

**Composite Minor Irrigation Scheme
Mysore
(Dist. Mysore), Karnataka**



BANK OF BARODA

PROJECT MONITORING & EVALUATION CELL

PRIORITY SECTORS DEPTT.

CENTRAL OFFICE

BALLARD PIER

BOMBAY - 400 038.

P R E F A C E

Bank of Baroda has been providing loan facilities for various agricultural development schemes with the principal objective of raising the farm productivity, standard of living of the farm family and nation's farm output. The field experiences as also success stories from different parts of the country have indicated that while beneficiaries who have received loan facilities from the Bank have secured benefits to a varying degree, there has been a most urgent need to evaluate the projects with a view to estimating the extent to which they have benefited in terms of their output, productivity, employment opportunities and net income. In fact, such studies should form an integral part of the project and serve as tools to policy making and decision-making process. With this end in view, the Project Monitoring and Evaluation Cell at the Central Office, Bombay conducted an in-depth evaluation study of 'A Composite Minor Irrigation Scheme', Mysore, District Mysore (Karnataka), so as to quantitatively estimate the increase in the (i) cropping intensity, (ii) per-acre productivity of different crops, (iii) employment opportunities, (iv) total farm output and (v) level of net incremental income per farmer during the post-investment period. The efforts have also been made to compare the actual with the anticipated project benefits and analyse the reasons for the divergence between the two so that appropriate corrective steps could be taken to improve the viability of the project and more particularly the repaying capacity of the borrowers. More emphasis has been laid in this study to determine the nature and extent to which the small farmers have derived benefits under the project. This is the third study conducted by the Bank.

The Project Monitoring and Evaluation Cell places on record the assistance provided by Sarvashree R. P. Shah, Chief Manager (Agriculture), Southern Zone, Madras and Balkrishnan, Manager, Mysore branch. The studies were designed, conducted and guided by Shree A. R. Patel, Officer attached to the Cell, Bombay. The data were analysed and presented in the manuscript form by Shree Patel with the help of Sarvashree C. S. Sampathkumaran and N. M. Shah, Officers of Agricultural Finance Department and Smt. R. M. Shah, Officer of Lead Bank Department. The services rendered by Shree S. Rajgopal and Shree B. S. Ramakrishna, Officers, Chickmagalur and Mysore branches respectively in providing the necessary data during the course of field study and analysis as also of the field staff who collected the data are acknowledged with deep appreciation.

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PROJECT MONITORING AND
EVALUATION CELL
(PRIORITY SECTORS DEPOTT.)
BOMBAY

COMPOSITE MINOR IRRIGATION SCHEME

MYSORE (Dist. Mysore) KARNATAKA

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CHAPTER - 1

PROFILE OF THE AREA

The agrarian economy of the twelve villages where Bank of Baroda has provided finance of the order of Rs. 3,95,000 to 145 farmers and landless labourers for various purposes is predominantly dependant upon the monsoon rains. The monsoon is very much erratic in respect of its commencement, frequency, duration, quantum and cessation as a result of which the variation in the output of the major crops of jowar, paddy, etc. is considerable. The soil and the climate are most suitable for the successful cultivation of a wide variety of crops — paddy, jowar, sugarcane, mulberry, vegetable etc. — which, under appropriate scientific technology, can yield rich dividends to the farmers and provide wages to the landless labourers.

Crop and cropping pattern

The crops raised at present in this area under rainfed conditions and to some extent, partly irrigated through available but limited sources of irrigation are jowar (51.40 percent), mulberry (27.27 percent), paddy (13.58 percent), and ragi (5.25 percent) which cover an area of 9059 acres (97.72 percent) out of 9270 acres under various crops. Wherever irrigation facilities are assured, crops like sugarcane and vegetables are also raised. However, the area under these crops is very much limited to only 125 acres and 107 acres respectively.

The output of foodgrains is about 4703 tonnes of which paddy accounts for 1854 tonnes (39.42 percent), jowar contributes 2553 tonnes (54.28 percent) and the share of ragi is 296 tonnes (6.30 percent). The productivity of these crops per acre on an average is 14.6 quintals in case of paddy, 5.3 quintals in case of jowar and 5.9 quintals in case of ragi, which varies considerably from village to village. The mulberry crop is also cultivated in all the twelve villages with an output of 349 tonnes of cocoons. However, the average productivity of cocoons per acre is very low (138 kg). The discussions with the farmers reveal that wherever irrigation is available, the productivity of paddy and mulberry crops per acre has been of the order of 20 quintals and 300 kgs. respectively.

TABLE No. - 1

AREA UNDER DIFFERENT CROPS PRODUCTION AND PRODUCTIVITY PER ACRE

Name of the Village	Area under crops	Area in acres			Output in tonnes			Yield in quintals/acre			Hybrid Jowar area
		Paddy area	Sugar-cane area	Out-pit	Mul-berry area	Output cocoons	Jowar area	Output cocoons	Vege-table area	Ragi area	
Murtatti	1189	430 (20)	15 (400)	860	350 (1.20)	42	380 (6)	228	14	—	—
Alamburmunti	45	—	—	—	15 (1.20)	1.80	25 (5)	12.5	—	5 (6)	3.00
Nerale	1849	200 (12)	—	240	660 (1.20)	79.2	925 (5)	462.5	—	50 (10)	50.0
Hinkal	1592	150 (12)	—	180	50 (1.20)	6.0	1200 (5)	600.0	62	130 (6)	78.0
Bendagally	495	—	40 (320)	—	260 (1.20)	31.2	210 (5)	105.0	—	30 (15)	45.0
Bhujagayanhundi	115	4 (12)	—	4.8	35 (1.10)	3.85	60 (6)	36.0	4	12 (6)	7.2
K. Mukahally	308	—	10 (400)	—	190 (1.30)	24.70	100 (6)	60.0	—	8 (6)	4.8
Hulimavu	948	285 (8)	15 (400)	228	208 (3.00)	62.4	440 (6)	264.0	—	—	—
Chikkakavalande	1132	60 (12)	—	72	350 (1.30)	45.5	700 (5)	350.0	—	30 (4)	12.0
Hoshahally	897	20 (15)	10 (350)	30	350 (1.30)	45.5	445 (6)	267.0	12	60 (4)	24.0
Bidanchally	375	120 (20)	35 (400)	240	60 (1.20)	7.2	160 (6)	96.0	—	—	—
Menegalli	325	—	—	—	—	—	120 (6)	72.0	15	180	72.0
Total	9270	1269 (14.6)	125 (370)	1854.8	2538 (1.38)	349.35	4765 (5.3)	2553.0	107	497 (5.9)	296.0
Percentage of total area		(13.58)	(1.35)		(27.27)	(51.40)		(1.15)		(5.25)	15

Figures in parentheses indicate yield in quintal per acre.

Thus, the output of various crops and productivity per unit area of all these crops could be increased if irrigation facilities are created/improved/augmented through various sources. At present the gross area under irrigation is 1574 acres (16.98 percent). The main sources of irrigation are Canal and wells. There are three villages, which are in the command area of canal irrigation system, where the irrigated area is 445 acres (37.43 percent) in Muthathi, 300 acres (31.81 percent) in Hulimavu and 155 acres (41.33 percent) in Bidarahallihundi. Almost all the villages have irrigation wells varying from one to 16 in number. While the Total number of irrigation wells are 86, the total number of pumpsets installed are 75 irrigating an area of about 350 acres (22.23 percent). These facts are evident from the statistics given in Table No. 2.

TABLE No. - 2

AREA UNDER CROPS, IRRIGATION AND SOURCES OF IRRIGATION

Name of the Village	Area under cultivation acres	Area under irrigation acres	Source irrigation	No. of wells	No. of pump-sets
Muttatti	1189	445 (37.43)	Canal and Wells	10	10
Alamburmunti	45	5 (11.11)	Wells	2	1
Hinkal	1592	155 (9.74)	Tank and Wells	16	16
Nerale	1849	316 (17.09)	Wells and Tank	14	14
Bendagalli	495	26 (5.25)	Wells	6	6
Bhujagayanahundi	115	12 (10.43)	Wells	3	3
K. Mukahally	308	24 (7.79)	Wells	6	6
Hulimavu	948	300 (31.81)	Canal	3	2
Chikkakayalande	1137	85 (7.47)	Wells and Tank	15	6
Hosahally	897	76 (8.47)	Wells and Tank	7	7
Bidarahally	375	155 (41.33)	Canal	1	1
Menagalli	325	15 (4.61)	Well	3	3
Total	9270	1574 (16.98)		86	75

Figures in parentheses indicate percentage area under irrigation.

Concentration of small farmers

The significance of developing agrarian economy lies in the fact that there are 1564 farming families and 1361 families of landless labourers. Of the farming families the small farmers possessing land between 2.51 acres and 5.00 acres are 677 (43.30 percent). While on an average a small farmer possesses 3.43 acres of land, total land held by 677 farmers constitutes 25.07 per cent (2324 acres) of the total land under crops.

The proportion of the marginal farmers possessing land less than 2.50 acres are 585 who constitute 37.40 percent of the farming families. While on an average a marginal farmer possesses 2.41 acres of land, their share in the total land is 1291 acres farming 13.93 percent. Thus, the population of the small and marginal farmers in these twelve villages is 1262 (80.70 percent) holding 3615 acres of land (39 percent). This shows that 19.30 per cent of farmers possess 61 per cent of the total land under crops. On an average, these farmers amongst them hold land 18.72 acres (Table No.3) per farmer.

There are eight villages where the concentration of the small and marginal farmers is more than 80 per cent ranging from 80 percent in Bhujagayananhundi to 94.55 percent in Hinkal villages. These eight villages have preponderance of small and marginal farmers (931) who account for 59.53 percent of the total farming families in this area. Similarly, there are four villages where the concentration of landless labourers is extremely high (1030) forming 75.68 percent of the total number of landless labourers in the area. This, therefore, points to the fact that the prosperity of these small and marginal farmers as also landless labourers can be brought about by developing agriculture — making it free from the vagaries of monsoon through creating a sound irrigation system and modernising agriculture. The efforts may have to be therefore made to help farmers shift their traditional farming to multiple cropping, which can increase the crop-productivity, total output, employment opportunities and high income. Wherever necessary, grasslands could also be developed and high yielding species of green grass (perennial) be raised. When once irrigation facilities are created so as to help farmers and landless labourers raise milch animals. These efforts will help supplement their income through subsidiary occupation which will gainfully engage them and their family members.

With a view to providing a momentum to the development of agrarian economy the Bank has tried to identify the needs of the farmers/landless labourers of this area in light of their existing activities and endeavoured to provide the financial assistance for the purposes such as creating irrigation facilities, purchase of milch animals, crop-cultivation and for undertaking small-business (Table No. 4 Annexure 11).

For the development of irrigation potential 14 farmers had been sanctioned/disbursed investment credit to the extent of Rs. 1,55,500. Of the 14 beneficiaries under the scheme, five farmers are small farmers, six are medium and three are large farmers (Table No. 5).

TABLE No. – 5

YEARWISE AND CATEGORYWISE ASSISTANCE PROVIDED

Category	Amount in Rs.									
	1973		1974		1975		1978		Total	
	A/c.	Amt.	A/c.	Amt.	A/c.	Amt.	A/c.	Amt.	A/c.	Amt.
Small farmers	—	—	—	—	3	32000	2	19000	5	51000
					(1	1000)	(1	1080)	(2	2080)
Medium farmers	1	15000	1	12000	1	12000	3	29000	6	68000
	(1	3000)	(1	5500)					(2	8500)
Large farmers	—	—	—	—	3	36500	—	—	3	36500
Total	1	15000	1	12000	7	80000	5	48000	14	155500
	(1	3000)	(1	5500)	(2	3000)	(1	1080)	(5	12580)

(Figures in parentheses indicate number of a/cs. and crop loan sanctioned).

These farmers have been assisted for sinking of new wells, renovation of old-wells, installation of electrical pumpsets, construction of pump house, construction of delivery tank, construction of field-channels, undertaking land development works and cultivation of crops. Purposewise finance provided has been given in Table No. 6.

AGRARIAN STRUCTURE WITH REFERENCE TO CATEGORIES OF FARMERS AND LAND HELD BY THEM

Name of the Village	Total Holding	Cultivated area (acres)	Small farmers		Marginal farmers		Other farmers		Small and Marginal farmers		No. of land-less labourers
			No.	Area in acres	No.	Area in acres	No.	Area in acres	No.	Area in acres	
Muttatti	65	1189	18	60	35	80	12	1049	53	140	36
Alambumunti	12	45	4	17	6	13	2	15	(81.54)	(11.77)	12
Hinkal	312	1592	185	560	110	205	17	827	(83.34)	(66.66)	135
Nerale	205	1849	45	190	70	135	90	1524	(94.55)	(48.05)	445
Bendagalli	65	495	16	67	25	56	24	372	(56.10)	(17.57)	18
Bhujagayanahundi	15	115	5	18	7	12	3	75	(63.08)	(24.85)	18
K. Mukhally	40	308	14	62	19	35	7	211	(80.00)	(34.78)	5
Hulimavu	306	948	220	680	60	115	26	148	(82.50)	(31.49)	230
Chikkakavalande	260	1137	85	335	90	220	85	582	(91.50)	(84.30)	88
Hosahally	72	897	25	110	38	135	9	652	(59.53)	(48.81)	44
Biderahally	140	375	40	145	85	130	15	100	(87.50)	(27.31)	220
Metagalli	72	325	20	80	40	155	12	90	(89.39)	(77.33)	90
Total	1564	9270	677	2324	585	1291	302	5655	1262	3615	1361
Percentage of total			(43.80)	(25.07)	(37.40)	(13.93)	(19.30)	(61.00)	(80.70)	(39.00)	
Average area in acres/farmer			3.43		2.41		18.72				

Figures in parentheses indicate percentage of total in respective village.

FINANCIAL ASSISTANCE PROVIDED BY BANK — VILLAGEWISE

Name of the Village	Distance from Branch Kms.	Irrigation development		Dairy		Crop Loan		Others		Total	
		A/c	Rs.	A/c	Rs.	A/c	Rs.	A/c	Rs.	A/c	Rs.
Muttatti	25	2	20,000	—	—	3	8,000	—	—	5	28,000
Alamburmunti	30	1	10,500	—	—	—	—	—	—	1	10,500
Hinkal	6	1	10,000	70	1,60,000	—	—	35	40,000	106	2,10,000
Nerale	38	2	23,500	—	—	—	—	—	—	2	23,500
Bendagalli	30	1	12,000	—	—	1	6,000	—	—	2	18,000
Bhujagayanahundi	36	1	14,000	—	—	—	—	—	—	1	14,000
K. Mukahally	44	1	13,500	—	—	—	—	—	—	1	13,500
Hulimavu	20	1	15,000	—	—	4	13,000	—	—	5	28,000
Chikkakavalande	42	1	9,000	—	—	—	—	—	—	1	9,000
Hosahally	18	1	10,000	—	—	—	—	—	—	1	10,000
Bidarahally	15	1	9,000	—	—	—	—	—	—	1	9,000
Metagalli	3	1	9,000	—	—	3	7,000	15	5,000	19	21,000
Total		14	1,55,000	70	1,60,000	11	34,000	50	45,000	145	3,94,500

TABLE No. 6

ANNEXURE III

PURPOSEWISE FINANCE PROVIDED FOR DEVELOPING IRRIGATION POTENTIAL

Name of the Village	A/c.	Sinking of new wells	Renova- tion of old well	Elec. pumpset incl. instal- lation	Pump- house	Deli- very Tank	Land Dev.	Field Chann- els	Total	Crop Loan	Grand Total	Year of disbursal
Muttatti	(S)	—	1,500	5,000	1,500	300	1,200	500	10,000	1,080	11,080	1978
	(M)	—	1,500	5,000	1,500	300	1,700	—	10,000	—	10,000	1978
Alamburmunti	(S)	4,000	—	5,000	1,500	—	—	—	10,500	—	10,500	1975
Hinkal	(S)	3,000	—	5,000	1,500	—	500	—	10,000	—	10,000	1975
Nerale	(S)	4,500	—	5,000	1,500	—	1,000	—	11,500	1,000	12,500	1975
	(M)	5,500	—	4,500	2,000	—	—	—	12,000	—	12,000	1975
Bendagalli	(M)	5,000	—	4,500	1,500	—	1,000	—	12,000	5,500	17,500	1974
Bhuhagayanahundi	(L)	6,350	—	4,650	2,000	—	1,000	—	14,000	2,000	16,000	1975
K. Mukahally	(L)	7,500	—	4,000	1,500	500	—	—	13,500	—	13,500	1975
Hulimavu	(M)	5,500	—	4,500	1,500	1,500	2,000	—	15,000	3,000	18,000	1973
Chikkakavalande	(L)	5,000	—	4,000	—	—	—	—	9,000	—	9,000	1975
Hosahally	(M)	4,000	—	4,500	1,500	—	—	—	10,000	—	10,000	1978
BidrahallyMandi	(M)	4,000	—	4,000	1,000	—	—	—	9,000	—	9,000	1978
Metagalli	(S)	3,000	—	4,500	1,500	—	—	—	9,000	—	9,000	1978
Total		57,350	3,000	63,650	20,000	2,600	8,400	500	1,55,500	12,580		

SCHEME IN NUTSHELL

The Bank has financed 14 farmers for creating irrigation facilities in 12 villages. The loan facilities to the extent of Rs. 1,55,500 have been provided to these farmers for specific purposes associated with the creation and improvement of irrigation facilities, viz., Rs. 57,350 for sinking of new wells, Rs. 3,000 for renovation of old wells, Rs. 63,650 for installation of electrical pumpsets, Rs. 20,000 for construction of pump-houses, Rs. 2,600 for construction of delivery tanks, Rs. 500 for construction of field channels and Rs. 8,400 for land development works.

For the purpose of evaluation study all these cases were thoroughly examined in respect of their existing status which can help us determine the nature and extent to which they have benefited the farmer-beneficiaries.

The *prima-facie* scrutiny of these cases revealed that of the five cases in which the disbursement has been made in the year 1978, the construction of well had been incomplete in one case since April, 1978 and in two cases the work was in progress at the time of interview. Thus, these three cases were excluded from the present study. Thus, out of the fourteen cases financed by the Bank, 11 cases had been interviewed for collecting information on important parameters. During the course of interview it was further revealed that out of 11 cases under study the electricity has yet not been provided to two borrowers as a result of which the pumpsets have so far not been installed and these two wells have not been put to use. Of these two cases, one was disbursed loan in 1973 and other one in 1974. Also, in one case for which loan was disbursed in 1974 the well did not strike water which had therefore to be abandoned by the borrower. In the final, out of 14 financed, relative information was collected from only eight cases where the farmers had been using the irrigation for agricultural purpose (Table 7).

TABLE No. - 7

PARTICULARS OF CASES EXCLUDED FROM THE STUDY

	1973	1974	1975	1978
Total cases	1 (15000)	1 (12000)	7 (80000)	5 (48000)
No. electricity	1 (15000)	—	1 (8000)	—
No. yield of water	—	—	1 (12000)	—
Incomplete work	—	—	—	1 (3000)
Work in progress	—	—	—	2 (14400)
Sub-total	1 (15000)	—	2 (20000)	3 (17400)

* Figures in parentheses indicate the amt. financed in Rs.

Thus finally the detailed study was confined to these eight cases of which three were small farmers, three were medium farmers and the rest two were large farmers (Table No. 8).

Table No. - 8

CATEGORYWISE NUMBER OF FARMERS UNDER STUDY AND LOAN DISBURSED

Category of the farmers	A/c No.	Loan amt. Disbursed (Rs.)
Small	3	30,500
Medium	3	33,500
Large	2	27,500
	8	91,500

This pattern of spread also offers fairly good scope to study and compare amongst them the magnitude of the benefits accrued to them under the scheme.

The efforts are made to quantitatively estimate the extent to which these farmers have benefited in terms of increase, during the post-investment period over the pre-investment period in (i) cropping intensity, (ii) productivity of different crops per unit area (iii) total farm output (iv) employment opportunities (v) level of net incremental income per farmer/hectare. The study also endeavours to compare the actual benefits with the anticipated benefits under the scheme and analyse the reasons for the divergence between the two with a view to suggesting the remedial measures to improve the viability of the scheme and repaying capacity of the farmers. The study, therefore encompasses the coverage of those parameters which have direct relationship on the socio-economic gains and direct bearing on the cropping intensity, crop-productivity, cropping-pattern, net income before and after the investment has been made by these categories of the farmers. It has therefore sought to collect and analyse the information on important aspects at two different time-series. The broad spectrum of the parameters studied are as follows :

- (i) Age, education, caste, family-size, assets - house, livestock, farm implements, durable consumer goods, liabilities, etc.
- (ii) size of holding, irrigated land, cropping pattern - area allotted to different crops - production, value, investment on labour, seeds, fertilisers, farm-income, expenditure, etc.
- (iii) Progressiveness response to new technology, problems encountered etc.

It is interesting to note that all the farmers except one wishing to borrow and develop irrigation facilities were within the medium age group of 28 years to 40 years. While all the six farmers possessing land upto 5.00 hectares were young, one having land more than 5.00 hectares was of old -age. All the farmers except one were literate - they were able to read and write. Only one small farmer was illiterate. Average number of members per family were 6.66 in case of small farmers, 5.33 in case of medium farmers and 7.50 in case of large farmers. It is further observed that the average number of children upto the age of 14 years per family were, 4, 1.66 and 3 respectively. Thus, while it was appreciable to note that farmers within medium age group have come forward to avail of loan facilities, the average number of members of family per borrower seems to be higher taking into consideration the size of the land each one of them possessed (Table No. 9).

TABLE No. 9

LITERATE/ILLITERATE, AGE-GROUP AND NUMBER OF MEMBERS PER FAMILY

Group	Total Number	Literate	No. of adults	No. of children	Total members	Age group years
Small	3	2	8	12	20	35 to 40
Medium	3	3	11	5	16	28 to 32
Large	2	2	9	6	15	34 to 70
Total	8	7	28	23	51	28 to 70

The statistical data (Table No. 10) Annexure-1 on the time elapsed between the date of application for loan and the date of sanction or the first disbursement reveal that while four proposals have been considered within 18 to 43 days, there has been considerable or inordinate delay ranging from 84 to 269 days in other four cases. The reasons so far advanced by the Bank relate to (i) individual cases coming from a village far away from the Branch (30 to 38 Kms). which made the pre-sanction/pre-disbursement scrutiny operationally difficult, (ii) inadequate information furnished by the applicant, especially the completion of documentation. In these cases disbursement has been made on the same day of the sanction of the loan proposals. Thus, the borrower took considerable time to execute the documents. Further, it is revealed that the loan amount has been disbursed in suitable instalments (2 to 11) after verifying the progress achieved in the execution of work/utilisation of previous instalments. Of course, at every time of disbursement verification of the progress in all the cases has not been personally done by the field staff because of the longer distance. However, it is observed that the time elapsed between the disbursement of the first and the last instalment in three cases varied from 38 to 63 days. In other cases the period ranged from 108 to 292 days. In fact, indirectly this period is indicative of the completion of work to some extent. This much delay in execution of work has been explained by the farmers and the field staff through various reasons of which the most important ones are (i) interruption of work due to monsoon rains. In fact, this has happened because of scattered lending – one case in each village. However, field visits should have been so organised/planned that more cases would have been secured and they would have been supervised. While sinking of or repairs to wells during monsoon season helps farmers dig easily as also farm families are available to do this work, however, it is not advisable since there are chances of landslide, interruption of work, extra cost in removing the rain water accumulated in the pit, construction material is not available and its transport and storage cost extra etc.

If the field-visits were properly planned, the progress of the work under execution should have been monitored effectively and the investment might not have remained idle for some time as also additional lending in this and other schemes might have been made possible. (Table No. 10)

It may be observed that the Bank has been financing in these seven villages since 1973 and by now 118 farmers have been assisted for various purposes. It is also seen that there are 57 irrigation wells and the

area under irrigation is 983 acres. Further, except in one case all the seven farmers who have sunk/renovated wells have been getting adequate water. This points to the fact, there is scope for exploitation of groundwater resources on one side and there is scope simultaneously need for exploring such scope in these villages on other side as revealed by the fact that 4610 acres are under dry land agriculture (78.68 per cent). Thus, it is very much essential for the Bank in consultation with the Government officials, State Directorate of Ground Water to find out the feasibility of additional wells, density and spacing between two wells, and then, to motivate the farmers for undertaking the Minor Irrigation scheme for improving the farm productivity and introducing high value, heavy duty crops – sugarcane, mulberry cultivation etc. This may even now help Bank to expand its lending operations in this field including crop-loans and simultaneously or subsequently in the allied activities. This will improve the viability of the lending operations and help large number of farmers. If this is done, the existing accounts can also be properly followed up, supervised and recovery be expedited.

The variation between the figures of the loan amount requested by the farmers and the amount sanctioned by the Bank (Table No.10) in all the cases except one is considerable (5 to 150 per cent). This is mainly attributed to the reasons that correct estimates on cost-structure of digging wells, installation charges of the pumpsets, construction of pumphouse, land development works etc. for which the farmers requested for loan were neither available nor worked out on scientific lines. The field officer of the Bank may have to remain in close contact with the civil Engineers of the Bolck Office/District Offices and other progressive farmers for the purpose of obtaining the detailed data on the magnitude of the earth work to be done, civil works to be done, material required, etc. As these types of works have been/are being executed by the Government Officials in the Soil-conservation/Irrigation Department, their help would have helped substantially. The Deputy Engineers of the Panchayats/Government Departments should also work out on continuing basis scientifically the cost structure of all such development programmes which involve engineering aspects and help financing institutions as also farmers to investment that much amount which is only necessary. This is the area, if not properly and scientifically attended to, where either misutilisation of funds occur or the farmers are under-financed as a result repaying capacity of the farmer and the viability of the scheme suffers.

TIME TAKEN IN PROCESSING/SANCTION AND FINAL DISBURSEMENT OF LOAN

Group	No.	Date of application	Date of sanction	Date of disbursement			Loan amount		Percentage varn. btwn. loan reqtd. and sanctd.
				First disbmt.	Last disbmt.	No.	Reque- sted	Sanc- tioned	
Small farmers	1	6-4-78	10-5-78 (35)	10-5-78	12-11-78 (187)	4	12,000	10,000	20
	2	24-7-74	21-1-75 (181)	21-1-75	13-6-75 (144)	6	16,500	10,500	57
	3	14-3-74	17-4-74 (35)	17-4-74	13-6-75 (58)	6	12,500	10,000	25
Medium farmers	1	18-4-78	5-5-78 (18)	5-5-78	22-9-78 (141)	4	15,000	10,000	50
	2	28-2-74	22-5-74 (84)	22-5-74	23-7-76 (63)	11	12,000	11,500	5
	3	20-5-74	1-7-74 (42)	1-7-74	7-8-74 (38)	2	20,500	12,000	70
Large farmers	1	5-8-74	11-2-75 (191)	11-2-75	29-11-75 (292)	7	35,000	14,000	150
	2	29-4-74	22-1-75 (269)	22-1-75	9-5-75 (108)	3	20,000	13,500	48

The information on the dimensions of the wells (Table No. 11) indicated that the shape and the size of these wells varied from field to field. However, the total depth was in the range of 16' to 50'. In one case the well did not yield adequate water even at a depth of 35' and so it was bored upto 76'. However, at this depth of boring also it did not yield adequate water. In all the cases except one referred to above water-yield was reported to be adequate. The height of the water-column in the post-winter period, at the time of interview, was in the range of 4' to 6' in four cases and 12' to 15' in three cases. The quality of water as experienced by the farmers is good.

The farmers were however not able to correctly tell the water-level maintained during different periods — monsoon, winter and hot-weather seasons. In fact, how much area could be irrigated from the existing water-level on a continuous running of the pumpset in different seasons is important to determine the cultivation of irrigated crops and introduction of new cropping pattern. Thus, record of water-level on a continuing basis should be maintained by the farmers for which they need guidance of the local village level workers and the field staff. The adequacy of water as reported by seven farmers should have to be viewed from the point of view of raising/introducing multiple-cropping system instead of partially irrigating some area in monsoon when there is longer spell between two showers or irrigating some rabi crops. For this purpose they have to be guided by the subject matter specialists/Agronomist/irrigation Specialist. (Table No. 11)

TABLE No. - 11

DIMENSION OF WELL, WATER COLUMN ETC.

Group	No.	Dimension of the well	Total depth	Depth from ground to water level	Height of water column	Quantity of water	Quality of water
		feet	feet	feet	feet		
Small farmers	1	20 x 15	20	15	5	Adequate	Good
	2	25 x 22 x 20	25	21	4	Adequate	Good
	3	20 x 20	20	14	6	Adequate	Good
Medium farmers	1	16 x 15	16	12	4	Adequate	Good
	2	35 x 20 x 18 (bore - 76)	35	29		Inadequate	Good
	3	25 x 33	25	13	12	Adequate	Good
Large farmers	1	31 x 33	31	16	15	Adequate	Good
	2	50 x 32 x 28	50	38	12	Adequate	Good

The analysis of the data on the purpose-wise investment made by the farmers (Table No. 13) reveals that the farmers have to a varying degree, sought finance for/utilised the funds for developing not only the irrigation facilities but also improving the efficiency of irrigation through constructing pumphouses, undertaking land development works, etc. In fact, one small farmer has used funds for all the associated works, viz. for constructing field channels, delivery tank, pump-house and land development works. While all the eight farmers have constructed new wells/renovated old-wells and pump-house along with the installation of pumpsets, six farmers have undertaken the land development works also. It is further observed that while four farmers have taken up the construction of delivery tank, one farmer has already gone ahead to construct the field channels.

The information on the investment was further analysed from the view-point of the loan amount requested, disbursed and actual utilization. It was revealed that in four cases the amount of loan disbursed was a little less than the actual costs incurred by the farmers. This higher costs included the labour put up by the farmer and some margin money to be met by the farmers. However, all these four farmers had requested for loan amount more than the actual costs incurred. While in two cases the actual costs incurred by the farmers were a little higher than that requested by them, in one case it was almost equal and in other case it was exceptionally on higher side.

The reasons for this much variation could be attributed to (i) no scientific estimates were prepared for various types of works involving engineering aspects, earth work, civil work, (ii) time elapsed between

the commencement and completion of the work, (iii) lack of effective supervision and guidance, because of the longer distance from the Branch, (iv) No technical person/civil supervisor was available in the area from the Government/Panchayat Office.

In one case the actual cost incurred was Rs. 22,000 and the cost estimated by the Bank was Rs. 7,500. This was explained by the fact that the size of the well was for greater than that of others.

The margin money including self-labour invested by the farmers varied from 4.17 per cent to 60.00 per cent. The margin including the self-labour upto 25 per cent in cases other than small farmers can be considered the normal banking condition. In case of small farmers two have received subsidy varying from Rs. 1,750 to Rs. 2,000. While 25 per cent margin is the normal stipulation for other farmers, it has to be scientifically examined as to whether those farmers who have invested more than 25 per cent have met the requirements of funds out of their own funds or raised from relatives/money-lenders, etc. The replies received from these farmers revealed that they have managed from their own resources and from relatives.

The total investment actually made by these eight farmers was of the order of Rs. 1,30,905 for creating irrigation facilities. The net area brought under irrigation out of this investment was 13.27 hectares out of total land of 40.10 hectares owned by these farmers. Thus, with this much investment 33.09 percent area has been brought under irrigation which by all standards is a very good sign of development. The average command area under the well was 1.65 hectares. The cost for creating irrigation facilities over an area of one hectare on an average worked out to Rs. 9,865. On inquiry with other farmers in this area the average cost per hectare for works including sinking of well, installation of pumpset and land development works comes to Rs. 10,000.

PURPOSEWISE FINANCE — ACTUAL AND ANTICIPATED

Group	No.	Digging/ repairs to well	Pump- set	Pump- house	Delivery Tank	Land deve- lopment	Field chan- nels	Total	Crop Loan	Investment credit		Farmers contri- bution (%)
										reques- ted	disbur- sed	
Small Farmers	1	(R) 1500 (3620)	5000 (5200)	1500 (2350)	300 (300)	1200 (1600)	500 (500)	10,000 (13770)	1080	12000	10000	16.67
	2	4000 (4500)	5000 (5620)	1500 (1500)	—	— (1000)	—	10500 (12620)	—	16500	10500	87.70
	3	3000	5000 (5000)	1500 (1500)	—	500 (2000)	—	10000 (10500)	—	12500	10000	36.37
Medium Farmers	1	(R) 1500 (2500)	5000 (5200)	1500 (2000)	300 (1000)	1700 (3000)	—	10000 (13700)	—	15000	10000	20.20
	2	5000 (7515)	4500 (3860)	2000 (1500)	—	— (1500)	—	11500 (14375)	—	12000	11500	20.00
	3	5000 (7300)	4500 (4500)	1500 (1500)	—	1000 (7000)	1000	12000 (20300)	5500	20500	12000	20.00
Large Farmers	1	6350 (7000)	4650 (4650)	2000 (2000)	—	1000 (1000)	—	14000 (14650)	2000	35000	14000	60.00
	2	7500 (22000)	4000 (4990)	1500 (2000)	500 (2000)	—	—	13500 (30990)	—	20000	13500	4.60
												32.50

(R) Repairs to old wells.

Figures in parentheses indicate actual amount incurred by the farmers.

TABLE - No. 13

AREA BENEFITED BY IRRIGATION AND COST STRUCTURE

	Small Farmers			Medium Farmers			Large Farmers		Overall Avg.			
	1	2	3	Avg.	1	2	3	1		2	Avg.	
Area held (hectare)	1.80	1.70	1.33	1.61	2.04	2.93	3.40	2.79	17.70	9.20	13.45	5.01
Area brought under irrigation (hectare)	1.20	1.40	1.33	1.31	1.34	1.60	2.00	1.65	3.20	1.20	2.20	1.65
Irrigation (Percentage)	66.66	82.35	100.00	81.36	65.68	54.60	58.82	59.02	18.08	13.04	16.36	33.09
Cost involved (Rupees)	13,770	12,620	10,500	12,297	13,700	14,375	20,300	16,125	30,990	14,650	22,820	16,363
Per hectare cost (Rupees)	11,475	9,014	7,895	9,387	10,223	8,994	10,150	9,792	10,860	19,909	10,372	9,864

The present study, however, revealed that in case of small farmers the area brought under irrigation ranged from 66.66 percent to 100.00 percent, whereas in case of medium farmers it varied from 54.60 percent to 65.68 percent and in case of large farmers it was from 13.04 percent to 18.08 percent. However, the average command area of the well was 1.31, 1.65 and 2.20 hectares under each corresponding category of the farmers. The average cost per hectare worked out to Rs. 9,387 in case of small farmers, Rs. 9,792 in respect of medium farmers and Rs. 10,372 in case of large farmers. The variation in the cost structure was because of the variation in the magnitude of the work-earth work and civil works—executed by the farmers (Table No. 13).

CROPPING PATTERN, CROPPING INTENSITY AND OUTPUT

The careful study of the data on crops, cropping pattern and cropping intensity presented in the Table No. 14, have by and large established the fact that investment on the creation of irrigation facilities has commenced transforming the agrarian economy. However, it has been observed that the extent to which it has been instrumental to effect positive changes in quantitative terms has been directly related to/dependent upon various factors including the farmer's knowledge of irrigated farming practices, balanced use of nutrients, high yielding/hybrid seeds, etc.

Cropping pattern and cropping intensity

The first visible change witnessed on the farms of the small farmers during the post-investment period was that while their kharif cropping intensity increased by 31.05 percent, the increase in rabi cropping intensity was very much spectacular (169.01 percent). These farmers have introduced rabi crop on an area of 3.62 hectares during Kharif season and hybrid jowar crop on an area of 2.40 hectares during rabi season in the post-investment period. Thus, cropping pattern has witnessed a significant shift towards high value crops on 6.02 hectares (124.64 percent) during the post-investment period. They have, however, allocated the same area to groundnut in kharif season and horsegram in rabi season during post-investment period as was done during pre-investment period. However, on inquiry it was learnt they raised these crops under protective irrigation as and when the crops showed symptoms of withering. This has resulted into higher productivity and fetched higher income. The crops of hybrid jowar under irrigation during rabi season yielded spectacular results. In short, the area brought under various crops during post-investment period was 8.04 hectares which indicated 66.45 percent increased intensity over the land held (4.83 hectares) by them as against 96.06 percent (4.64 hectares) under cropping during pre-investment period. Thus, increased area has been brought under crops.

In case of medium farmers, the results revealed that the kharif and rabi cropping intensity increased by 27.82 percent and 20.47 percent respectively, during the post-investment period. Though the cropping intensity has not shown substantial improvement, the irrigation facilities created out of this investment have helped the growers to raise high value crops like hybrid jowar, sugarcane and mulberry under irrigation on an area of 2.20 hectares, 1.20 hectares and 1.34 hectares respectively. These crops have paid rich dividends. One farmer did not get adequate water in his well, which otherwise would have helped him to increase area under irrigated crops.

TABLE No. - 14

**LAND HOLDING, CROPPING INTENSITY AND CROPPING PATTERN DURING THE
PRE-INVESTMENT AND POST-INVESTMENT PERIOD**

	Small Farmers			Medium Farmers			Large Farmers		
	Pre-invest-ment	Post-invest-ment	Percen-tage increase	Pre-invest-ment	Post-invest-ment	Percen-tage increase	Pre-invest-ment	Post-invest-ment	Percen-tage increase
Land holding (hectare)	4.83	4.83	—	8.37	8.37	—	26.90	26.90	
Average holding/farmer (ha)	1.61	1.61	—	2.79	2.79	—	13.45	13.45	
Average irrigated area/farmer (ha)	—	1.31	—	0.13	1.88	—	—	2.20	
Kharif cropped area (ha)	3.22	4.22	31.05	6.47	8.27	27.82	23.70	23.70	—
Rabi cropped area (ha)	1.42	3.82	169.01	2.93	3.53	20.47	—	—	—
Total (ha)	4.64	8.04	73.27	9.40	11.80	25.53	23.70	23.70	—
Area under crops (ha)									
<i>Kharif</i> :									
Groundnut	0.60	0.60		—	0.40		—	—	
Ragi	—	3.62		—	—		—	—	
Jowar	1.82	—		4.43	4.63		20.50	19.30	
Paddy	0.80	—		0.70	0.70		—	—	
Mulberry	—	—		1.34	1.34		3.20	3.20	
Sugarcane	—	—		—	1.20		—	1.20	
<i>Rabi</i> :									
Jowar	—	2.40		—	—		—	—	
Horsegram	1.42	1.42		—	—		—	—	
Ragi	—	—		—	0.60		—	—	
Pulses	—	—		2.93	2.93		—	—	

These farmers after creating irrigation facilities introduced new crops which gave high returns as also changed cropping pattern to accommodate these crops on an appreciable area. They introduced the crop of groundnut, hybrid jowar, sugarcane and ragi on an area of 4.80 hectares. In terms of land held by them these crops shared 57.35 per cent which by all standards was a good achievement.

The large farmers did not increase the cropping intensity at all. In short, they used to raise crops on an area of 23.70 hectares during the kharif season in the post-investment period also. They did not raise any rabi crop, though irrigation facilities were created. However, these farmers have changed cropping pattern in such a way as could help them raise irrigated crops of high economic value. They have reduced area under jowar crop by 1.20 hectares and planted sugarcane on 1.20 hectares. The irrigated crops of Mulberry and sugar-cane have paid rich dividends.

The study has brought out that the cropping intensity has been increased by 73.26 percent in case of small farmers and 25.53 per cent in respect of medium farmers. Thus, these small and medium farmers have, because of their limited holdings, endeavoured to intensify the cropping and utilise the available resources — land and water — at their command to the best of knowledge and within reach. The large farmers have

not intensified their cropping because they have on an average 13.45 hectares of land. Instead, they have shifted their cropping pattern to the raising of more remunerative crops – Mulberry and Sugarcane – by irrigating them. In fact, it was anticipated under the scheme that the cropping intensity would increase by 33 to 50 percent on an average.

It is observed that, though the command area of the well is limited to irrigating 1.31 hectares of land in case of small farmers, 1.65 hectares of land in case of medium farmers and 2.20 hectares of land in case of large farmers, more area to the extent of 0.80 hectares under paddy would have been raised by the small farmers and protective irrigation could have been given to increase the output. The crops of high economic value, viz. mulberry and sugarcane on 1.42 hectares, instead horse-gram, should have been cultivated. This has not happened because on inquiry it was found that such a remunerative cropping plan was not envisaged in the scheme nor technical guidance was imparted to them. The medium farmers and the large farmers had better access to the sources of guidance and services than the small farmers. In fact the medium and large farmers had been raising the mulberry crop prior to investment made for creating irrigation facilities. They had already been aware of the benefits of irrigating the mulberry crop and introducing the sugarcane in this tract. Accordingly, these farmers, though did not intensify the cropping to the expected level, did harvest better results by changing the crops and irrigating them.

Further, the reasons for the lower cropping intensity during kharif season in case of small farmers and in both the seasons in case of medium farmers are attributed to the factors (i) none of these farmers except one had constructed systematic field channels which have substantial role in increasing the water-use-efficiency (WUE), (ii) number of irrigations and the quantum of water given to each crop had no relation with the actual need as warranted by the soil-moisture stress at specific crop growth stage. There has been thus some wastage of water when surplus water has been given to the crops especially during early stage of growth.

Crop productivity

The third effect of the investment made in creating irrigation facilities was realised from the increased productivity of the crops per unit area. The analysis of the data presented in the Table No. 15 revealed that in case of small farmers, the productivity of the crops – groundnut, horsegram – per hectare has increased appreciably. The productivity of the groundnut crop and horsegram which they used to cultivate during the pre-investment period has increased from 6.66 quintals per hectare to 10.00 quintals per hectare (50.15 percent) and from 3.52 quintals per hectare to 5.63 quintals per hectare (59.94 percent) respectively. Further, these farmers have now switched over to raising the ragi crop in kharif season and jowar crop in the rabi season. The yield of ragi per hectare was 35.91 quintals and that of jowar was 43.75 quintals per hectare. These yield data are fairly comparable/appreciable by any standard.

The per-hectare crop-productivity during the post-investment period in case of medium farmers has also increased significantly. In case of jowar, it has increased from 13.54 quintals to 22.03 quintals (62.70 percent) per hectare, while in case of paddy the productivity has increased from 50.00 quintals to 57.14 quintals (14.28 percent) per hectare. However, in case of pulses, the productivity has been stagnant at the level of 6.83 quintals per hectare.

It is interesting to note that out of three medium farmers under study, one was already raising hybrid jowar in the pre-investment period and he increased the area under hybrid jowar during the post-investment period from 0.93 to 1.60 hectares. He, however, improved the productivity of hybrid jowar from 21.50 quintals to 31.15 quintals (44.88 percent) per hectare during the post-investment period. In case of another farmer, he was raising local variety of jowar during the pre-investment period and he continued to raise the same local jowar as also experimented on 0.60 hectares of land the cultivation of hybrid jowar during the post-investment period. It was observed that while the yield of local jowar was stagnant at the level of 10 quintals

on 1.5 hectares in the pre and post-investment period, the yield of hybrid jowar was 50 quintals per hectare as against the yield of 6.66 quintals of local jowar per hectare during the post-investment period. Thus, the hybrid jowar recorded six and half times more productivity than that of local jowar.

Out of three farmers, one introduced the groundnut crop, while other one introduced sugarcane and ragi crops during the post-investment period. The third farmer irrigated his mulberry crop during the post-investment period. The results revealed that while the productivity of the groundnut crop was 12.50 quintals, the productivity of the sugarcane crop and ragi crop was 1000 quintals and 50 quintals per hectare respectively. The productivity of the mulberry crop increased from 1.49 quintals of cocoons to 9.70 quintals of cocoons per hectare i.e., five and half times more than that in the pre-investment period.

While the productivity of jowar crops in case of large farmers increased very little, the productivity of mulberry under irrigation during the post-investment period increased from 2.50 quintals to 7.50 quintals of cocoons per hectare. The yield of sugarcane crop newly introduced during the post-investment period was 750 quintals per hectare.

The analysis of the data (Table No. 16) on the productivity of various crops during the post-investment period as compared to those anticipated under the scheme revealed that by and large the productivity status of all the crops except groundnut and horsegram in case of small farmers, pulses in case of medium farmers and mulberry and sugarcane crops in case of large farmers was appreciably high. The productivity of the crops is a function of response of farmers to adopt the recommended package of practices X availability of inputs of production – including credit X technical guidance. In this study, it has been revealed that while all the farmers have adopted the fertilisers, seeds, only four farmers secured crop-loans for raising these crops and others managed out of their resources which were not adequate to meet the actual requirements as warranted by the recommended practices. Also, none of the farmers except one had laid out systematic field-channels for efficient water use. The irrigation technology requires sound knowledge of how, when and how-much to irrigate. Thus, training in efficient use of water makes all the difference. Further, none of the farmers had got the soil of their fields tested in respect of nutrient status in the soil. The soil-testing helps the farmers know the deficiency of specific nutrients and guides them from which source they could be met with. This also helps in reducing the cost of production.

Output

In the ultimate analysis, the results revealed that the output of food-crops has gone up by 181 quintals (266 per cent) from 68 quintals in case of three small farmers and by 54 quintals (46.96 per cent) from 115 quintals in case of three medium farmers, during the post-investment period. However, in respect of two large farmers the food-crops output has declined by 18 quintals because the area – under the jowar crop has been reduced by 1.20 hectares during the post-investment period. They have raised sugarcane crop over an area of 1.20 hectares and earned good return therefrom. It is however, interesting to note that though the area under the jowar crop declined, the productivity of jowar per hectare increased by 0.55 quintals from 23.90 quintals per hectare.

The interesting feature of the investment revealed that the production of jowar which is considered to be the principal staple crop of this area has increased by 101 quintals (17.47 per cent) despite the fact that the area under jowar has declined from 26.75 hectares to 26.33 hectares in the post-investment period. This phenomenal rise in the production is attributed to the small and medium farmers' switch-over to the cultivation of hybrid jowar. In short, the overall rise in the food output in case of these farmers has been due to (i) increase in the cropping intensity in both the seasons (ii) increase in the productivity of crops per unit area and (iii) adoption of new cropping pattern by adjusting the available land resources to accommodate other crops.

TABLE NO. — 15

PRODUCTIVITY, COST OF CULTIVATION, VALUE OF PRODUCE, NET INCOME PER HECTARE UNDER DIFFERENT CROPS DURING PRE-INVESTMENT AND POST-INVESTMENT PERIOD

	Pre-investment Period					Post-investment Period						
	Area (ha)	Prody. per hectare (Q)	Cost of cultn. per hectare (Rs.)	Value of produce per hectare (Rs.)	Net income per hectare (Rs.)	Total income under respective crop (Rs.)	Area (hct.) (ha)	Prody per hectare (Q)	Cost of cultn. per hectare (Rs.)	Value of produce per hectare (Rs.)	Net income per hectare (Rs.)	Total income under respective crop (Rs.)
Small Farmers												
<i>Kharif</i>												
—	0.60	6.66	250	666	416	250	0.60	10.00	416	1000	584	350
—	—	—	—	—	—	—	3.62	35.91	1478	4088	2610	9448
—	1.82	15.38	522	1934	1412	2570	—	—	—	—	—	—
—	0.80	43.75	2375	5906	3531	2825	—	—	—	—	—	—
<i>Rabi</i>												
—	—	—	—	—	—	—	2.40	43.75	1937	4187	2250	5400
—	1.42	3.52	70	563	493	700	1.42	5.63	106	563	457	649
Medium Farmers												
<i>Kharif</i>												
—	—	—	—	—	—	—	0.40	12.50	1075	1250	0175	70
—	4.43	13.54	745	1557	812	3600	4.63	22.03	961	2073	1112	5150
—	0.70	50.00	2000	4500	2500	1750	0.70	57.14	2285	5714	3429	2400
—	1.34	1.49	522	1567	1045	1400	1.34	9.70	5112	11157	6045	8100
—	—	—	—	—	—	—	1.20	10.00	5250	11000	5750	6900
<i>Rabi</i>												
—	—	—	—	—	—	—	0.60	50.00	2000	4500	2500	1500
—	2.93	6.83	341	819	478	1400	2.93	6.83	409	955	546	1600
Large Farmers												
<i>Kharif</i>												
—	20.50	23.90	927	2390	1463	29992	19.30	24.45	953	2445	1492	36479
—	3.20	2.50	1500	4000	2500	8000	3.20	7.50	6250	15000	8750	28000
—	—	—	—	—	—	—	1.20	7.50	5250	8625	3375	4050

Net Incremental Income (Rs.)

Net income before investment	Small Farmer	Medium Farmer	Large Farmer
Net income after investment	6345	8150	37992
Net incremental income after investment	15847	25720	68529
Per Farmer	9502	17570	30537
Per Hectare	3167	5856	15268
	1967	2098	1135

TABLE NO. - 16

**PRODUCTIVITY OF CROPS PER HECTARE DURING POST-INVESTMENT PERIOD —
ANTICIPATED *Versus* ACTUAL UNDER THE SCHEME**

Quintals/hectare

Crop	Small Farmers	Medium Farmers	Large Farmers	Anticipated
<i>Kharif</i>				
— Groundnut	10.00	12.50	—	12.00
	—(16.66)	+(4.16)	—	
— Ragi	35.91	—	—	30.00
	+(19.70)			
— Jowar (L)	—	22.03	24.45	20.00
		+(10.15)	+(22.25)	
— Jowar (hybrid)	—	40.57	—	35.00
		+(15.91)		
— Paddy	—	57.14	—	35.00
		+(63.25)		
— Mulberry	—	9.70	7.50	8.00
		+(21.25)	—(6.25)	
— Sugarcane	—	1000.00	750.00	1000.00
		(—)	—(25.00)	
<i>Rabi</i>				
— Jowar (hybrid)	43.75	—	—	40.00
	+(9.37)			
— Ragi	—	50.00	—	35.00
		+(42.85)		
— Horsegram	5.63	—	—	10.00
	—(43.70)			
— Pulses	—	6.83	—	10.00
		—(31.70)		

Figures in parentheses indicate percentage increase (+) or decrease (—) over anticipated yield per hectare

ECONOMICS OF CROP PRODUCTION AND INCREMENTAL INCOME

Economics of crop-production per hectare

It is revealed from the above discussion that the investment has resulted into introduction of new crops, changing the cropping pattern, increase in the cropping intensity and the productivity of the crops per hectare. All this in the ultimate effect has increased the total output of the crops from the limited holding the farmers possessed especially the small and medium farmers. It should, however, be noted that investment made in the creation of the irrigation facilities has also induced the farmers to invest more on the cultivation of crops to increase the cultivation expenses which involve improved methods, high yielding seeds, manures, fertilisers, insecticides, farm-power, etc. In fact, investment on irrigation cannot pay unless it is supported by matching investment on inputs of production, labour farm-power etc. which have been directly and positively co-related with the productivity of the crops.

This, therefore, focuses the attention on the need for analysing the data to determine as to whether, with the increase in the cultivation expenses on different crops per hectare during the post-investment period there has been corresponding increase in the final value of the produce per hectare and ultimately the increase in the net profit per hectare. As the percentage increase in the net profit per hectare under individual crops during the post-investment period is the result of the interacting effects of percentage increase in the crop-productivity X percentage increase in the value of the produce per hectare, the rise or fall in the market price often is instrumental to increase or decrease the net profit.

However, the fall in the price of the produce can to some extent be made good by the increased productivity of the crops. Thus, net profit per hectare under individual crops during the post-investment period can be determined/quantified in terms of net return per rupee investment and optimum level of increase in the productivity. This will help the farmers choose their crops, cropping pattern and ultimately allocate the scarce resources — Land, water, farm-power — to different crops accordingly. It is with this consideration an attempt is made here to compare percentage increase in the net profit per hectare and the net return per rupee investment under various crops.

The analysis of the data on the cost of cultivation, value of the produce and net profit per hectare presented in Table No. 17, revealed that the cultivation expenses and profit under these crops during post-investment period has increased to a varying degree. In case of the small farmers, while the cultivation expenses for the groundnut increased by 66.40 per cent, the value of the produce recorded rose by 50.15 per cent only indicating increase in net profit/return only by 40.38 per cent. In case of the horsegram, the increase in the cultivation expenses did not, however, reflect any increase in the value of the produce. This has therefore showed a negative return per hectare by 7.31 per cent.

In case of the medium farmers, the increase in the value of produce of jowar crop was higher by 33.14 per cent as against the expenses on cultivation by 28.99 per cent. This has therefore, reflected in the net increase of profit by 36.94 per cent. Similar results of higher profit have been secured in case of paddy crop. However, in respect of pulses and mulberry crops the percentage increase in the value of produce per hectare is less than that of the percentage increase in the cultivation expenses during the post-investment period. As a result of this situation, the percentage increase in the net profit per hectare is less in these crops.

In respect of large farmers, the results of Jowar and Mulberry crops revealed that the percentage increase in the cultivation expenses was higher than that of the percentage increase in the value of the produce of these crops per hectare during the post-investment period. This has, therefore, shown less percentage increase in the net profit per hectare under these crops.

The above findings showed that except in case of medium farmers who have cultivated paddy and jowar, the net return per rupee investment has been less during post-investment period over the pre-investment period. Thus, though the per hectare productivity of these crops has increased because of the investment made in the creation of irrigation facilities, the rate of return realised from the sale of produce has not been commensurate with the rate of investment made on the raising of the crops. This fact is evident from the analysis of the data presented in Table No. 17.

TABLE No. - 17

PERCENTAGE INCREASE IN THE COST, INCOME, NET PROFIT PER HECTARE AND NET RETURN PER RUPEE INVESTMENT DURING POST-INVESTMENT PERIOD OVER PRE-INVESTMENT PERIOD

Category/ Crop	Pre-Investment (Per hectare)			Post-Investment (Per hectare)			Net return per rupee investment	
	Cost	Income	Profit	Cost	Income	Profit	Pre-Invst.	Post-Invst.
Small Farmers								
— Groundnut	250	666	416	416 (66.40)	1000 (50.15)	584 (40.38)	1 : 1.66	1 : 1.40
— Horsegram	70	563	493	106 (51.43)	563 (—)	457 (-7.31)	1 : 7.04	1 : 4.31
Medium Farmers								
— Jowar	745	1557	812	961 (28.99)	2073 (33.14)	1112 (36.94)	1 : 1.08	1 : 1.16
— Paddy	2000	4500	2500	2285 (14.25)	5714 (26.97)	3429 (37.16)	1 : 1.25	1 : 1.50
— Pulses	341	819	478	409 (19.94)	955 (16.60)	546 (14.22)	1 : 1.40	1 : 1.33
— Mulberry	522	1567	1045	5112 (879.31)	11157 (611.99)	6045 (478.46)	1 : 2.00	1 : 1.18
Large Farmers								
— Jowar	927	2390	1463	953 (2.80)	2445 (2.30)	1492 (1.98)	1 : 1.58	1 : 1.57
— Mulberry	1500	4000	2500	6250 (316.65)	15000 (275.00)	8750 (250.00)	1 : 1.66	1 : 1.40

Note : Figures in parentheses indicate percentage increase over corresponding figures during pre-investment period.

These facts bring to the surface that the farmers may have to be guided by the technical experts in the cultivation of crops on scientific lines which lay emphasis on the higher rate of return per rupee investment on the use of high yielding seeds, organic manures, chemical fertilisers, pesticides/insecticides, irrigation, farm-power etc. The quality of soil and water has to be frequently tested to determine their worthiness/reaction /response to different crops of economic importance. This points to the need for strengthening the

research base on the Agricultural Research Station in the area and popularising the methods of cultivation etc. amongst the farmers.

Economics of crop-production per unit quantity

With all the technological developments taking place in the field of agriculture, the farmer is often interested or is guided by his experience to select the crops, cropping pattern and adopt practices which can help him earn more per quintal of produce rather than net return per rupee investment or increase in the total output per hectare. Thus, while increasing the productivity of the crops per hectare, efforts are being made to reduce the cost of production per quintal and optimise the net profit per quintal. However, more often than not this depends much on the market forces determining the cost of inputs and labour, price of produce, etc. at a given situation. With the adoption of balanced technology the farmers may have to incur more for the production of one quintal of produce. This cost could be optimised and net profit per unit quantity could be increased under the optimum use of resources as experimented on the research farms. It is with this consideration an attempt is made here to compare the net profit per unit quantity under various crops.

The analysis of the data on the unit cost of production and net profit per quintal of products of various crops (Table No. 18) raised by the farmers after the investment has been made for creation of irrigation facilities has revealed that in case of small farmers, though the productivity of groundnut and horsegram per hectare has increased by 50.15 and 59.94 per cent respectively during the post-investment period, the net profit per quintal of groundnut has declined by Rs. 4.07 and that of horsegram by Rs. 58.88. The comparative figures of net profit per quintal of products under various crops grown during the post-investment period, however, showed that the horsegram fetched net profit of Rs. 81.17 per quintal, followed by Ragi (Rs. 72.68), groundnut (Rs. 58.40) and jowar (Rs. 51.43). It is interesting to note that though the crop of hybrid jowar has recorded the highest productivity (43.75 Q/Ha) per hectare the net profit per quintal was the least (Rs. 51.43). This is explained by the fact, that the unit value of the produce of hybrid jowar was the least (Rs. 96.70). This was further corroborated by higher net profit per quintal recorded by the crop of Ragi. This was because it has recorded higher productivity (35.91 Q/Ha) and fetched higher value per quintal (Rs. 113.84/Q).

In respect of medium farmers, the net profit per quintal of jowar and mulberry crop (cocoons) has been less by Rs. 9.59 and Rs. 78.16 respectively, though the productivity of these crops has increased substantially. The comparative figures of net profit per quintal under various crops raised during the post-investment period revealed that the mulberry crop (cocoons) fetched the highest net profit of Rs. 623.19 followed by the pulses, paddy, jowar, Ragi, Groundnut and sugarcane.

In respect of large farmers, though the productivity of jowar has increased by 2.30 percent, the net profit per quintal of jowar has declined by Rs. 0.19. However, in case of mulberry crop the productivity increased by 200 percent and the net profit has increased by Rs. 166.67 per quintal of cocoons. This was because of the realisation of high price of cocoons per quintal.

Net incremental income

The genuineness and worthiness of the investment are determined from the analysis of the financial viability of the project and the net incremental income the farmer would derive during the post-investment period. This will establish the repaying capacity of the farmer who is the ultimate beneficiary of such investment. The net incremental income is the difference between the post-investment and pre-investment net income per farmer.

The net incremental income is the function of the factors viz., favourable changes brought about by the farmer in the allocation of his land resources to more remunerative crops, increase in the cropping intensity, increased productivity of the crop per unit area and net profit per unit area. In short, it is significantly influenced by the interacting forces, viz. cropping intensity X Crop-productivity X net-profit per unit area.

TABLE NO. - 18

UNIT COST OF PRODUCTION, VALUE AND NET PROFIT PER QUINTAL

Category/ Crop	Pre-Investment				Post-Investment				Percentage increase in producti- vity
	Yield in Q./ha.	Prodn. cost per qntl.	Value of produce per qntl. (Rs.)	Net Profit per quintal (Rs.)	Yield in Q./ha	Prodn. cost per qntl.	Value of produce per qntl. (Rs.)	Net Profit per quintl. (Rs.)	
Small Farmers									
— Groundnut	6.66	37.53	100.00	62.47	10.00	41.60	100.00	58.40	50.15
— Ragi	—	—	—	—	35.91	41.16	113.84	72.68	—
— Jowar	—	—	—	—	43.75	44.27	95.70	51.43	—
— Horsegram	3.52	19.89	159.94	140.05	5.63	18.83	100.00	81.17	59.94
Medium Farmers									
— Groundnut	—	—	—	—	12.50	86.00	100.00	14.00	—
— Jowar	13.54	55.02	114.99	59.97	22.03	43.62	94.10	50.48	62.70
— Paddy	50.00	40.00	90.00	50.00	57.14	39.99	100.00	60.01	14.28
— Mulberry	1.49	350.33	1051.68	701.35	9.70	527.01	1150.20	623.19	551.00
— Sugarcane	—	—	—	—	1000.00	5.25	11.00	5.75	—
— Ragi	—	—	—	—	50.00	40.00	90.00	50.00	—
— Pulses	6.83	49.93	119.91	69.98	6.83	59.88	139.97	80.09	—
Large Farmers									
— Jowar	23.90	38.79	100.00	61.21	24.45	38.98	100.00	61.02	2.30
— Mulberry	2.50	600.00	1600.00	1000.00	7.50	833.33	2000.00	1166.67	200.00
— Sugarcane	—	—	—	—	750.00	7.00	11.50	3.50	—

The analysis of the data (Table No. 19) revealed that the small farmer secured Rs. 3167 as net incremental income during the post-investment period as against Rs. 5856 and Rs. 11426 secured by medium and large farmers respectively.

The reasons for securing Rs. 3167 as net-incremental income by the small farmer could be attributed to the factors viz: (i) changes in the cropping pattern by introducing crops like Ragi in Kharif season on 3.62 hectares and hybrid jowar in rabi season on 2.40 hectares which have given net income per hectare to the extent of Rs. 2610 and Rs. 2250 respectively (ii) increase in the cropping intensity by 73.27 per cent from 4.64 hectares to 8.04 hectares (iii) increased crop-productivity of the groundnut. The productivity of the horsegram has increased by 59.94 per cent. While the cost of cultivation increased by 51.43 per cent, the value of the produce per quintal declined by 37.75 per cent resulting into the net loss of Rs. 51 on 1.42 hectares. This loss was, however, compensated by the gains under groundnut cultivation. The sizable increase in the gains has been realised from the cultivation of Ragi and hybrid jowar.

The net incremental income per farmer in case of medium farmer has been Rs. 5856 during the post-investment period. This has been due to the fact that (i) these farmers introduced new crops during the post-investment period viz. groundnut, sugarcane and Ragi on 2.20 hectares which increased net income by Rs. 8470 (ii) Also the cropping intensity has increased by 26.07 per cent from 9.36 hectares to 11.80 hectares (iii) The increase in the productivity of the crops viz. Jowar, Paddy and Mulberry (cocoon) has also contributed significantly to the increase of net income during the post-investment period (iv) The increase in the value of the crops per unit quantity in case of paddy, mulberry (cocoon) and pulses has also appreciably increased the net incremental income.

It is, however, interesting to note that though the value of the jowar crop per quintal declined by 18.17 per cent, the increased productivity of jowar per hectare by 62.70 per cent and increase in the area by 0.20 hectare resulted into net incremental income by Rs. 1550. The increased productivity and higher price in case of paddy and mulberry crops fetched Rs. 7350 as net incremental income. Though the productivity of pulses has been stagnant, the increased value of the pulses resulted into net incremental income of Rs. 200.

The net incremental income secured by the large farmer during the post-investment period has been of the order of Rs. 11,426. This has been due to the reasons that (i) these farmers introduced sugarcane crop on an area of 1.20 hectares by reducing equal area under jowar crop. This has resulted into net incremental income of Rs. 4050. (ii) While the productivity of jowar crop marginally increased by 2.30 per cent, there was no rise in the price. Thus, there was loss in the incremental income by Rs. 1197. This has been more than compensated by the cultivation of mulberry crop which, because of rise in the productivity and the unit price, resulted into net additional income of Rs. 20,000 during the post-investment period.

The analysis of the data further showed that the net incremental income increased per hectare of holding was Rs. 1967 in case of small farmers, Rs. 2098 in case of medium farmer and Rs. 850 in case of large farmer. This has revealed that though the large farmer has secured the highest net incremental income of Rs. 11426-95.12 per cent and 260.78 per cent higher than that of medium farmer and small farmer respectively-has recorded that least net incremental income per hectare (Rs. 850). This fact points out that the higher net incremental income secured by the small farmer and the medium farmer than that by the large farmer during the post-investment period was principally/largely due to the increase in the cropping intensity. There has not been any change in the cropping intensity in case of large farmers.

Investment pattern—labour, seeds etc.

It is established that the investment on the creation of irrigation facilities has to be simultaneously supported by use of high yielding seeds/hybrids, organic manures, chemical fertilisers, pesticides, farm

power etc. Thus, with the introduction of changes in the cropping pattern, increased cropping intensity and adoption of improved methods of cultivation involving enhanced use of inputs of production, the investment pattern has also witnessed a change (Table No. 20). This is primarily reflected in the over-all increase in the cost of cultivation of different crops. The irrigation facilities also create additional requirement of labour for various farm operations viz. seed-bed preparation, application of manures, fertilisers, irrigation, spraying of pesticides, seeding, harvesting and post-harvesting operations.

TABLE NO. 19

NET INCREMENTAL INCOME PER FARMER PER HECTARE ETC.

	SMALL FARMER		MEDIUM FARMER		LARGE FARMER	
	Pre- inv.	Post- inv.	Pre- inv.	Post- inv.	Pre- inv.	Post- inv.
No. of farmers	3	3	3	3	2	2
Average holding (ha) per farmer	1.61	1.61	2.79	2.79	13.45	13.45
Area under cropping (ha)	4.64	8.04	9.40	11.80	23.70	23.70
Increase in cropping intensity (%)	—	73.27	—	25.53	—	—
Net income (Rs.)	6345	15847	8150	25720	37992	60845
Net income (Rs.) per farmer	2115	5282 (149.74)	2717	8583 (215.90)	18996	30422 (60.15)
Net income per hectare of cropped area (Rs.)	1367	1971 (44.18)	867	2179 (151.32)	1603	2567 (60.13)
Net incremental income per farmer (Rs.)	—	3167	—	5856	—	11426
Net incremental income per hectare of the holding (Rs.)	—	1967	—	2098	—	850

The detailed break-up of cultivation expenses incurred on individual crops by these farmers into different components such as on (i) labour (ii) seeds (iii) manures and fertilisers and (iv) others including farm-power, pesticides etc. revealed that there has been an appreciable rise in these expenses.

In case of small farmers, it has been observed that the change in the cropping pattern and adoption of improved methods of cultivation involving inputs of production have resulted into higher investment on fertilisers, pesticides and farm-power in respect of crops such as groundnut, horsegram, ragi and jowar. The investment on labour is also appreciable. The investment on labour due to intensive methods of cultivation has simultaneously increased employment opportunities for labour in case of groundnut crop and horsegram by 9 mandays and 3 mandays per hectare respectively. The introduction of new crops viz. ragi and hybrid jowar under irrigated conditions has created employment opportunities to the extent of 100 to 103 mandays per hectare.

The medium farmers have intensified the cropping under Kharif jowar, paddy, mulberry and pulses through improved package of practices and introduced new crops such as groundnut, sugarcane and ragi. The data revealed that while there has been appreciable rise in the cost structure on the use of seeds, manure fertilisers and farm-power, the increase in the investment on labour has created increased employment opportunities by 7 mandays in kharif jowar, 14 mandays in paddy, 7 mandays in pulses and 200 mandays in mulberry crop (concoons) per hectare. The introduction of crops has also generated employment opportunities of the order of 40 mandays in ragi crop under irrigated conditions.

The large farmers have adopted intensive methods of cultivation in case of mulberry crops and introduced sugarcane crop. There has been significant investment on manures, fertilisers and pesticides farm-power in case of mulberry crop. While mulberry crop has generated additional labour of the order of 260 mandays, the sugarcane crop created employment for 150 mandays per hectare.

TABLE No. - 20

INVESTMENT ON LABOUR, SEEDS, FERTILISERS, FARM-POWER, ETC.

(Rs./Hectare)

	Groundnut		Horsegram		Ragi		Jowar (Rabi)					
	Pre	Post	Pre	Post	Pre	Post	Pre	Post				
Small Farmers												
Labour	130	190	60	80	—	8000	—	820				
Seeds	50	60	10	10	—	38	—	80				
Manures, fertilisers	40	75	—	10	—	400	—	600				
Others	30	91	—	6	—	240	—	437				
Total	250	416	70	106	—	1478	—	1937				
	Jowar (Kharif)		Mulberry		Pulses		Groundnut		Sugar cane		Ragi (Rabi)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Medium Farmer												
Labour	350	400	750	850	222	2600	2000	250	—	375	—	1585
Seeds	45	61	50	75	—	—	30	39	—	70	—	1000
Manures, fertilisers	150	200	600	660	200	1512	60	80	—	250	—	2165
Others	200	300	600	700	100	1000	51	40	—	380	—	500
Total	745	961	2000	2285	522	5112	341	409	—	1075	—	5250
			Jowar		Mulberry		Sugar cane					
	Pre	Post	Pre	Post	Pre	Post	Pre	Post				
Large Farmers												
Labour	450	450	600	3250	—	—	—	1500				
Seeds	50	50	—	—	—	—	—	850				
Manures, fertilisers	250	250	650	1800	—	—	—	2000				
Others	177	203	250	1200	—	—	—	900				
Total	927	953	1500	6250	—	—	—	5250				

It has, however, been observed that though these farmers have adopted improved methods of cultivation as also high-yielding seeds/hybrids, manures, fertilisers, pesticides, etc. the investment made/ expenditure incurred on the cultivation of crops is not related to the actual cost of cultivation as warranted under scientific cultivation of various crops. In fact, while the average cost of cultivation in case of groundnut, horsegram and pulses incurred by the farmers is lower than the actually worked out, the cost of cultivation in respect of Ragi, jowar (Hybrid) and paddy is higher than the actually required. In case of mulberry, jowar and sugarcane there is not much variation. It is, further, revealed that the loan facilities requested by the farmers and sanctioned by the Bank were not on the line as recommended by the farm scientists. Of the eight farmers under study, only four had been sanctioned crop-loans varying from Rs. 1000 to 5500. Thus in three cases the loans were less than the actually required for raising the crops on scientific lines. Other four farmers did not request for loan but managed from their own resources. It was evident that while two large farmers were able to meet out of their own resources, the small and medium farmers would have been guided properly by the extension agency of the government and the field staff of the Bank. Also, the cost of cultivation of crops should be decided after the analysis of the soil as the nutrient status of the soil should be worked out and the deficiencies of the elements be met through the organic manures and chemical fertilisers. This has therefore focussed attention on the urgent need for soil-analysis and advising the farmers to incur expenditure on the cultivation of crops involving inputs as determined by the farm scientists. Also, the field staff of the Bank should help farmer in this respect by sanctioning the crop-loans as warranted by the improved methods of cultivation and his capacity to invest from his own resources. In case, he is financed less, he would borrow from other sources and his repaying capacity would be jeopardised. In case he does not borrow, the yield/productivity of the crops would not be as anticipated in the project and thereby he will not benefit.

Assets :

The analysis of the data presented in Table No. 21 on the Assets held by the farmers in the pre-investment period and subsequently acquired/improved in the post-investment period revealed that there has been a marginal improvement in the acquisition of assets viz. house, durables, and farm implements. While the small farmers have improved their assets viz. house and durables by 3.96 per cent and 33.33 per cent respectively, the medium farmers improved these assets by 7.48 per cent and 25.00 per cent respectively. In case of large farmers, only one farmer has substantially invested on the purchase of durables. It is observed that small and medium farmers are very eager to improve their assets. However, it depends upon their increased net-return, increased saving and investment capacity, which may be very meagre in the initial years. The same would, however, increase in the course of time when they would fully adopt improved technology and acquire better knowledge and skill to manage the resources — land, water and livestock —efficiently.

TABLE NO. — 21

ASSETS PER FARMER DURING PRE-INVESTMENT AND POST-INVESTMENT PERIOD

(Value in Rupees)

Assets	Small Farmer		Medium Farmer		Large Farmer	
	pre- investment	post- investment	pre- investment	post- investment	pre- investment	post- investment
House	8330	8660 (3.96)	22330	24000 (7.48)	67500	67500
Durables	1500	2000 (33.33)	4000	5000 (25.00)	15000	26000 (73.33)
Livestock	2660	2330	4660	4660	18000	18000
Land	4025	5300 (31.68)	6975	8150 (16.84)	33625	35825 (6.52)
Farm Implements	1660	1660	4000	4000	10000	12000
Total	18175	19950 (9.76)	41965	45810 (9.16)	144125	159325 (10.54)

Figures in parentheses indicate percentage increase over corresponding figure.

CHAPTER NO. 5

CRITICAL ASSESSMENT OF THE SCHEME

The study has revealed that the electric connection has so far not been given in two cases with the result that the electric pumpsets purchased in the year 1973 and 1974 have been lying idle and investment made for sinking of wells as also for the purchase of pumpsets has been unfruitful. In such cases, the disbursements should not have been allowed unless the Electricity Board has committed to provide connection in a reasonable period. The matter should have been pursued vigorously at the D.C.C. meeting convened by the Lead Bank as also independently with the Electricity Board and the Government administration. If there are no prospects of getting the connection, the farmers should be advised to switch-over to diesel pumpsets and endeavour to irrigate the land for which wells have been sunk.

In one case for which loan was disbursed in 1974 the well did not strike water. The well had been abandoned. Such instances are, though, very rare need to be studied in-depth by the Directorate of the Groundwater and the Government in order to determine the scope and extent to which water would be struck in case they are deepened/bored. If no possibility is in sight, the expenditure incurred by the farmer should be re-imbursed from some source. This has to be done since under Agricultural Credit projects all over the country, a large number of wells are sunk/being sunk with huge outlays.

There has been considerable delay in sanctioning the proposal ranging from 84 to 269 days in four cases. The reasons so far advanced by the Bank relate to (i) individual cases coming from a village which is located far away from the Bank (30 to 38 Kms.) which made the pre-sanction scrutiny operationally difficult (ii) inadequate information furnished by the applicant, especially the completion of the documents. In all these cases the disbursement of first instalment has been made on the very day of the sanction of the loan proposals. Thus, the borrowers took considerable time in executing the documents.

The loan amount in all the eight cases under study has been disbursed in suitable instalments varying from 2 to eleven. The purpose of releasing in instalments was to verify the progress made and the utilisation of the credit. However, at every time of disbursement, verification of the progress in all the cases has not been personally done by the field staff because of the longer distance.

The intervening period between the first and the last disbursement in five cases was from 108 to 292 days. Indirectly this period is indicative of the completion of work. This much delay in executing the work has been attributed by the farmers and the field staff to the factors (i) interruption of work due to monsoon rains. While sinking of wells during monsoon helps farmers dig the well easily as also farm-families are available to do this work, it is not advisable since there are chances of landslides, extra cost in removing the rainwater accumulated in the pit, construction material is not available and its transport/storage add to the costs. The correct estimates of cost incurred is difficult to be arrived at.

Had the field visits been properly planned, the progress of the work under execution would have monitored effectively and the investment might not have remained idle for sometime. This would have also helped to secure additional lending under other schemes in these villages. It would have been worthwhile, and even it could be done now, to find out the feasibility of additional wells, density and spacing between two wells in close co-ordination with the Directorate of the Ground Water survey. This would help Bank to expand its lending operations in this field as also for crop cultivation and other allied activities. This would inturn improve the viability of lending operations and help large number of farmers who could be followed up and effectively supervised.

The studies have revealed that the variation between the figures of the loan amount requested by the farmers and the amount sanctioned by the Bank in all the cases except one is considerable. This is mainly attributed to the reasons that correct estimates on the cost-structure of digging wells, installation

charges of the pumpsets, construction of pump-house, land-development works etc. for which the farmers requested for loan were neither available nor worked out on scientific basis. It is this area where the support from the civil Engineers of the Government Department is very much crucial. In fact, the estimates of these works should be worked out scientifically on a continuing basis so that farmers can be guided to invest that much amount which is only necessary.

While in all the cases except one the yield of water in wells was reported to be adequate, the farmers were not able to correctly indicate the water-column maintained during different periods—monsoon, winter and hot-weather seasons. In fact, how much area could be irrigated from the existing water level on a continuous running of the electric pumpsets as also time taken to recharge it in different seasons is important to determine the cultivation of irrigated crops and introduction of new cropping pattern. The adequacy of water as reported by seven farmers may have to be viewed from the point of view of raising/introducing multiple-cropping system instead partially irrigating some area in monsoon when there is long spell between two showers or irrigating some rabi crops. For this purpose, they have to be guided by the subject matter specialists/Agronomists/irrigation specialist.

The analysis of the data on the loan amount requested, disbursed and actual utilisation has revealed that in four cases the amount of loan disbursed is a little less than the actual costs incurred by the farmers. This higher costs include the labour put up by the farmer and some margin money to be met by the farmers. However, all these four farmers had requested for loan amount more than the actual costs incurred. While in two cases the actual costs incurred by the farmers were a little higher than that requested by them, in one case it was substantially on higher side. The reasons for this much variation could be attributed to (i) no scientific estimates were prepared for various types of works involving engineering aspects (ii) time elapsed between the commencement and completion of the work (iii) lack of effective supervision and guidance on account of longer distance from the branch.

The cost of creating irrigation facilities over an area of one hectare on an average worked out to Rs. 9865 which seems to be reasonable in this area. However, the study reveals that while in the case of small farmers the area brought under irrigation ranged from 66.66 per cent to 100 per cent, the area brought under irrigation by the medium farmers varied from 54.40 per cent to 65.68 per cent and that of large farmers varied from 13.04 per cent to 18.08 per cent. This has focussed the attention of the farmers especially the medium and large farmers to the fact that water and electricity are too costly now a days and as such they have to be judiciously utilised. They should be continuously demonstrated and guided to adopt the scientific methods of application of irrigation, after-care and maintenance/efficient running of pumpsets. The net effect of these innovations would be that the area under irrigation and irrigated crops would increase and the cost of electricity consumption and maintenance cost of the pumpsets would be reduced appreciably.

The cropping intensity has been increased by 73.27 per cent in case of small farmers and 25.53 per cent in case of medium farmers. These farmers because of their limited holdings endeavoured to intensify the cropping and utilise the available resources—land and water—at their command to the best of their knowledge. However, the large farmers have not intensified their cropping to any extent at all because they possessed on an average 13.45 hectares of land. It was anticipated that the cropping intensity would increase by 33 to 50 per cent on an average. It is observed that though the command area of the well is limited to irrigating 1.31 hectares for small farmers, 1.65 hectares for medium farmers and 2.20 hectares for large farmers, the small farmers would have increased area under irrigation as also brought some area under high-value crops viz. mulberry, which the medium and large farmers did. The small farmers need more attention and guidance in respect of irrigation technology.

The productivity of various crops during the post-investment period as compared to that anticipated under the scheme was by and large appreciable except that of groundnut and horsegram in case of small farmers, pulses in case of medium farmers; and mulberry and sugarcane crops in respect of large farmers. This is due to the fact that while all the farmers have adopted use of high yielding seeds and fertilisers, only four farmers secured crop-loans for raising their crops and others managed out of their own resources which

were not adequate to meet the additional requirements as warranted by the recommended practices. Also, none of the farmers except one had laid out systematic field channels for efficient water use. A farmer while practising irrigated farming should have sound knowledge on the subject of soil-water-plant relationship for optimising the production, productivity and returns.

The findings showed that except in case of medium farmers who have raised paddy and jowar, the net return per rupee investment has been less during the post-investment period over the pre-investment period. Thus though the per hectare productivity of these crops has increased because of the investment made in the creation of irrigation facilities, the rate of return realised from the sale of produce has not been commensurate with the rate of investment made on raising the crops. This fact emerges from the analysis of the data presented in Table No. 17. These facts bring to the surface that the farmers may have to be guided by the technical experts in the cultivation of crops with emphasis on the higher rate of return per rupee investment on the use of organic manures, chemical fertilisers, irrigation, farm-power etc. The quality of water and soil has to be frequently tested to determine their response to different crops and additional requirements of plant nutrients. This points to the need for strengthening the research base in the Agricultural Research station and popularising the methods of cultivation etc. amongst the farmers.

The net incremental income increased per hectare of holding was Rs. 1,967, Rs. 2,098 and Rs. 850 in case of small, medium and large farmers, respectively. This fact points out that the higher net incremental income secured by the small and medium farmers than that by the large farmers during the post-investment period is principally due to the increased cropping intensity. There has not been any increase in the cropping intensity in case of large farmers as against 73.27 per cent and 25.53 per cent in respect of small and medium farmers respectively.

The analysis of the data on the investment made on cultivation of crops showed that it was not related to the actual cost of cultivation as warranted by the scientific cultivation practices. While the average cost incurred in case of groundnut, horsegram and pulses by the farmers was lower than the actually required, the cost incurred in respect of ragi, jowar (hybrid) and paddy was higher than the actually required. It was further revealed that the loan facilities requested by the farmers and that sanctioned by the Bank were also not on the line as warranted by the scientific cultivation practices. Of the eight farmers, only four were sanctioned crop-loans varying from Rs. 1,000 to Rs. 5,500. In three cases the loans sanctioned were less than the actually required for raising the crops on scientific lines. Other four did not request for loans but managed from their own resources. It was evident that while two large farmers were able to meet out of their own resources, the small and medium farmers would have been guided properly by the extension agency of the Government and the field staff of the Bank. Also, the cost of cultivation of crops should be worked out on the basis of soil analysis report.

SUMMARY

The agrarian economy of the twelve villages where Bank has provided finance of the order of Rs. 3,95,000 to 145 farmers, landless labourers and others for various purposes is predominantly dependant upon the monsoon rains. The agro climate is quite suitable for the successful cultivation of a wide variety of crops — paddy, jowar, sugarcane, mulberry, vegetables etc., which under appropriate scientific technology can yield rich, dividends to the farmers and provide wages to the farm labourers.

The output of various crops and productivity of all these crops per unit area could be increased substantially if irrigation facilities are created through various sources. Accordingly, for the development of irrigation potential, 14 farmers were sanctioned investment credit to the extent of Rs. 1,55,500. Of these, five farmers were small, six were medium and three were large farmers. These farmers were assisted for various purposes viz., for sinking of new wells, renovation of old wells, installation of electric pumpsets, construction of pumphouses. Construction of delivery tank, field channels, undertaking land development works and for cultivation of crops.

An evaluation study was therefore planned to determine the nature and extent to which these farmers have benefited during the post-investment period. A detailed study was therefore confined to eight cases, of which three were small farmers, three were medium farmers and two were large farmers. It was observed that while four proposals were considered within 18 to 43 days, there was considerable delay ranging from 84 to 269 days in other four cases. It was further observed that the time elapsed between the first and the last disbursement varied from 38 to 63 days in three cases and from 108 to 292 days in other cases. The reasons for this could be attributed to the scattered lending in villages far away from the branch (30 to 38 kms.) which impeded effective supervision, follow-up etc.

This area presents favourable factors for financing for various purposes and with the close co-ordination of the Groundwater Survey Department, Government Department and Panchayat Institutions more efforts needed to be made to find out the groundwater potential, density and spacing between two wells for additional irrigation wells. This would have helped to expand the lending operations and cover large number of farmers. In the ultimate analysis the viability of the lending operations would have improved. Even this could be done now.

The variation between the amount of loan requested by the farmers and that sanctioned by the Bank in all the cases except one was considerable (5 to 150 per cent). This was mainly attributed to the reasons that correct estimates on cost structures of digging wells, construction of pumphouses, land development works, etc. were neither available with Government offices nor worked out scientifically.

The study on the loan amount disbursed and the actual utilisation/investment further revealed that in four cases the amount of loan disbursed was a little less than the actual costs incurred by the farmers. This higher costs included the labour put up by the farmers and some margin money met by them. However, in one case, the cost incurred by the farmer is substantially higher than that disbursed. The reasons for this were the lack of data of correct estimates of civil works as also lack of supervision and follow-up to verify the end use of credit at every stage of disbursement.

The total depth of the well was in the range of 16' to 50'. In one case the well did not yield adequate water even at a depth of 35' and so it was bored upto 76'. However, at this depth of boring also it did not yield adequate water. In all other cases the yield of water as reported by the farmers was adequate. The height of the water column in the post-winter period at the time of interview was in the

range of 4' to 6' in four cases and 12' to 15' in three cases. The quality of water was also good. The farmers were however, not able to correctly tell the water-level maintained during different periods — monsoon, winter and hot weather season. In fact, how much area could be irrigated during each season is important to determine the intensity of cropping. Thus, these data should be recorded on a continuing basis for which guidance be given to them by the extension agency and the field staff.

The area brought under irrigation in case of small farmers ranged from 66.66 per cent to 100 per cent, where as in case of medium farmers it varied from 54.60 per cent to 65.68 per cent and in case of large farmers it was from 13.04 per cent to 18.08 per cent. However, the average command area of the well was 1.31 hectares, in respect of small farmers, 1.65 hectares in case of medium farmers and 2.20 hectares in case of large farmers. With the judicious use of water as per the improved methods of irrigating different crops, the command area can be increased by 20 per cent from the present level. The average cost per hectare worked out to Rs. 9,387, Rs. 9,792 and Rs. 10,372 under corresponding category of the farmers. The variation in the cost structure is because of the variation in the magnitude of the work — earth work and civil works — executed by the farmers.

While *kharif* cropping intensity in case of small farmers increased by 31.05 per cent, the increase in *rabi* cropping intensity was very much spectacular (169.01 per cent). These farmers introduced ragi in *kharif* and hybrid jowar in *rabi* season. The medium farmers increased their *kharif* and *rabi* cropping intensity by 27.82 per cent and 20.47 per cent respectively. These farmers utilised irrigation facilities to irrigate hybrid, jowar, sugarcane, and mulberry crops which gave good returns. In case of large farmers the cropping intensity did not witness any change. However, irrigation facilities were utilised for irrigating mulberry and sugarcane crops which have paid rich dividends. In fact, mulberry is a labour intensive and a cash crop, which should now find a place in the fields of small farmers.

The productivity of groundnut crop and horsegram which small farmers used to cultivate during the pre-investment period has increased from 6.66 quintals per hectares to 10.00 quintals per hectare (50.15 per cent) and from 3.52 quintals to 5.63 quintals per hectare (59.94 per cent) respectively in the post-investment period. In case of medium farmers the per hectare productivity of jowar and paddy increased from 13.54 quintals to 22.03 quintals (62.70 per cent) and from 50.00 quintals to 57.14 quintals (14.28 per cent) respectively. While the productivity of jowar in case of large farmers increased very little, the productivity of mulberry crop increased considerably from 2.50 quintals to 7.50 quintals of cocoons per hectare.

In the ultimate analysis the results showed that the out-put of food crops has gone up by 181 quintals (266 per cent) from 68 quintals in case of three small farmers and by 54 quintals (46.96 per cent) from 115 quintals in case of three medium farmers during the post-investment period. The interesting feature of the investment was that the production of jowar which is considered to be the principal staple crop of this area has increased by 101 quintals (17.47 per cent) despite the fact that the area under jowar declined from 26.75 hectares to 26.33 hectares in the post-investment period.

The analysis of the data on the net return per rupee investment revealed that except in the case of medium farmers who cultivated paddy and hybrid jowar, the net return per rupee investment was less during post-investment period over the pre-investment period. Thus, though the per hectare productivity of these crops increased because of the investment made in the creation of irrigation facilities, the rate of return realised from the sale of produce has not been commensurate with the investment made on raising the crops. These facts point to the need for providing technical guidance to the farmers in respect of judicious use of inputs including seeds, manures, fertilizers, irrigation, pesticides and farm-power. The research farm of the Government as also operational research programme should demonstrate this point to the farmers on their fields on the basis of proven technology.

The study of the data on the net incremental income during the post-investment period revealed that while the small farmer secured Rs. 3,167 as the net incremental income, the medium and large farmer obtained net incremental income of Rs. 5,856 and Rs. 15,266 respectively. However, net incremental income per hectare of holding in respect of small, medium and large farmer worked out to Rs. 1,967, Rs. 2,098 and Rs. 850 respectively. This much variation in the figures of net incremental income is attributed to the varying degree of increased cropping intensity, the productivity and value of the crops.

The investment made in the creation of irrigation facilities has further brought changes in the investment pattern on the use of inputs and employment of labour for cultivation of various crops. In case of small farmers, appreciable investment has been made on fertilizers, pesticides, farm-power and labour in respect of crops such as groundnut, horsegram, ragi and jowar. While the investment on labour due to intensive methods of cultivation has simultaneously increased by 9 mandays in case of horsegram, the introduction of new crops, viz. ragi and hybrid jowar under irrigated conditions created employment opportunities of the order of 100 to 103 mandays per hectare. In case of medium farmers, the investment has created labour employment opportunities by 7 mandays in *kharif* jowar, 14 mandays in paddy, 7 mandays in pulses and 200 mandays in mulberry crop per hectare. Introduction of new crops of groundnut, ragi and sugarcane has generated labour employment for 40,100 and 150 man-days per hectare. In case of large farmers, the labour employment generated was 150 mandays in case of sugarcane and 200 mandays in case of mulberry crop per hectare.

On the basis of the findings reported in this manuscript, following are the concrete suggestions/recommendations to improve the return on the investment made by the farmers with the help of Bank loan as also improve the viability of the lending operations of the Bank in these far-off villages.

1. The electric connection should be provided to those borrowers who have been disbursed loans in 1973 and 1974 and have already dug wells as also purchased electric motors. If this is not possible they may be assisted for installation of diesel pumpsets so as to help them irrigate their fields and increase output and income. Efforts should be made to co-ordinate with Directorate of Ground-water survey, Karnataka State Electricity Board and concerned Government officials for the purpose of ascertaining the feasibility of additional wells, possibility of extending electric connections in these villages etc. If so a time-bound programme should be prepared for this purpose which would help the Bank to expand its lending operations in these 12 villages which are far away from the Branch (6 to 44 kms) and facilitate supervision as also follow-up operations.
2. With the help of Ground Water Survey Department, the cases in which the water has not struck at all as also where water is inadequate should be examined for possibility of deepening to get adequate water.
3. The field staff of the Bank with the help of Government officials should plan the field visits in such a way as can help the Bank dispose off the loan applications, disburse the loan amount and supervise the end-use of credit as speedily as possible.
4. The Government officials in the Public Works Department/Irrigation Department/Soil-Conservation Department/Deputy Engineers (Civil) with the Panchayats or Development Department should assist the Bank in working out the cost estimates of various works viz. digging/renovating old well, construction of pump house, laying out of field channels, levelling the fields, etc. so that financial feasibility of the loan proposals could be scientifically established and the farmers secure credit facilities as warranted by the scientific estimates. If this is done, the farmers cannot be under-financed or over-financed.

5. The farmers should be assisted by the technical staff for recording the water-levels in different seasons and growing those crops in accordance with the availability of water in the wells during *kharif*, *rabi* and hot-weather seasons. They should also be guided for the analysis of water and soil to determine the worthiness/ response to specific crops. The soil-analysis will help them reduce the cost of cultivation also.
6. As the irrigation water, inputs and electricity are very costly now-a-days, farmers should be properly and continuously guided in respect of judicious use of these costly inputs, so as to optimise the rate of return per rupee investment on these inputs. Periodical training programmes, field-demonstrations should be held by the Government/Panchayat institutions.
7. The small farmers and medium farmers can, under proper guidance, increase their area under irrigation by 20 per cent. The small farmers should be advised and helped for raising crops of labour-intensive and high economic value — mulberry, etc.