 16% in the case of wells with pumpsets.

## 6.6 Net Income

Per acre net income in with project conditions is substantially higher compared to the respective income in without project conditions. It was mainly due to the interaction between increased irrigated area, improvement in cropping pattern, increase in the cropping intensity, higher yields and higher cultivation costs. Per acre net income realised by the sample beneficiaries in the with and without project conditions is presented in the table No.6.3 below:

**Table No. 6.3**  
**Per Acre Net Income**

(Amt. in Rs.)

S.No. Category of wells	With Project			Without Project		
	Small far- mers	Other far- mers	All far- mers	Small far- mers	Other far- mers	All far- mers
1. Wells with electric pumpsets	3156 (3669)	3279 (3656)	3200 (3666)	521 (671)	485 (594)	500 (624)
2. Wells with Diesel Pumpsets	2170 (2571)	2459 (2707)	2230 (2599)	551 (711)	477 (589)	512 (651)
3. Wells with Pumpsets	2618 (3070)	2849 (3177)	2682 (3099)	537 (692)	482 (592)	511 (641)
4. Wells with Mhotes	2051 (2545)	-	2051 (2545)	447 (619)	-	447 (619)

Figures in brackets indicate the income based on the total cost excluding imputed value of family labour

6.7 Under with project situation, per acre net income of wells with electric pumpsets was substantially higher by Rs.970 compared to the respective income of wells operated with diesel pumpsets. Similarly per acre net income of wells with pumpsets was higher by Rs.631 compared to the respective income of wells operated by Mhotes. In the

case of wells with diesel pumpsets per acre net income for small farmers was slightly lesser compared to the respective income of other farmers. However, there was no significant difference in the per acre net incomes between small farmers and other farmers in respect of wells with electric pumpsets.

**6.8** As may be seen from the table No. 6.3 in the without project situation (rainfed area), there was no significant difference in the per acre net incomes of the beneficiaries of different types of wells.

**6.9** On the basis of per acre net income realised, the net income per unit of investment was worked out taking into account the average benefitted area and the same is presented in table 6.4 below:

**Table No. 6.4**  
**Net income per unit of investment**  
**(with project situation) (Amt.in Rs.)**

S.No.	Category of wells	Small farmers	Other farmers	All farmers
1.	Wells with Electric Pumpsets	10194 (11851)	11608 (12942)	10656 (12208)
2.	Wells with Diesel Pumpsets	6597 (7816)	10647 (11721)	7225 (8421)
3.	Wells with Pumpsets	8168 (9578)	10853 (12104)	8824 (10196)
4.	Wells with Mhotes	3446 (4276)	-	3446 (4276)

NB: Figures in brackets indicate the net income based on the total cultivation costs excluding the imputed value of family labour

**6.10** Net income per unit of investment realised in the case of wells with pumpsets was about 2½ times than that of the respective income of wells with mhotes. Also the net income of wells with electric pumpsets was about 1½ times that that of respective income of wells with diesel pumpsets. Further among the wells with pumpsets the net income per unit of investment realised by other farmers was higher by 26% compared to respective income realised by small farmers. The variations in per unit net incomes between different types of wells and farmers may be explained by the difference in the respective benefitted areas.

### 6.11 Incremental Income

Two estimates of incremental income i.e. (i) excluding imputed value of family labour in the cost of cultivation and (ii) including the imputed value of family labour in the cost of cultivation were worked out and are presented in the table 6.5 below:

**Table No. 6.5**  
**Incremental Income** (Amt. in Rs.)

S.No.	Category of wells	Per acre			Per unit of Investment		
		Small farm-ers	Other farm-ers	All farm-ers	Small farm-ers	Other farm-ers	All farm-ers
1.	Wells with Electric Pumpsets	2635 (2998)	2794 (3062)	2700 (3042)	8511 (9684)	9891 (10839)	8991 (10130)
2.	Wells with Diesel Pumpsets	1619 (1800)	1982 (2118)	1718 (1948)	4922 (5655)	8582 (9171)	5566 (6312)
3.	Wells with Pumpsets	2077 (2378)	2367 (2585)	2171 (2458)	6493 (7419)	9019 (9848)	7206 (8087)
4.	Wells with Mhotes	1604 (1926)	-	1604 (1926)	2695 (3236)	-	2695 (3236)

NB: Figures in brackets indicate the incremental income when the imputed value of family labour was excluded from the cultivation costs.

- 6.12** Per acre incremental income in respect of wells with pumpsets was higher by Rs.567 (Rs.532 when imputed value of family labour was excluded in the cultivation costs) compared to the respective incremental income with the wells with with mhotes. Among the wells with pumpsets per acre incremental income generated by the wells with electric pumpsets was substantially higher by Rs.982/- (Rs.1094 when imputed value of family labour excluded in the cultivation cost) compared to the respective income generated by the wells with diesel pumpsets.
- 6.13** Per unit of investment, incremental income realised under wells with pumpsets was higher by 1½ times compares to the incremental income realised under wells with Mhotes. Similarly the incremental income realised under wells with Electric Pumpsets was higher by about 61% compared to the respective income realised under wells with Diesel pumpsets. Further the incremental income realised by small farmers was less by 38% compared to the respective income realised by the other farmers.
- 6.14** Very wide variations in the incremental income realised by the sample beneficiaries were found as may be seen from the table 6.6 below:

**Table 6.6**  
**Range of incremental income (Per household) realised by the sample beneficiaries** (Amt. in Rs.)

S.No.	Category of farmers	Wells with PS			Wells with Mhotes		
		Mini- mum	Maxi- mum	Ave- age	Mini- mum	Maxi- mum	Aver- age
1.	Small farmers	1065 (1165)	10369 (12449)	6493 (7419)	620 (920)	5889 (6269)	2695 (3236)
2.	Other farmers	1331 (1474)	16921 (18091)	9019 (9848)	-	-	-
3.	All farmers	1065 (1165)	16921 (18091)	7206 (8087)	620 (920)	5889 (6269)	2695 (3236)

NB: Figures in brackets indicate the incremental income when the imputed value of family labour was excluded from the cultivation costs



**6.13** Though the average incremental income per unit of investment was Rs.7206 and Rs.2695 (including imputed value of family labour in the cost of cultivation) in the case of wells with pumpsets and wells with mholes respectively, it ranged from as low as Rs.1065 to as high as Rs.16921 in the case of wells with pumpsets and from a meagre Rs.620 to Rs.5889 in the case of wells with mholes. The study data revealed that only 49% of the farmers of wells with electric pumpsets, 42% of farmers of wells with diesel pumpsets and 53% of the farmers of wells with mholes realised the incremental income higher than the average. It was also observed that only 47% of the small farmers realised incremental income higher than the average whereas the respective figure worked out to 61% in the case of other farmers.

**6.14 On-farm labour employment**

Per acre employment of family labour as well as hired labour in the with project and without project situations in different categories of wells are presented in the Statement No. 16. Under with project situation labour employed per acre worked out to 100 mandays for wells using pumpsets and 83 mandays for the wells using mholes. A higher labour involvement (113 mandays) was observed in the case of wells using electric pumpsets compared to the respective figure (86 mandays per acre) of wells with diesel pumpsets. Under without project situation labour employed per acre was estimated at 26 mandays. Thus per acre incremental employment was estimated at 87, 60 and 57 mandays by the wells operated with electric pumpsets, diesel pumpsets and mholes respectively.

**6.15** Based on the above estimates the onfarm labour employment generated per unit of investment worked out to 3/6

mandays for wells with electric pumpsets, 279 mandays for wells with diesel pumpsets and 139 mandays by the wells with mnotes. The proportion of family labour in the total employment generated in respect of small farmers as well as other farmers under different types of wells is given in table 6.7 below:

**Table No. 6.7**  
**Labour employment under with project conditions**

(Mandays per unit  
of investment)

S.No.	Category of wells	Small farmers		Other farmers		All farmers	
		Fami-ly labour	Total lab-our	Fami-ly labour	Total lab-our	Fami-ly labour	Total lab-our
1.	Wells with Electric pumpsets	207	362	166	410	193	376
2.	Wells with Diesel Pumpsets	152	255	134	403	149	279
3.	Wells with pumpsets	178	303	156	408	174	329
4.	Wells with Mnotes	104	139	-	-	104	139

On the basis of the above estimates additional employment generated per unit of investment worked out to 290 mandays by wells with electric pumpsets, 194 mandays by the wells with diesel pumpsets and 96 mandays by the wells with Mnotes.

### 6.16 Financial viability

The financial viability of the investments was assessed in terms of the financial rate of return (FRR) worked out on the basis of the cash flow spread over a period of 20 years at 1985-86 constant prices. While working out the FRR, the following assumptions have been made:

- (a) The life of a dugwell is 40 years
- (b) The life of a pumpset is 15 years.
- (c) There will be no shrinkage in the command area of the wells over the years
- (d) There will be no change in the cropping pattern over the years
- (e) Full development benefits are realised only during the 3rd year
- (f) There will be no benefits in the first year and about 50% of the benefits are realised in the second year
- (g) As the life of a dugwell is assumed at 40 years its residual value at the end of 20 years has been taken at 50% of its initial cost
- (h) In respect of wells with pumpsets, the pumpset will be replaced at the end of 15th year and its residual value at the end of 20 years has been taken proportionately.

The FRR estimated for different types of investment are given in the table 6.8

**Table No. 6.8**  
**Financial Rate of Return**

S.No.	Category of wells	Including imputed value of family labour in the cultivation costs			Excluding imputed value of family labour in the cultivation costs		
		Small far-mers	Other far-mers	All far-mers	Small far-mers	Other far-mers	All far-mers
1.	Wells with Electric Pumpsets	32	32	32	35	34	35
2.	Wells with Diesel Pumpsets	22	31	24	25	33	27
3.	Wells with pumpsets	27	30	28	30	33	31
4.	Wells with Mhotes	22	-	22	25	-	25

**6.18** Thus, it is evident from the above that the investment in different types of wells and farmers was financially viable. The difference in FRR between different types of wells and farmers may be attributed to the difference in the benefitted area and per acre incremental income.

**CHAPTER VII**  
**REPAYING CAPACITY AND REPAYMENT**  
**PERFORMANCE**

**7.1** Even though the investment in dugwells by the small farmers as well as other farmers was found to be financially viable and generated a sizeable surplus, the repayment performance has not been encouraging. On the basis of survey data, the percentage of overdues in respect of 6 selected PADBs since 1979-80 to 1985-86 are presented in the table 7.1

**Table No. 7.1**  
**PADB-wise and year-wise percentage of overdues to demand**

S. no.	Name of the selected PADB	Years						
		79-80	80-81	81-82	82-83	83-84	84-85	85-86
1.	Vayalapadu	22	75	51	77	66	78	29
2.	Madavapalle	9	74	51	80	54	80	46
3.	Palamaner	21	74	51	80	53	82	54
4.	Punganur	-	73	50	69	40	80	22
5.	Satyavedu	40	76	71	79	69	79	50
6.	Srikalahasti	24	56	38	64	71	87	50
<b>TOTAL</b>		<b>18</b>	<b>70</b>	<b>51</b>	<b>76</b>	<b>61</b>	<b>81</b>	<b>42</b>

**7.2** The main reason for high overdues appears to be the less incremental income realised by the farmers owing to the frequent droughts experienced in the district. The years 1979-80, 1983-84 and 1984-85 were fairly good years for agricultural production and hence the percentage of overdues were relatively lesser during these years. Though the year 1981-82 was equally affected by drought, the

percentage of overdues during this year was lesser compared to the other drought affected years which may be attributed to the rigorous efforts made by the bank officials.

**7.3** The data relating to the sample beneficiaries also lends support to the above view point. Sample beneficiaries were financed during the year 1980-81 and the repayment instalments were due from the year 1981-82 onwards, as the bank had allowed one year gestation period. Year-wise demand, collection and balance in respect of sample beneficiaries since the year 1981-82 to 1985-86 are presented in the Statements No. 17 and year-wise percentage of overdues in the case of small farmers and other farmers are given in the table No. 6.2

**Table No. 7.2**  
**Percentage of overdues to demand of sample farmers**

S. no.	Year	Percentage of overdues		
		Small farmers	Other farmers	All farmers
1.	1981-82	58	35	53
2.	1982-83	69	37	61
3.	1983-84	63	25	55
4.	1984-85	82	40	74
5.	1985-86	42	15	37

**7.4** The above data also supports the view that during the drought affected years, the overdues were relatively higher due to lesser incremental income derived by the beneficiaries. Further in each of the above referred years, the overdues of small farmers were higher compared

to overdues of other farmers which may obviously be explained by the higher land holdings and consequently higher incomes.

### 7.5 Regularity in Repayments

Depending upon the dates of loan disbursements as at the end of June 1986 the sample beneficiaries were due for repayment of 4 to 5 instalments. Survey data revealed that out of 90 sample beneficiaries, 37 (41%) had repaid all the instalments in full. Of the remaining 53 (59%) beneficiaries who had defaulted in the repayment, 51 had repaid part of the loan instalments while the other two had not repaid any amount. The details of the 37 beneficiaries who had repaid all the instalments are given in the table: 7.3

Table No. 7.3

Sl.No.	Type of farmers	All instalments paid regularly	All the instalments paid but not regularly	Total No. of beneficiaries who had paid all instalments	Total number of sample farmers
1.	Small farmers	10	11	21	72
2.	Other farmers	14	2	16	18
3.	All farmers	24	13	37	90

As may be seen from the above that all the instalments were repaid in full only by 29% of the small farmers as against 89% of the other farmers. Further only 14% of the small farmers were regular in repayment while 78% of the other farmers had repaid regularly.

**7.6** Regularity in repayment according to the category of wells is furnished in the table 7.4

**Table No. 7.4**

Sl. no.	Category of wells	All instalments paid regularly	All the instalments paid but not regular	Total no. of beneficiaries who had paid all the instalments	Total No. of sample farmers
1.	Wells with electric pumpsets	18	1	19	37
2.	Wells with diesel pumpsets	4	10	14	38
3.	Wells with pumpsets	22	11	33	75
4.	Wells with mhotes	2	2	4	15
Total		24	13	37	90

The sample farmers who had paid all the instalments constitute 51% from wells with electrical pumpsets, 37% from wells with diesel pumpsets, and 27% from wells with mhotes. The percentage of the famers who had paid all the instalments regularly was very high in the case of wells with electrical pumpsets compared with the respective percentage in wells with diesel pumpsets, and wells with mhotes.

**7.7 Range in defaults - (1985-86)**

As at the end of June 1986 though the overall percentage of overdues of the sample farmers worked out to 37% the percentage of defaulters was as high as 67%. The percentage of defaulters was 69% among the small



farmers compared to 17% among the other farmers. Further the percentage of defaulters was highest in the case of wells with mhotes (73%) followed by the wells with diesel pumpsets (66%) and wells with electrical pumpsets (49%). Frequency distribution of the defaulters according to the extent of loan amounts defaulted is presented in table 7.5

**Table No. 7.5**

**Frequency distribution of the defaulters according to the extent of loan amount defaulted**

S.No.	Percentage of loan amount defaulted	No. of sample farmers		
		Small farmers	Other farmers	All farmers
1.	Upto 25%	8	1	9
2.	26 to 50%	5	2	7
3.	51 to 75%	10	-	10
4.	76 to 99%	4	-	4
5.	100%	23	1	24
6.	Total no. of defaulters	50	4	54
7.	Total no. of sample farmers	72	18	90

**7.8** During the year 1985-86, out of 54 defaulters as many as 24 (44%) had not repaid any amount. The defaulted amount was more than 50% in the case of 14 (26%) while it was less than 50% in the case of other 16 (30%) farmers. The incidence of defaulters as well as high overdues was very much pronounced among the small farmers compared to the other farmers which may again be attributed to the lesser incremental income obtained by the small farmers.



annual debt service liability of the wells with Mhotes was higher compared to the respective figure of the wells with pumpsets. The higher percentage of debt service liability is reflected in relatively higher percentage of overduees in different categories of wells and farmers as shown in the table above.

7.11 The percentage of actual demand to incremental income and the percentage of overduees as on 30th June 1986 are highly correlated as may be seen from the Table 7.6.

Table No. 7.6

Percentage of actual demand to incremental income and the percentage of overduees

S.No.	Category of well/ farmers	%age of actual demand to incre- mental income	%age of overduees to demand (30-06-86)
I.	<u>Wells with Electric pumpsets</u>		
	(a) Small farmers	26	42
	(b) Other farmers	18	2
	(c) All farmers	23	31
II.	<u>Wells with Diesel pumpsets</u>		
	(a) Small farmers	38	34
	(b) Other farmers	32	32
	(c) All farmers	37	33
III.	<u>Wells with pumpsets</u>		
	(a) Small farmers	31	38
	(b) Other farmers	22	15
	(c) Other farmers	28	32
IV.	<u>Wells with Mhotes (SF)</u>	59	63

7.12 It is evident from the above that higher percentage of demand to incremental income is related with the higher percentage of overduees in all the categories of wells and farmers. Further the percentage of demand to incremental income as well as percentage of overduees were highest

in the case of wells with Mhotes followed by the wells with Diesel Pumpsets and electric pumpsets. Like-wise percentage of demand to incremental income as well as percentage of overdues were higher in the case of small farmers compared to the respective figures of other farmers.

**7.13** A disaggregated analysis was carried out to examine the relation between incremental income and the percentage of overdues and the results are presented in Table No. 7.7

**Table No. 7.7**  
**Percentage of overdues according to incremental income (with hired labour)**

S.No.	Range of incremental income	Wells with pumpsets				Wells with Mhotes			
		Small farmers		Other farmers		All farmers		Small Farmers	
		No. of farmers	%age over-dues	No. of farmers	%age over-dues	No. of farmers	%age over-dues	No. of farmers	%age over-dues
1.	2500 and below	4	68	3	44	7	57	5	90
2.	2501 to 5000	19	56	-	-	19	56	10	60
3.	5001 to 7500	14	36	2	34	14	36	2	43
4.	7501 to 10000	7	2	2	-	9	2	-	-
5.	Above 10000	13	21	11	8	24	15	-	-
		57	38	18	15	75	32	15	63

**7.8** It can be seen from the above that with the increase in the incremental income, there was a progressive reduction in the level of overdues. In the case of wells with Mhotes, the percentage of overdues have reduced from 90% for the lowest income group to 43% for the highest income group. In respect of wells with pumpsets,

there was reduction in the overdues from 57% for the lowest income group to 2% for the penultimate income group. However, the overdues were pretty high at 15% for the highest income group i.e., about Rs.10,000. Of the 24 farmers in that group, 17 had repaid in full, 5 had partly repaid and the remaining 2 had not paid any amount at all as per the details given in the table No. 7.9 below:

**Table No. 7.9**

S.No.	Type of borrower	No. of farmers with incremental income of above Rs 10000	No. of farmers fully paid	No. of farmers not paid any amount partly	No. of farmers not paid any amount	% of overdues
1.	Small farmers	13	9	2	2	21
2.	Other farmers	11	8	3	-	8
3.	All farmers	24	17	5	2	15

7.9 The 7 farmers who had not repaid (fully or partly) the loan instalments even after obtaining more than Rs. 10,000 incremental income may be considered as wilful defaulters constituting about 8% of the sample farmers.

7.10 Thus on the basis of the above analysis, it can be concluded that the lesser incremental income obtained by the sample farmers was the main reason for high overdues, though there was some instances of wilful defaulters.

**7.11** Realising the need, NABARD of late has rightly extended the repayment period for Dug wells from 12 years to 15 years in the case of small farmers and 9 to 12 years for other farmers. The gestation period also extended from one to two years for small farmers.

## CHAPTER VIII

### IMPACT OF SCHEME INVESTMENTS - MACRO ESTIMATES

- 8.1 In order to assess the benefits at macro level, the total number of units under the schemes were arrived by making suitable adjustments for failed, incomplete and misutilised investments. Accordingly, the total number of units under the schemes worked out to 982 with the following break-up.

**Table No. 8.1**  
**No.of units for different categories of wells**

S.No.	Category of well	No.of units
1.	Wells with Electric pumpsets	404
2.	Well with Diesel pumpsets	415
3.	Wells with Mhotes	163
		<u>982</u>

- 8.2 On the basis of the sample data, the macro level benefits have been estimated in terms of increase in irrigated area, increase in production, increase in income, increase in employment etc., and are presented in the table No.8.2 below:

**Table No. 8.2**  
**Aggregate impact of the scheme**

S.No.	Particulars	Unit	Incremental magnitude
1.	Irrigated area	Acres	2964
2.	Agricultural Production	Tonnes	
	(a) Paddy	"	1396

1	2	3	4
	(b) Sugarcane	Tonnes	1695
	(c) Groundnut	"	251
	(d) Millets	'	(-)57
	(e) Pulses	"	(-)115
	(f) Vegetables	Rs.lakhs	29.26
	(g) Others	-do-	7.90
3.	Gross value of output at 1985-86 prices	-do-	122.00
4.	Value of added at 85-86 prices		
	(a) On the basis of the cultivation cost of excluding imputed value of family labour	Rs.lakhs	72.39
	(b) On the basis of the cultivation cost including imputed value of family labour	-do-	63.82
5.	Employment		
	(a) Recurring	Lakh	2.13
	(b) Non-recurring	mandays	9.13

### 8.3 Incremental Irrigated Area

The total area irrigated by wells financed under the schemes came to 2964 acres. As discussed earlier in the report, the pre-investment situation of the benefitted area under all types of wells was only rainfed and hence, the entire area irrigated by the wells under the scheme is a net addition to the irrigated area. An estimated amount of Rs.203.72 lakhs were invested by all the scheme beneficiaries in the construction of Minor Irrigation structures at reference year prices. Thus to create an acre



of irrigation potential under dugwells, it was required to invest Rs.6873 at 1985-86 prices.

#### **8.4 Incremental production**

The annual incremental output of important crops viz., paddy, sugarcane and groundnut was estimated at 1396 tonnes, 1695 tonnes and 251 tonnes respectively. In addition Rs.37.16 lakhs worth of vegetables and other crops were produced annually.

8.5 As a result of switchover of the area under pulses and millets to other high value crops, there was a reduction in annual production of pulses and millets to the extent of 115 tonnes and 57 tonnes respectively. The gross value of incremental output was estimated as Rs.122.00 lakhs at 1985-86 prices.

#### **8.6 Incremental Income**

On the basis of per unit incremental income under different categories of wells the value added to the Gross Domestic Product (GDP) by the investments under the schemes is estimated at Rs.63.82 lakhs, when the imputed value of family labour was included in the cultivation costs and Rs.72.39 lakhs when such costs were excluded.

#### **8.7 Employment**

Besides increasing the farm income of beneficiary farmers, the investment activities financed under the schemes also created substantial additional employment opportunities. A part of the employment so created was of non-recurring nature i.e., during the construction of wells and installation of pumpsets and the rest was of recurring

nature. According to survey data 1034 mandays were needed to construct a well with electric pumpset, 905 mandays to construct a well with diesel pumpset and 737 mandays to construct a well with mhote. On this basis the investments in dugwells under the schemes created non-recurring employment for about 9.13 lakh mandays. All the sample farmers reported that in construction of wells, no family labour was involved and the wells were constructed through contract. In addition to this, the investment in Minor Irrigation structures under the schemes has created additional annual recurring on-farm employment of 2.13 lakh mandays of which 1.03 lakh mandays were for hired labour. Thus implementation of schemes have augmented the annual employment of own labour of the beneficiary families to the extent of 1.10 lakh mandays.

STATEMENT NO. 1

**Targets and achievements under the schemes**

(Amt. in lakhs of rupees)

Sl. Name of the PADB	Targets			Total Financial Assistance	Achievements		
	Dugwells No.	Development of wells (No)	Pumpsets No.		Development of wells (No)	Pumpsets No.	Total financial assistance
1. Madanapalle	400	635	135	45.12	651	186	43.30
2. Chittoor	-	304	6	3.84	265	38	3.66
3. Chandragiri	-	105	-	2.40	262	37	9.71
4. Vayalapadu	482	440	100	40.75	426	261	36.75
5. Satyavedu	200	225	125	24.72	178	110	26.62
6. Punganur	420	690	110	39.24	668	104	30.48
7. Puttur	-	300	-	5.76	250	28	8.37
8. Kalahasti	150	-	200	20.40	232	102	14.94
9. Kuppam	-	450	-	10.56	437	10	7.22
10. Palamaner	200	300	-	22.08	274	13	17.30
Total	1852	3449	676	214.87	3643	889	198.35

**Statement No. 2**  
**Coverage of Small Farmers (Dug wells)** (Amt. in lakhs of rupees)

S.No.	Name of the PADB	Small Farmers		Other Farmers		Total		% coverage of S.Fs.	
		No.	Amount	No.	Amount	No.	Amount	No.	Amount
1.	Madanapalle	197	10.52	49	2.63	246	13.15	75	80
2.	Vayalapadu	94	5.07	11	0.57	105	5.64	90	90
3.	Satyavedu	85	4.33	22	1.06	107	5.29	79	80
4.	Chandragiri	8	0.48	2	0.13	10	0.61	79	79
5.	Punganur	190	9.82	40	2.46	230	12.28	83	80
6.	Puttur	18	1.14	5	0.29	23	1.43	78	80
7.	Kalahasti	109	6.50	5	0.25	114	6.75	96	96
8.	Kuppam	67	2.87	15	0.81	82	3.68	82	78
9.	Palamaner	238	10.27	43	1.82	281	12.09	85	85
	<b>Total</b>	<b>1006</b>	<b>50.90</b>	<b>192</b>	<b>10.02</b>	<b>1198</b>	<b>6092</b>	<b>84</b>	<b>84</b>

**Statement No. 3**

**Time lag**

Sl. Time lag	Between Application and sanction		Between Sanction and disbursement		Between I and II instalments		Between II and III instalments	
	No. of cases	Percentage to total	No. of cases	Percentage to total	No. of cases	% to total	No. of cases	% to total
1. Below 15 days	9	10	44	49	22	24	6	12
2. 15 days to one month	12	13	15	17	18	20	16	32
3. 1-2 months	27	30	14	16	25	28	16	32
4. 2-3 months	19	21	5	5	11	12	4	8
5. 3-6 months	14	16	9	10	8	9	5	10
6. More than 6 months	9	10	3	3	6	7	3	6
Total	90	100	90	100	90	100	50	100

Statement No. 3A

Time Lag

Sl. no.	Time taken	Electric Wells			Diesel Wells			Mhote Wells						
		Bet- ween appln and sant tion	Bet- ween I&II inst and alment dis- burse ment	Bet- ween II & III instal ment	Bet- ween appln and sanc- tion	Bet- ween I&II inst and alment dis- burse ment	Bet- ween II & III instal ment	Bet- ween appln and sanc tion	Bet- ween I & II inst and alment dis- burse ment	Bet- ween II & III instal ment				
1.	Below 15 days	1	19	16	6	6	18	4	4	-	2	7	2	-
2.	15 days to one month	4	7	9	5	6	6	7	6	6	2	2	2	5
3.	1 to 2 months	15	5	6	5	10	6	13	9	9	2	3	6	2
4.	2 to 3 months	7	1	3	-	8	3	6	3	3	4	1	2	1
5.	3 to 6 months	6	4	2	-	6	3	5	3	3	2	2	1	2
6.	More than 6 months	4	1	1	1	2	2	3	1	1	3	-	2	1
	Total	37	37	37	17	38	33	38	22	22	15	15	15	11

**Statement No. 4**

**Land holding particulars of the sample beneficiaries**

(Average area in acres)

Before Investment                      After investment

S.No.	Particulars	Before Investment		Total	After investment			Total
		Un-irrigated area	Irrigated area		Un-irrigated area	Area irrigated by other sources (other than benefitted area)	Benefitted Area	
<b>I. Wells with electric pumpsets</b>								
a.	Small Farmers	6.08	0.20	6.28	3.13	0.20	3.23	6.56
b.	Other farmers	13.92	2.31	16.23	10.96	2.64	3.54	17.14
c.	All farmers	8.62	0.89	9.51	5.67	1.00	3.33	10.00
<b>II. Wells with Diesel Pumpsets</b>								
a.	Small farmers	5.37	0.31	5.68	2.67	0.31	3.04	6.02
b.	Other farmers	15.38	1.67	17.05	11.05	1.67	4.33	17.05
c.	All farmers	6.95	0.53	7.48	4.00	0.53	3.24	7.77
<b>III. Wells with pumpsets</b>								
a.	Small farmers	5.68	0.26	5.94	2.87	0.26	3.12	6.25
b.	Other farmers	14.41	2.09	16.50	10.99	2.32	3.81	17.12
c.	All farmers	7.78	0.70	8.48	4.82	0.75	3.29	8.86
<b>IV. Wells with Mhotes</b>								
a.	Small farmers	4.47	-	4.47	2.79	-	1.68	4.47

Statement No. 5  
Crop pattern  
(Benefitted area)

(Average area in acres)

S.No.	Category of wells	Paddy	Sugarcane	Ground nut	Seri-culture	Ragi	Bajra	Vegetables			Flowers	
								Tomato	Other vegetables			
I.	<u>Wells with Electric pumpsets</u>											
a.	Small farmers	1.87	0.82	1.02	0.06	0.54	-	0.74	0.22	0.04		
b.	Other farmers	1.35	0.92	0.98	0.33	0.98	-	0.73	0.13	0.10		
c.	All farmers	1.71	0.85	0.99	0.15	0.68	-	0.74	0.19	0.06		
II.	<u>Weil with Diesel Pumpsets</u>											
a.	Small farmers	0.57	0.30	2.50	0.03	0.19	0.33	0.23	0.20	-		
b.	Other farmers	1.17	-	4.16	0.17	-	-	0.83	0.67	-		
c.	All farmers	0.66	0.25	2.76	0.05	0.16	0.28	0.32	0.27	-		
III.	<u>Wells with pumpsets</u>											
a.	Small farmers	1.14	0.53	1.85	0.04	0.34	0.18	0.45	0.21	0.02		
b.	Other farmers	1.29	0.61	2.00	0.28	0.65	-	0.76	0.31	0.07		
c.	All farmers	1.18	0.55	1.89	0.10	0.42	0.14	0.52	0.23	0.03		
IV.	<u>Wells with Motors</u>											
	Small farmers	0.60	0.32	0.33	-	0.35	-	0.45	0.22			



Statement No. 6

Area under each crop as a percentage of gross cropped area

C R O P S

Sl. Category of wells/ farmers	Paddy	Sugar- cane	Ground nut	Seri- culture	Ragi	Bajra	Tomato	Vegetables Other vege- tables	Flowers
<b>I. Wells with Electric pumpsets</b>									
a) Small farmers	35.22	15.44	19.21	1.13	10.17	-	13.94	4.14	0.75
b) Other farmers	24.46	16.67	17.75	5.98	17.75	-	13.22	2.36	1.81
c) All farmers	31.84	15.83	18.44	2.79	12.66	-	13.78	3.54	1.12
<b>II Wells with Diesel Pumpsets</b>									
a) Small farmers	13.10	6.90	57.47	0.69	4.37	7.59	5.28	4.60	-
b) Other farmers	16.71	-	59.43	2.43	-	-	11.86	9.57	-
c) All farmers	13.89	5.56	58.11	1.05	3.37	5.90	6.74	5.68	-
<b>III. Wells with Pumpsets</b>									
a) Small farmers	23.93	11.02	38.77	0.92	7.17	3.86	9.55	4.41	0.37
b) Other farmers	21.61	10.22	33.50	4.69	10.89	-	12.75	5.19	1.17
c) All farmers	21.77	11.09	38.10	2.02	8.47	2.82	10.48	4.65	0.60
<b>IV. Wells with Mhotes</b>									
a) Small farmers	26.43	14.10	14.54	-	15.42	-	19.82	9.69	-

Statement No. 7

Area under each crop as percentage of crops cropped area  
(Without project unirrigated area)

S. Category of the farmers/wells	Crop			
	Ground-nut	Bajra	Ragi	Horsegram
<hr/>				
I. Wells with Electric pumpsets				
a. Small farmers	61.36	13.42	10.27	14.95
b. Other farmers	68.41	15.58	5.75	10.26
c. All farmers	65.78	14.78	7.43	12.01
II Wells with Diesel Pumpsets				
a. Small farmers	65.31	21.22	3.51	9.96
b. Other farmers	66.80	22.64	-	10.56
c. All farmers	65.97	21.83	1.98	10.22
III Wells with pumpsets				
a. Small farmers	63.42	17.50	6.74	12.34
b. Other farmers	67.88	17.94	3.82	10.36
c. All farmers	65.86	17.74	5.14	11.26
IV Wells with Mhotes				
a. Small farmers	48.16	28.67	7.17	16.00

Statement No. 8

Average yield of crops  
(Benefitted area)

(Quintals per

Sl. No.	Category of farmers/ wells	Paddy	Sugar- cane (tonnes)	Ragi	Bajra	Ground- nut	Seri- culture	Vegetables		Flowers
								Tomato	Vege- table	
								(Rs)	(Rs)	(Rs)
<b>I. Wells with Electric Pumpsets</b>										
a)	Small farmers	13.42	34.15	5.52	-	7.34	2.10	4375	4000	4000
b)	Other farmers	14.09	35.27	5.74	-	7.54	2.18	4000	4000	-
c)	All farmers	13.59	34.54	5.62	-	7.40	2.16	4255	4000	4000
<b>II Wells with Diesel pumpsets</b>										
a)	Small farmers	12.49	33.05	5.25	6.19	6.93	2.00	4077	4000	-
b)	Other farmers	12.86	-	-	-	7.00	2.00	4200	3250	-
c)	All farmers	12.74	33.05	5.25	6.19	6.97	2.00	4173	3422	-
<b>III. Wells with pumpsets</b>										
a)	Small farmers	13.16	33.80	5.44	6.19	7.02	2.04	4289	4000	4000
b)	Other farmers	13.52	35.27	5.74	-	7.10	2.14	4106	3372	-
c)	All farmers	13.35	34.19	5.55	6.19	7.06	2.13	4174	3512	4000
<b>IV Wells with Mhotes</b>										
a)	Small farmers	11.04	31.79	4.86	-	6.80	-	4000	3000	-

**Statement No. 9**  
**Average yield of crops per acre**  
**(Unirrigated area of the sample farmers)**

(Yield in quintals)

S. Category of no. farmers/ wells	Ground-	Bajra	Crop Ragi	Horsegram
<b>I. Wells with Electric pumpsets</b>				
a. Small farmers	3.27	3.14	2.12	2.18
b. Other farmers	3.07	3.24	2.12	2.22
c. All farmers	3.14	3.21	2.12	2.20
<b>II. Wells with Diesel pumpsets</b>				
a. Small farmers	3.17	2.98	2.00	2.11
b. Other farmers	3.03	3.00	-	2.00
c. All farmers	3.11	2.99	2.00	2.06
<b>III Wells with pumpsets</b>				
a. Small farmers	3.22	3.04	2.08	2.15
b. Other farmers	3.05	3.14	2.12	2.15
c. All farmers	3.12	3.09	2.10	2.15
<b>IV. Wells with Mhotes</b>				
a. Small farmers	3.03	2.83	2.00	2.15

Statement No. 10

Net income and incremental income per net area

Sl. no.	Category of farmers/ wells	Income with hired labour		Income with total labour		Incremental income	
		With project	Without project	With project	Without project		
<b>I. Wells with Electric pumpsets</b>							
a.	Small farmers	3669	671	2998	3156	521	2635
b.	Other farmers	3656	594	3062	3279	485	2794
c.	All farmers	3666	624	3042	3200	500	2700
<b>II. Wells with Diesel Pumpsets</b>							
a.	Small farmers	2571	711	1860	2170	-551	1619
b.	Other farmers	2707	589	2118	2459	477	1982
c.	All farmers	2599	651	1948	2230	512	1718
<b>III. Wells with pumpsets</b>							
a.	Small farmers	3070	692	2378	2618	537	2077
b.	Other farmers	3177	592	2585	2849	482	2367
c.	All farmers	3099	641	2458	2682	511	2171
<b>IV. Wells with Mhotes</b>							
a.	Small farmers	2545	619	1926	2051	447	1604



Statement No. 12

Cost of cultivation with project conditions - (per net acre)

Sl. No.	Particulars	Small farmers				Other farmers				All farmers			
		Wells with Diesel P sets	Wells with Elec. pump-sets	Wells with Diesel P. sets	Wells with Elec. Pump-sets	Wells with Diesel P. sets	Wells with Elec. Pump-sets	Wells with Diesel P. sets	Wells with Elec. Pump-sets	Wells with Diesel P. sets	Wells with Elec. Pump-sets	Wells with Diesel P. sets	Wells with Elec. Pump-sets
1.	Seeds & seedlings	346	275	314	332	272	295	343	274	309	254		
2.	Chemical fertilizers	401	579	482	491	575	543	420	577	499	383		
3.	Manures	186	213	198	181	225	208	185	217	201	297		
4.	Pesticides	118	130	123	115	120	118	117	127	122	90		
5.	Operation and maintenance cost of pumpsets	375	193	292	462	192	413	393	193	326	-		
6.	Bullock maintenance	147	185	164	169	186	180	152	185	168	305		
7.	Hired labour	274	380	322	495	552	530	321	439	380	165		
8.	Other including interest on ST credit	129	175	150	165	245	215	137	199	168	43		
9.	Total cost of cultivation with hired labour cost	1976	2130	2045	2410	2367	2502	2068	2211	2173	1537		
10.	Family labour	401	513	452	248	377	328	369	466	417	494		
11.	Total cost of cultivation with total labour	2377	2643	2497	2658	2744	2830	2437	2677	2590	2031		

Statement No. 13

Cost of cultivation  
(un-irrigated area of the sample farmers)

Sl. No.	Particulars	Small farmers			Other farmers			All farmers			Wells with Mhotes (S.Fs.)
		Wells with Diesel Elec. P.sets	Wells with Diesel Elec. P.sets	Wells with Diesel Elec. P.sets	Wells with Diesel Elec. P.sets	Wells with Diesel Elec. P.sets	Wells with Diesel Elec. P.sets	Wells with Diesel Elec. P.sets	Wells with Diesel Elec. P.sets		
1.	Seeds & seedlings	162	153	158	165	179	174	169	163	167	121
2.	Chemical fertilisers	34	39	36	43	44	44	42	38	40	10
3.	Manure	39	38	39	32	35	34	36	36	36	35
4.	Pesticides	16	14	12	21	24	23	20	15	17	8
5.	Bullock Maintenance	58	52	55	57	52	54	52	58	54	43
6.	Hired labour	54	59	56	100	100	100	85	74	80	16
7.	Others including interest on Short term Credit	15	15	15	47	51	50	37	36	32	12
8.	Total cost of cultivation with hired labour cost	373	370	371	465	485	479	441	420	426	245
9.	Family labour	160	150	155	112	109	110	124	139	130	172
10.	Total cost of cultivation with total labour	533	520	526	577	594	589	565	559	556	417



**Statement No. 14**  
**Un-irrigated area of the sample farmers**  
**Value of gross produce, cost of cultivation**  
**and net income**

(Rs. per net acre)

Sl. no.	Category of the farmers	Value of gross produce	Cost of cultivation		Net income	
			with hired labour	With total labour	With hired labour	With total labour
<hr style="border-top: 1px dashed black;"/>						
<b>I. <u>Wells with Electric pumpsets</u></b>						
a.	Small farmers	1041	370	520	671	521
b.	Other farmers	1079	485	594	594	485
c.	All farmers	1065	441	565	624	500
<b>II. <u>Wells with Diesel pumpsets</u></b>						
a.	Small farmers	1084	373	533	711	551
b.	Other farmers	1054	465	577	589	477
c.	All farmers	1071	420	559	651	512
<b>III. <u>Wells with pumpsets</u></b>						
a.	Small farmers	1063	371	526	692	537
b.	Other farmers	1071	479	589	592	482
c.	All farmers	1067	426	556	641	511
<b>IV. <u>Wells with Mhotes</u></b>						
a.	Small farmers	864	245	417	619	447

Statement No. 15

Gross income, cost of cultivation, Net income and labour employment (Rs. per net acre)

S.No	Particulars	Gross income	Cost of cultivation		Net income	
			With hired labour	With total labour	With hired labour	With total labour
<b>I. With project conditions</b>						
<b>1. Wells with Electric Pumpsets</b>						
a.	Small farmers	5799	2130	2643	3669	3156
b.	Other farmers	6023	2367	2744	3656	3279
c.	All farmers	5877	2211	2677	3666	3200
<b>2. Wells with Diesel Pumpsets</b>						
a.	Small farmers	4547	1976	2377	2571	2170
b.	Other farmers	5117	2410	2658	2707	2459
c.	All farmers	4667	2068	2437	2599	2230
<b>3. Wells with pumpsets</b>						
a.	Small farmers	5115	2045	2497	3070	2618
b.	Other farmers	5679	2502	2830	3177	2849
c.	All farmers	5272	2173	2590	3099	2682
<b>4. Wells with Mhotes</b>						
a.	Small farmers	4082	1537	2031	2545	2051
<b>II. Without project conditions</b>						
a.	Small farmers	1023	354	513	669	510
b.	Other farmers	1071	479	589	592	482
c.	All farmers	1046	414	549	632	497

**Statement No. 16**

**Labour employment**

(Mandays per net acre)

Sl. No.	Particulars	Labour employed		
		Family labour	Hired labour	Total
<b>I. <u>With Project conditions</u></b>				
<b>1. <u>Wells with Electric Pumpsets</u></b>				
a.	Small farmers	64	48	112
b.	Other farmers	47	69	116
c.	All farmers	58	55	113
<b>2. <u>Wells with Diesel Pumpsets</u></b>				
a.	Small farmers	50	34	84
b.	Other farmers	31	62	93
c.	All farmers	46	40	86
<b>3. <u>Wells with Pumpsets</u></b>				
a.	Small farmers	57	40	97
b.	Other farmers	41	66	107
c.	All farmers	53	47	100
<b>4. <u>Wells with Mhotes</u></b>				
a.	Small farmers	62	21	83

**Statement No. 17**

**Year-wise and categorywise Demand, Collection and Balance in respect of sample farmers**

Sl. No.	Particulars	Years					1985-86
		1981-82	1982-83	1983-84	1984-85	1985-86	
<b>I.</b>	<b>Wells with Electric Pump sets</b>						
a	Small farmers - Demand	22804	37099	46333	54947	56152	
	- Collection	9535	14978	15556	13969	32540	
	- Balance	13269	22121	30777	40978	23612	
	Percentage of overduees to demand	58	60	66	75	42	
b	Other Farmers - Demand	10725	19798	21639	17892	21158	
	- Collection	6439	13706	19294	12321	20765	
	- Balance	4286	6092	2345	5571	393	
	Percentage of overduees to demand	40	31	11	31	2	
c	All farmers - Demand	33529	56897	67972	72839	77310	
	- Collection	15974	28684	34850	26290	53305	
	- Balance	17555	28213	33122	46549	24005	
	Percentage of overduees to demand	52	50	49	64	31	
<b>II.</b>	<b>Wells with Diesel Pump-sets</b>						
a	Small Farmers - Demand	27340	44206	65262	69921	60121	
	- Collection	7987	7450	25577	9560	39455	
	- Balance	19353	36756	39685	60361	20666	
	Percentage of overduees to demand	71	23	61	86	34	
b	Other Farmers - Demand	5805	10412	13794	15403	16545	
	- Collection	4359	5375	7140	7634	11252	
	- Balance	1446	5037	6654	7769	5293	
	Percentage of overduees to Demand	25	48	48	50	32	
c	All farmers - Demand	33145	54618	79056	85324	76666	
	- Collection	12346	12825	32717	17194	50707	
	- Balance	20799	41793	46339	68130	25959	
	Percentage of overduees to demand	63	77	59	80	34	

III Wells with pumpsets									
a. Small farmers - Demand	50144	81305	111595	124868	116273				
- Collection	17522	22428	41133	23529	71995				
- Balance	32622	58877	70462	101339	44278				
Percentage of overdues to demand	65	72	63	81	38				
b Other Farmers - Demand	16530	30210	35433	33295	37703				
- Collection	10798	19081	26434	19955	32017				
- Balance	5732	11129	8999	13340	5686				
Percentage of overdues to demand	35	37	25	40	15				
c All farmers - Demand	66674	111515	147028	158163	153976				
- Collection	28320	41509	67567	43484	104012				
- Balance	38354	70006	79461	114679	49964				
Percentage of overdues to demand	58	63	54	73	32				
IV. Wells with Mhote									
a. Small farmers - Demand	8714	11947	16088	19870	23844				
- Collection	7062	6139	6498	3002	8736				
- Balance	1652	5808	9590	16868	15108				
Percentage of overdues to demand	19	49	60	85	63				

**ANNEXURE I**  
**Groundwater potential - Chittoor District**

Date of Assessment: December 1985 (Ad hoc)

Sl. No.	Block	Gross recharge (ha.m)	Utili- sable recharge (ha.m)	Net yearly draft (ha.m)	Ground water Balance (ha.m)	Stage of Develop- ment (%)	Draft cleaned Physi- cal units cleared $\frac{DW}{SIW} / \frac{DTW}{BW}$	Net draft cleared (ha.m)	Total net draft (ha.m)	Stage of development (as on 9.9.86)
1.	Bansampalem	135333	11503	6487	5016	56.39	23 30 20	31	6518	57.0
2.	Chandragiri	22430	19065	6553	12512	34.3	120 65 170 15	324	6877	36.0
3.	C. Gallu	12506	10630	3190	7440	30.0	70 80 30	107	3297	31.0
4.	Chittoor	15646	13299	9280	4019	69.7	47 100 40	249	9499	71.0
5.	Kuppam	9442	8026	2239	5787	27.9	50 85 45	216	2455	30.5
6.	Madanapally	16847	14320	2594	10726	25.0	65 48 46 13	223	3817	26.6
7.	Nagari	4003	3402	2005	1397	59.0	55 103 30	266	2272	56.78
8.	Palamaner	14785	2567	4516	8051	36.0	70 88 45	154	4670	37.16
9.	Pungarur	24048	20440	5487	14954	27.0	135 121 30 30	255	5737	28.06
10.	Puttur	15472	13381	6525	6856	48.7	75 95 30	156	6681	49.9
11.	Satyavedu	12021	10218	2186	8032	21.4	120 140 70	2398	2398	23.46
12.	Srikalahasti	11134	9464	1221	8243	13.0	66 76 23 6	112	1333	14.0
13.	Tamballapalle	9475	8054	2423	5631	30.0	60 54 12 12	147	2570	31.9
14.	Thottambedu	8907	7571	1201	6370	15.86	60 70 12	91	1292	17.0
15.	Vayalpadu	12303	10458	4095	6362	39.0	70 95 25	216	4311	41.2

ANNEXURE II

Monthly actual Rainfall data in Chittoor district from 1977-78 to 1985-86

(Rainfall in mms.)

Year	(N56) June	(N79) July	(N102) Aug.	(N127) Sept.	(N149) Oct.	(N143) Nov.	(N46) Dec.	(N26) Jan.	(N70) Feb.	(N71) Mar.	(N124) Aprl	(N62) May	(N821) Total
1977/ 78	88	71	138	65	266	233	1	2	12	1	48	41	966
1978/ 79	40	110	51	215	102	189	140	1	41	-	8	60	957
1979/ 80	43	117	88	160	69	340	15	-	-	3	10	46	891
1980/ 81	31	67	109	42	74	185	41	6	-	26	11	74	666
1981/ 82	76	108	117	196	177	49	53	-	-	2	14	36	828
1982/ 83	62	71	45	118	92	164	-	-	-	7	6	55	620
1983/ 84	64	115	165	272	152	36	139	8	107	71	19	17	1165
1984/ 85	19	156	12	205	108	157	62	23	-	5	11	20	778
1985/ 86	62	165	94	97	108	207	54	26	34	-	8	30	945

N - Normal

Source: Bureau of Economics & Statistics

**Annexure III**

**Area irrigated by different sources  
(Chittoor District) (in acres)**

Sl. No.	Source of irrigation	Average preceding 5 years	Y e a r s						
			1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-85
1.	Canals	18837	21109	19653	13694	12164	13879	10998	9920
2.	Tanks	163188	231037	84928	172595	96689	193552	172965	173600
3.	Wells	295629	29311	302653	299036	274949	275164	292314	277760
4.	Tubewells	3454	2687	4427	3859	4239	4209	7928	4960
5.	Other sources	13178	19957	8002	10590	5153	12587	10096	7440
6.	Net area irrigated	348291	383285	304497	359583	297033	370084	370969	347200
7.	Area irrigated more than once	145993	184616	115166	140181	96161	129905	123333	128960
8.	Gross area irrigated	494285	567901	419663	499764	393194	499989	494302	473680



## ANNEXURE IV

## Area under principal crops in Chittoor district

(Area in Hectares)

Sl.No.	Crops	Avg. preceding									
		5 years	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85			
1.	Rice	1,57,149	1,58,143	93,374	1,25,141	90,299	1,29,876	1,09,067			
2.	Jowar	14,286	13,621	14,265	19,392	16,593	19,227	15,184			
3.	Bajra	682	540	22,192	25,447	20,035	23,308	15,646			
4.	Ragi	49,038	47,128	36,377	44,342	33,749	37,535	37,836			
5.	Small Millets	12,049	11,113	8,654	15,250	9,329	9,669	8,202			
6.	Green gram	191	137	220	335	135	187	184			
7.	Horse Gram	14,361	12,582	20,152	14,389	14,919	15,471	13,073			
8.	Redgram	3,912	3,707	3,019	3,781	3,132	4,787	6,753			
9.	Other pulses	1,616	1,667	1,150	1,093	918	1,756	2,180			
10.	Cereals & Millets	2,60,409	2,54,657	1,75,697	2,29,911	1,70,418	2,19,882	1,86,161			
11.	Chillies	4,104	4,396	3,571	3,957	3,522	3,706	3,672			
12.	Total food crops	3,27,052	3,20,910	2,51,812	3,04,585	2,40,381	2,93,844	2,61,881			
13.	Groundnut	2,27,475	2,32,071	2,23,974	2,27,542	2,07,759	2,36,488	2,47,815			
14.	Sesamum	1,973	2,470	1,991	1,875	1,229	1,827	1,622			
15.	Castor	335	288	231	248	191	197	217			
16.	Total oil seeds	2,31,821	2,36,584	2,28,283	2,31,591	2,11,137	2,40,191	2,51,382			

contd...

1	2	3	4	5	6	7	8	9	10
17. Tobacco		19	7	6	2	1	-	2	
18. Sugarcane		18,227	17,302	20,107	22,540	20,855	19,218	21,528	
19. Cotton		107	30	19	18	4	-	-	
20. Total non-food crops		2,36,635	2,41,884	2,34,628	2,38,007	2,18,468	2,47,452	2,58,721	
21. Total cropped area		5,63,687	5,62,794	4,86,440	1,16,286	4,58,849	5,41,296	5,20,602	
22. Net area sown		4,95,014	4,84,531	4,38,239	4,83,189	4,18,243	4,87,895	4,68,164	

Sources: Bureau of Economics & Statistics.

